

# **Sustainable Urban Mobility in South-Eastern Asia and the Pacific**

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## Contents

<b>1. The Crisis of Sustainability in Urban Mobility: The Case of South-Eastern Asia and the Pacific .....</b>	<b>1</b>
1.1. Introduction .....	1
1.2. Scope definition .....	1
1.3. Crisis in urban transportation .....	1
<b>2. Non-Motorized Transport.....</b>	<b>3</b>
2.1. Brief overview.....	3
2.2. Trends and conditions .....	4
2.3. Impacts and challenges .....	6
<b>3. Public Motorized Transport .....</b>	<b>8</b>
3.1. Brief overview.....	8
3.2. Trends and conditions .....	9
3.3. Impacts and challenges .....	12
<b>4. Informal Motorized Transport.....</b>	<b>14</b>
4.1. Brief overview.....	14
4.2. Trends and conditions .....	16
4.3. Impacts and challenges .....	16
<b>5. Private Motorized Transport.....</b>	<b>19</b>
5.1. Brief overview.....	19
5.2. Trends and conditions .....	21
5.3. Impacts and challenges .....	22
<b>6. Commercial Goods Transport.....</b>	<b>23</b>
6.1. Brief overview.....	23
6.2. Trends and conditions .....	23
6.3. Impacts and challenges .....	25
<b>7. Land-use and Transport Planning .....</b>	<b>27</b>
7.1. Brief overview.....	27
7.2. Trend and conditions.....	27
7.3. Impacts and challenges .....	30
<b>8. Social Sustainability of Urban Transport.....</b>	<b>32</b>
8.1. Brief overview.....	32
8.2. Policies, programmes and practices .....	33
8.3. Challenges .....	36
<b>9. Urban transport and the environment.....</b>	<b>37</b>
9.1. Brief overview.....	37
9.2. Policies, programmes and practices .....	38
9.3. Challenges .....	41
<b>10. The Economics of Sustainable Urban Transport.....</b>	<b>43</b>
10.1. Brief overview.....	43
10.2. Policies, programmes and practices .....	45
10.3. Challenges .....	48

<b>11. Urban Transport Institutions and Governance .....</b>	<b>50</b>
11.1. Brief overview .....	50
11.2. Policies, programmes and practices .....	51
11.3. Challenges .....	53
<b>12. Towards Sustainable Urban Transport .....</b>	<b>55</b>
12.1. Introduction .....	55
12.2. Need for action .....	55
12.3. Concluding remarks .....	57
<b>List of References .....</b>	<b>58</b>

## List of figures

Figure 1. Non-motorized mode in mixed modes of transport in Siem Reap, Cambodia.....	3
Figure 2. Bicycle parking facilities at mass rapid transit station in Singapore.....	4
Figure 3. Pedestrian crossing system with electronic timer display in Singapore.....	5
Figure 4. Bangkok overhead sky-train, Thailand.....	9
Figure 5. Metro Rail Transit (MRT-3) at Metro Manila (the Philippines) .....	10
Figure 6. Bus on Bangkok street (Thailand).....	11
Figure 7. Bus Rapid Transit System in Bangkok, Thailand .....	12
Figure 8. Integrated ticketing system between the MRT and buses in Singapore.....	13
Figure 9. <i>Tuk tuks</i> in Vientiane, Laos .....	15
Figure 10. <i>Jeepneys</i> used as cheaper form of taxi in Bangkok, Thailand.....	17
Figure 11. Motorcycles in Ho Chi Minh City, Viet Nam .....	19
Figure 12. High proportion of motor cycle traffic at Bangkok streets (Thailand).....	20
Figure 13. Traffic congestion on a Bangkok street (Thailand).....	21
Figure 14. Motor-cycle converted to goods van in Ho Chi Minh City, Viet Nam .....	24
Figure 15. Integrated bus interchange and commercial complexes at Boon Lay MRT station, Singapore .....	29
Figure 16. Safety helmet laws are not strictly followed in Ho Chi Minh City, Viet Nam .....	32
Figure 17. Security system at Singapore buses.....	34
Figure 18. Real-time bus arrival information displayed at a bus stop in Singapore.....	35
Figure 19. Car free day at Jakarta, Indonesia.....	36
Figure 20. Increased number of cars affecting the urban environment of Kuala Lumpur, Malaysia.....	38
Figure 21. Variable Message Sign (VMS) in Singapore .....	39
Figure 22. Integrated bus hub in Kuala Lumpur, Malaysia .....	44
Figure 23. Ticketing area of integrated bus hub in Kuala Lumpur, Malaysia.....	45
Figure 24. Electronic road pricing system in Singapore.....	47

## List of acronyms

BTS	Bangkok Mass Transit System Public Company Ltd. (Thailand)
dB	decibel (unit of noise level)
GDP	gross domestic product
PM	particulate matter
S\$	Singapore dollar
US	United States of America
US\$	US dollar



# 1. The Crisis of Sustainability in Urban Mobility: The Case of South-Eastern Asia and the Pacific

## 1.1. Introduction

Transport is the backbone of a country or an economy and it is even more critical in the urban areas where most of the population lives and works and where the engines of the economy reside. However, in recent years, sustainability concerns over urban developments have called for transportation policies, plans and operating systems to be reviewed and justified in terms of sustainability goals.

## 1.2. Scope definition

This study aims at making an inventory of the issues and practices related to urban transport sustainability in South-Eastern Asia and Pacific. In this study, the urban transport policies and systems of 33 countries in the region are examined. The study will identify the facts, trends and issues in modal, infrastructural, environmental, economic, social and institutional sustainability along with initiatives and instances of success and failure.

For the purpose of this study, the 33 countries are broadly classified as 11 countries in South-Eastern Asia<sup>1</sup> and 22 in the Pacific.<sup>2</sup> In general, the countries of the first category are those with higher gross domestic product (GDP) and experience high urban growth, while those in the second have lower GDP with varying degrees of urbanization but with some urban growth potential.

## 1.3. Crisis in urban transportation

Globally, more people are living in urban areas and this is no different in the region. The rate of urbanization is particularly rapid in emerging economies in South-Eastern Asia. For example in Viet Nam, the population in urban areas has increased from about 20 per cent in 1995 to more than 30 per cent in 2009.<sup>3</sup> Urban development is supported and facilitated by transport infrastructure development and many cities in South-Eastern Asia have committed hundreds of billions of dollars to build transport infrastructure and systems in the next decade. For example, the US\$5 billion subway network in Ho Chi Minh City (Viet Nam) is under construction<sup>4</sup> and the US\$4.5 billion toll road around Jakarta (Indonesia) will begin construction in 2011.<sup>5</sup> However, while many of these developments are planned to meet the current needs of the population, they may not ensure that the needs of future generations can be met with the same level of quality.

Problems caused by the dependence on motorized vehicles, especially private cars and motorcycles, as the primary mode of travel within the urban areas and the provision of transportation infrastructure to support these motorized modes are already evident in the

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1. Brunei Darussalam, Cambodia, Democratic Republic of East Timor, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam.

2. American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands.

3. Viet Nam News, 2010a.

4. ADB, 2006.

5. Primanita, 2010.

region. Congestion in Metro Manila (the Philippines) costs 4.6 per cent of its GDP,<sup>6</sup> 14,000 tons of particulate matter are emitted from road vehicles each year from Bangkok streets<sup>7</sup> (Thailand) and road accidents cost is 0.5 per cent of GDP in highly-efficient Singapore.<sup>8</sup> Environmental impacts not only affect the individual country but also contribute to global climate change leading to adverse consequences felt worldwide. The economic costs not only exact a burden on the present generation but also commit the future generations to long-term debts, which may eventually have a global effect on growth. There are also serious concerns over issues of social inequality, health and loss of quality of life.

In recognizing the adverse consequences, many developed countries have embraced sustainable transportation development in an attempt to address the urban malaise and reverse the trend. This report documents the current status of the transportation systems in South-Eastern Asia and the Pacific and identifies some of the policies, programmes, solutions and practices that contribute towards urban transportation development. It also highlights some of the difficulties experienced when sustainable programmes were adopted and provides some suggestions on the way forward in making the region more effective in pursuing the sustainability agenda.

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6. UNCRD, 2008d.  
7. Juntarawijit, 1998.  
8. Chin, 2003.



## 2. Non-Motorized Transport

### 2.1. Brief overview

Non-motorized transport does not damage the environment directly and is a healthy form of transport. In South-Eastern Asia countries, there exists a wide variety of non-motorized transport modes such as walking, bicycles, *calesas*, pedicabs, cycle-rickshaws, tricycles, *cyclos* and *becaks*. In Vientiane (Laos), walking and cycling represented 20 per cent modal share in 2007<sup>9</sup> while in Bangkok (Thailand), 14 per cent trips were made by walking and non-motorized vehicles.<sup>10</sup> In Goroka city (Papua New Guinea) the majority of the population walk daily to their place of work.<sup>11</sup> In major cities like Bangkok, Manila (the Philippines), Jakarta (Indonesia) and Kuala Lumpur (Malaysia), non-motorized trips accounted for fewer than 30 per cent of total trips in 1996.<sup>12</sup>

One common non-motorized transport mode in this region is the tricycle or *cyclo*, found in urban areas of Myanmar, Thailand, Indonesia, the Philippines, Viet Nam and Cambodia. Known as pedicabs in Metro Manila (the Philippines), they operate through narrow streets and routes where *jeepneys* and buses are not allowed to operate.<sup>13</sup> In 1990, there were around 5,500 pedicabs in Metro Manila. In downtown Metro Manila, there is also the horse-drawn carriage locally called as *calesa* or ‘*tartanillas*’ in Barangay Tambacan.<sup>14</sup> Like pedicabs, they serve short-distance trips and are hired to haul goods. In 2000, *calesas* made up 16 per cent of all road traffic in the Chinatown area of Metro Manila.<sup>15</sup>

Figure 1. Non-motorized mode in mixed modes of transport in Siem Reap, Cambodia



Photo: by author.

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9. UNCRD, 2008a.
  10. ERIA, 2008.
  11. UN-HABITAT, 2010a.
  12. Hook and Replogle, 1996.
  13. World Bank, 2010f.
  14. World Bank, 2010f.
  15. Cervero, 2000.

Indonesia's version of pedicabs, called '*becaks*', operate in all urban areas and can form a sizeable part of the vehicle population.<sup>16</sup> For example, in Bandung, Indonesia's second largest metropolitan area, there were 4,845 *becaks* in 2004, making up 33 per cent of all transport modes.<sup>17</sup>

In Myanmar, non-motorized vehicles are widely used in Yangon and the suburbs, and bicycles are common in Mandalay although their use in the central business district is limited to the day time.<sup>18</sup>

Bicycles are not registered in many countries because there are usually no rules governing their use. Consequently the exact number of bicycles may not be known and seldom reported, for example, there is no official register in Bandung (Indonesia).<sup>19</sup>

In the Pacific islands, non-motorized transport is common largely because of poor public transport services. Bicycles are popular on many islands, e.g. in Wallis and Futuna<sup>20</sup> and there are even bikes and pushbikes for hire, usually for tourism purposes. In Cook Islands, bikes and helmets hire are available even from car-rental companies.<sup>21</sup>

## 2.2. Trends and conditions

There is no general trend on the growth of non-motorized transport. Some cities are encouraging non-motorized transport as a green and sustainable alternative for short-distance travel while some others are discouraging these usually for safety and efficiency reasons. Jakarta (Indonesia) has banned *becaks* in the city in the 1970s and has attempted to widen the ban elsewhere.<sup>22</sup> Similar restrictions were imposed on Indonesia's secondary cities, where the

Figure 2. Bicycle parking facilities at mass rapid transit station in Singapore



Photo: by author.

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16. Cervero and Golub, 2007.
  17. Joewono and Kubota, 2005.
  18. UNCRD, 2008e.
  19. Joewono and Kubota, 2005.
  20. Lonely Planet, undated c.
  21. Lonely Planet, undated b.
  22. Hook and Replogle, 1996.

Figure 3. Pedestrian crossing system with electronic timer display in Singapore



Photo: by author.

*becak* was far more important, accounting for up to 30 per cent of the mode share.<sup>23</sup> Viet Nam has also banned tricycles nationwide since 2008 because they were considered obsolete and unsafe and hindering the flow of traffic.<sup>24</sup>

However, in Phnom Penh (Cambodia), the number of non-motorized vehicles has increased from 150,000 in 2005 to 220,000 in 2006, giving almost 50 per cent per annum increase rate.<sup>25</sup> In fact, Vientiane (Laos) plans to increase walking and cycling from 200,000 trips in 2007 to 300,000 by 2025 with an annual growth of 2.3 per cent while motorcycles and cars have been targeted to grow at a slower rate of 1.1 per cent and this rate for public motorized transport is 16.3 per cent.<sup>26</sup> Similarly Chiang Mai (Thailand) under the Sustainable Urban Transport Project aims to improve non-motorized transport.<sup>27</sup> The city of Udon Thani<sup>28</sup> (Thailand) is promoting cycle rickshaws as an environment friendly alternative to car usage.

Despite the problems associated with non-motorized vehicles (see section 2.3), many consider them a useful mode,<sup>29</sup> especially for women, students and low-income earners. For example in Bandung (Indonesia), 36 per cent of *becak* users make trips to market on them and 62 per cent regard them as comfortable. Some 81 per cent of them go to the extent of wanting a special lane for *becaks*.

Bicycles are a useful mode, particularly for personal travel. Many riders in Bandung rely on the bicycle for school, work and recreational trips. Most of the trips are less than five kilometres and rarely exceed 10 kilometres.<sup>30</sup>

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23. Hook and Replogle, 1996.

24. Chakravorty, 2008.

25. Chhoeurn, 2007.

26. Toda, 2008.

27. GEF, 2010.

28. SUTP, 2008.

29. Joewono and Kubota, 2005.

30. Joewono and Kubota, 2005.

In Singapore, walking and cycling are now promoted for short trips as well as for recreational purposes. In the city centre, streets have been pedestrianized<sup>31</sup> and cycle routes are planned both for recreational and commuting purposes.<sup>32</sup>

### 2.3. Impacts and challenges

While non-motorized vehicles are non-polluting and have many other social benefits, they have limitations in operations. Personal safety and health, as well as public safety if the non-motorized vehicles are used for public transportation, are concerns in the operation of non-motorized vehicles. In Singapore, non-motorized vehicle users (pedal cyclists, trishaw riders and passengers) are reported to be account for 9.3 per cent of total killed and 5.3 per cent of total injured in road accidents in 2009.<sup>33</sup> A survey on *becak* users in Bandung (Indonesia) reveals that 21 per cent of the users were injured in accidents at least once in life.<sup>34</sup> In Thailand, Malaysia and Indonesia, pedal cyclists are involved in 6 to 7 per cent of all road traffic deaths while pedestrians are involved in up to 47 per cent of accidents.<sup>35</sup> Therefore one of the key challenges is how to make non-motorized vehicles operate with greater safety. Prohibiting them from using crowded streets or highways may keep the vehicle occupants out of harm, but the loss of convenience is not readily accepted by the users as in the case of Jakarta (Indonesia).<sup>36</sup> Strict regulations to force such vehicles out of the system may not entirely resolve the conflicts between non-motorized vehicle users and other road users. For example, following the ban on *becaks* on Jakarta streets in 1985, some 60,000 were dumped into the Jakarta Bay without compensation by 1996.<sup>37</sup> To reinforce the ban further large-scale seizures of *becaks* continued to be made until 2007.<sup>38</sup>

Operating a transport network with a high mixture of motorized and non-motorized vehicles inevitably result in disorder and even confusion. While congestion and delays are the immediate consequences, the disorder also creates a long-term effect on users to accept the chaotic condition as part of the traffic system. Correcting the mind-set and the behaviour of users to respect order and be more disciplined on the road is not an easy thing to do. It will require concerted efforts on the part of all road users, authorities and transportation operators to develop a more socially acceptable road environment and culture.

Non-motorized vehicles are useful for short trips. For economic development, it is usual for governments to give priority to developing infrastructure that support long-distance and high-speed travel. Consequently infrastructure for non-motorized vehicles may be neglected.<sup>39</sup>

Segregating non-motorized vehicles from motorized traffic in busy urban streets may help to reduce fatalities among non-motorized vehicle occupants. For example it may be sensible to move cyclists from the roadways designed for motorized vehicles onto walkways designed for pedestrians. However, pedestrians may feel that this is an intrusion into their space. Experiments in Singapore to encourage sharing the footpath with cyclists resulted in objections from pedestrians but the scheme was managed well so that eventually both cyclists and pedestrians were said to be pleased.<sup>40</sup>

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31. Yuen and Chin, 1998.

32. Green Kampong, 2010.

33. Dept. of Statistics Singapore, 2010.

34. Joewono and Kubota, 2005.

35. Tiwari, 1999.

36. Jakarta Post, 2009.

37. Hook and Replogle, 1996.

38. Jakarta Post, 2009.

39. Replogle, undated.

40. Channel News Asia, 2008.

There are also differences between institutions representing the motorized vehicles and non-motorized vehicles. The former usually comes under the ambit of the transport ministry with well laid out legislative powers. Non-motorized vehicles however may not fall under the purview of the transport ministry or even the traffic police department, as some of the vehicles may be used for recreational purposes. Consequently, in resolving conflicts between the two types of vehicles, there are more conflicts and disagreements, for example between agencies which have a transportation agenda and civic groups which have a social agenda.<sup>41</sup>

In the Pacific islands, the biggest challenge regarding non-motorized transport is the provision of adequate infrastructure facilities, e.g. for walking or cycling. In Palau, roads are relatively narrow, making cycling unpleasant and even hazardous.<sup>42</sup> Similarly in New Caledonia, the lack of street lights on secondary roads can make pedestrians vulnerable in night operation.<sup>43</sup> Drivers, assuming cyclists to be intruders to their road space may also be discourteous to cyclists as in Noumea, New Caledonia.<sup>44</sup>

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41. Replogle, undated.

42. DOI, 2006.

43. World66, undated.

44. Lonely Planet, undated f.

## 3. Public Motorized Transport

### 3.1. Brief overview

The type of public transportation modes deployed in a country varies according to its geography, economic conditions and the degree of urban development.

In South-Eastern Asia, compared to the Pacific islands, public transportation tends to be more organized and there is a higher reliance on technology. Bangkok (Thailand) and Metro Manila (the Philippines) has an urban rail system, although the rest of Thailand and the Philippines are still relying on buses and other forms of public transport. Bangkok has the overhead Sky-train and the underground subway system transporting about 400,000 and 170,000 passenger trips daily respectively<sup>45</sup> while Manila has 2 light rail transit lines carrying a total of 500,000 passenger trips daily and 1 Metro Rail Transit line with a daily ridership of 400,000 passenger trips.<sup>46</sup>

In South-Eastern Asia, buses still form the backbone of public transport system in many of the urban centres. In Bangkok 50 per cent of the passenger trips are made on buses, rising to 75 per cent during peak periods.<sup>47</sup> Scheduled buses are the basic organized public transportation system in Metro Manila (the Philippines), Phnom Penh (Cambodia) and Siem Reap (Cambodia).<sup>48</sup> Jakarta (Indonesia) and Bangkok (Thailand) also has a bus rapid transit system.<sup>49</sup> In Myanmar, buses form only 1 per cent of the total vehicle fleet,<sup>50</sup> and the bus system in Yangon makes 19,000 bus trips/ day carrying 4.4 million pax/ day.<sup>51</sup>

In cities of the Pacific islands like Viti Levu, Vanua, Levu and Taveuni in Fiji<sup>52</sup> and Port Moresby in Papua New Guinea,<sup>53</sup> scheduled buses provide the main form of public transportation services. In Guam, which is under US administration, bus services are more organized and buses are owned and operated by the Guam Transit Authority.<sup>54</sup> Here, the bus services may also operate as demand responsive systems. Samoa buses are operated slightly differently as they are run by private operators.<sup>55</sup> Innovation and the desire to keep costs low have resulted in *jeepney*-type public transport operations.

In the smaller islands of the Pacific, where population size is low, there is no need for large capacity buses. Public transportation is supported by mini buses, e.g. the 11-seater buses in Kiribati, 20-seater buses in the Marshall Islands, New Caledonia, Tuvalu and Tonga.<sup>56</sup> These may not run on fixed routes and the level of service can be poor. For example, on the island of Tongatapu in Tonga, and in Vanuatu, the mini buses move, not according to schedule but when there is sufficient demand.<sup>57</sup> On a smaller scale is the taxi service. In several islands, like the Federated States of Micronesia, the Northern Mariana Islands and French Polynesia, regular taxis is the only public transport mode as there are no buses.<sup>58</sup>

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45. CAI-Asia, 2006c.

46. CAI-Asia, 2006d.

47. CAI-Asia, 2006c.

48. CAI-Asia, 2006b.

49. CAI-Asia, 2006c.

50. RTAD-MM, 2008.

51. UNCRD, 2008e.

52. WTG, undated b.

53. UN-HABITAT, 2010b.

54. DOI, 2006.

55. Samoa, 2010.

56. Virtual Tourist, undated b (Kiribati); DOI, 2006 (Marshall Islands); Lonely Planet, undated f (New Caledonia); WTG, undated c (Tuvalu); Lonely Planet, undated g (Tonga).

57. Lonely Planet, undated g (Tonga); Jasons, 2010 (Vanuatu).

58. DOI, 2006 (Federated States of Micronesia); WTG, undated a (Northern Mariana Islands); Theodora, 2010 (French Polynesia).



Figure 4. Bangkok overhead sky-train, Thailand



Photo: Gcom. 2004. Bangkok Skytrain Saladaeng, Wikimedia Commons, [http://commons.wikimedia.org/wiki/File:Bangkok\\_Skytrain\\_Saladaeng.jpg](http://commons.wikimedia.org/wiki/File:Bangkok_Skytrain_Saladaeng.jpg).

In several Pacific islands which attract tourists, rental vehicles are quite common, especially where public transport services is poor or non-existent. For example, American Samoa, Solomon Islands and French Polynesia have no formal public transport systems. There is also a general lack of common public transport infrastructure such as bus stops, as the formal public transport is less in number or even non-existent.

### 3.2. Trends and conditions

One of the incentives to move to promote public transport is the potential improvement to the environment. This is achieved in two ways – firstly, a reduction in single trips in favour of shared trips, and secondly, adoption of better technologies in public transport for improved fuel efficiency and cleaner fuel. Several countries, such as Viet Nam,<sup>59</sup> Thailand<sup>60</sup> and the Philippines<sup>61</sup> are adopting this strategy to push for promotion of public transport.

Congestion in cities in South-Eastern Asia has pushed governments to seek ways to increase the proportion of travel on public transport. For example, in the Philippines, the bus fleet has increased 3.4 per cent per annum over the period 1990–2007<sup>62</sup> and in Metro Manila the light rail transit (LRT) ridership increased by 29 per cent in one year from 118 million passengers in 2004 to 147 million in 2005 with the expansion of lines,<sup>63</sup> and has settled at about 20 per cent per annum resulting in 372 million passengers in 2010.<sup>64</sup> Similarly, in Myanmar, to match the increase in patronage, the number of buses has increased at 2.3 per cent per annum during the 2004–2008 period.<sup>65</sup>

In mega cities like Bangkok (Thailand) and Metro Manila (the Philippines), rail transit is a suitable public transportation mode. Under the Bangkok Railroad Improvement Project, the

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59. Truong, 2008.

60. UNCRD, 2008c.

61. UNCRD, 2008d.

62. Sheila, 2010.

63. CAI-Asia, 2006d.

64. Judy, 2011.

65. RTAD-MM, 2008.

Figure 5. Metro Rail Transit (MRT-3) at Metro Manila (the Philippines)



Photo: Icqgirl. 2009. Manila Metro Rail Transit (MRT-3 Blue Line) at Cubao, Wikimedia Commons, accessed 10 May, 2010 online at [http://commons.wikimedia.org/wiki/File:Manila\\_Metro\\_Rail\\_Transit\\_%28MRT-3\\_Blue\\_Line%29\\_at\\_Cubao.JPG](http://commons.wikimedia.org/wiki/File:Manila_Metro_Rail_Transit_%28MRT-3_Blue_Line%29_at_Cubao.JPG).

urban rail network in Bangkok is to be expanded to 234 kilometres of rail track<sup>66</sup> from the current 24 kilometres of BTS Skytrain and 20 kilometres of subway.<sup>67</sup> Similarly, according to Ho Chi Minh City's Department of Transport<sup>68</sup> (Viet Nam) six metro routes at US\$1.5 billion each would be built under the city's plan to 2025 for transport networks.

Metro Manila (the Philippines) has 3 suburban rail lines: the 15 kilometre elevated LRT-1 from Parangue City to Kaloocan City which is owned and run by the Light Rail Transit Authority, the 16.8 kilometre LRT-3 which is a Build-Lease-Transfer contract operated by the Department of Transport and Communications, and the latest 13.8 kilometre LTR-2 from Santolan Mrikina City to Recto, which is owned and operated by Light Rail Transit Authority. There are plans to introduce greater integration in the public transport network, for example through the use of a unified ticketing system.<sup>69</sup>

In Singapore, mass rapid transit has been the main public transport mode since its introduction in 1987. To increase public transport users to 70 per cent of all trips, the Land Transport Authority will expand the rail network in the next decade with the addition of another 100 kilometres of rail track on top of the current 130 kilometre network.<sup>70</sup> To promote seamless travel, a single integrated ticketing system between the mass rapid transit system and buses is already in place.

Bus rapid transit is becoming more attractive as a cheaper alternative to urban rail and can increase overall transportation efficiency.<sup>71</sup> In Jakarta (Indonesia) the newly implemented 'Trans-Jakarta Busway' now serves 10 corridors out of the total of 15 corridors planned. Some 14 per cent of the bus-way users have shifted from using the private car and the number of bus-way passengers is seen to be increasing significantly each year. Global positioning system (GPS) is to be installed on the new buses on the Jakarta Busway to facilitate better

66. UNESCAP, 2001.

67. Chirakiti, undated.

68. Vietnam Financial News Network, 2010.

69. CAI-Asia, 2006d.

70. LTA-SG, 2008.

71. SUTP, 2010a.



Figure 6. Bus on Bangkok street (Thailand)



*Photo: by author.*

fleet management and potentially can enable operators to dispatch additional vehicles when needed.<sup>72</sup> Jakarta also has planned for the construction of monorails and MRT (mass rapid transit) to tackle the massive congestion problem.<sup>73</sup> In Yogyakarta, Indonesia, the newly implemented urban bus system with air-conditioned buses equipped with smart card on – line ticketing system is more comfortable and reliable. Yogyakarta now has an integrated bus and airport train system with smart card operations to make transfers more convenient.<sup>74</sup> Under the Sustainable Urban Transport Project, Chiang Mai is also planning for an improved bus transit system.<sup>75</sup>

Public transportation is also promoted as an alternative to motorcycles in Viet Nam which hope to reduce motorcycle travel by increasing public transportation services by 50 per cent.<sup>76</sup> Ha Noi, for example, aims to increase the capacity of its public transportation system from the current 1000 buses on the road which meet only 10 per cent of the total travel demand 55 per cent by 2030 and 65 per cent thereafter.<sup>77</sup> Ha Noi has also started work on its 'Nhon-Hanoi Station urban railway project' in an effort to ease traffic congestion caused by motorcycles in the capital city.<sup>78</sup> Da Nang has also started working on 'Developing Da Nang – Environmental City' which aims at developing Da Nang as a bus-based public-transport city,<sup>79</sup> even though four metro routes have been planned.<sup>80</sup>

In the Pacific islands, there is only nominal increase or improvements in public transport services and developments. Except for Guam, most of the Pacific islands lack a comprehensive public transport strategy. Under the Guam Transport Plan 2030,<sup>81</sup> the bus services in Guam are to be expanded, the bus fleet replaced and a better maintenance

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72. Jakarta Post, 2010e.

73. Jakarta Post, 2010c.

74. Prameshwari, 2010.

75. GEF, 2010.

76. Truong, 2008.

77. Vietnam Business News, 2010.

78. Viet News, 2010a.

79. SUTP, 2010b.

80. VCCI News, 2010.

81. GTP, undated.

Figure 7. Bus Rapid Transit System in Bangkok, Thailand



Photo: Sry85. 2010. Sathorn Station (Bangkok BRT), Wikimedia Commons, [http://commons.wikimedia.org/wiki/File:Sathorn\\_Station\\_%28Bangkok\\_BRT%29.jpg](http://commons.wikimedia.org/wiki/File:Sathorn_Station_%28Bangkok_BRT%29.jpg).

programme introduced. In Fiji, the feasibility of a bus transit system along the Suva-Nausori corridor is currently under consideration.<sup>82</sup>

Bandar Seri Begawan, Brunei, has put forward a master plan with enhanced transportation options for 2035 to explore the possibility of implementing a ‘multi-modal transportation system’ that encompasses walking, biking, buses, taxis, ‘park and ride’, trams, light rail transit or other appropriate transportation system for the movement of people between various centres both within Bandar Seri Begawan and to other urban centres.<sup>83</sup> This is against the backdrop that for a number of years, the bus and taxi services have declined and expected to deteriorate further if nothing is done to correct the situation.

### 3.3. Impacts and challenges

In the face of congestion and environmental damage in mega cities, South-Eastern Asia countries are forced to re-examine the transport policies in favour of public transportation. However these economies face a number of challenges.

The public transport service is generally fragmented, operating under a weak regulatory environment. For example, in Metro Manila (the Philippines), the government has to set up a task force to regulate bus operations and increase efficiency.<sup>84</sup> In Kuala Lumpur (Malaysia), public transport was poorly coordinated and managed because there were at least 18 government agencies belonging to different ministries, to oversee the various functions of public transport.<sup>85</sup>

The introduction of urban rail brings with it new technology and operational know-how which can facilitate better integration between bus and rail. However, the lack of coordination among operators makes such integration a challenge, especially in the absence of a

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82. MWT-FJ, 2010.

83. Siang, 2009.

84. UNCRD, 2008d.

85. Yunus, 2010.

Figure 8. Integrated ticketing system between the MRT and buses in Singapore



*Photo: by author.*

coordinating authority. In Metro Manila (the Philippines)<sup>86</sup> rationalization of the public transport routes and the development of a comprehensive public transport network with integrated infrastructure development was introduced. The two urban rail systems in Bangkok (Thailand), i.e., BTS and MRT are managed by different operators and do not have an integrated station and ticketing system although plans are now underway to achieve a better integrated system.<sup>87</sup>

Improved regulation can also bring about benefits of efficiency and safety. The regulation and even facilitation of fleet maintenance can ensure less vehicle breakdown and mishaps, and these benefits not only translate to a better environment and an improved economy but they also improve the image of the public transport system. This is the approach adopted in Metro Manila (the Philippines).<sup>88</sup>

It is also important to take into account the social impact of changes that are introduced to improve efficiency. For example, in Fiji, when the authorities decreed the operation of vans as public transport, there was much resistance from the taxi operators due to the potential individual-level loss of business, even though the move would have increased system-level travel efficiency.<sup>89</sup>

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86. UNCRD, 2008d.

87. Lueng-uthai, 2010.

88. UNCRD, 2008d.

89. Fiji Times, 2010.

## 4. Informal Motorized Transport

### 4.1. Brief overview

In South-Eastern Asia, the main informal motorized modes of transport are three-wheelers or *tuk-tuks*, *jeepneys*, tricycles, and other para-transit options. Notwithstanding the lack of information on the actual number of such vehicles, these modes can significantly affect the urban traffic condition. In Laos, informal transport is dominated by the *tuk-tuk* – a three wheeled motorized vehicle used for short distance travel. The same mode is used in Thailand although the version in Cambodia is in the form of a motorcycle-drawn carriage.<sup>90</sup> Because of their relative convenience, *tuk-tuks* seem to be preferred over taxis. They also frequently serve areas not well-covered by the bus system.<sup>91</sup>

In the Philippines, *jeepneys* (converted trucks to carry passengers) are widely used in urban transport.<sup>92</sup> Manila's ornately coloured and decorated *jeepneys* are the mainstay of the city's transportation system and they carry around 40 per cent of all passenger trips in 2000.<sup>93</sup> *Jeepneys* operate on fixed routes, stopping just about anywhere for customers who board at the rear of the vehicle and sit sideways on benches. They seat between 14 and 26 passengers reaching 30 or more on busy routes. In Manila, around 65 per cent of bus trips are over 7.5 kilometres in length and a similar percentage of *jeepney* trips are shorter than 5 kilometres.<sup>94</sup> A hybrid between the buses and taxis are the mini buses and micro buses. These normally operate on fixed routes of Manila but some may be demand responsive.<sup>95</sup> In Metro Manila, there were an estimated 34,000 tricycles (motorcycles with sidecars) in 2000.

*Tuk-tuks* and *jeepneys* are often considered as the cheaper forms of taxis. They are strong competitors to the bus services and are popular in a number of cities like Manila (the Philippines) and Bangkok (Thailand).<sup>96</sup> In some of cities, e.g. Vientiane (Laos)<sup>97</sup> and Mandalay (Myanmar),<sup>98</sup> these informal services are the primary public transport modes. Most of these are privately owned and they are popular because they are cheap and more flexible as they can navigate narrower streets which buses cannot. Some of these may operate without licence, as in Metro Manila.<sup>99</sup>

Jakarta's '*ojeks*' (Indonesia)), or motorcycle taxis, offer services over slightly longer distances. The hybrid three-wheeled motor-taxis, locally called '*bajajs*', provide comfort more akin to a private car, while the larger three-wheeled '*bemos*' and '*toyokos*' carry as many as 8 passengers in more crowded conditions, and the larger *microlets* and minibuses carry 10 to 25 passengers.<sup>100</sup> The *bemos* are registered in the district they serve and are confined to operate only within the restricted territory.<sup>101</sup>

Bangkok (Thailand) also has a good mix of informal motorized transport. There are minibuses with 14 to 18 seating capacity, pick-up trucks, and vans that often carrying passengers; micro-buses (called *silok lek*) that can carry up to 11 passengers, three-wheelers

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90. Wikipedia, 2010a.

91. World Bank, 2010a.

92. World Bank, 2010f.

93. Cervero, 2000.

94. Cervero, 2000.

95. World Bank, 2010f.

96. World Bank, 2010f.

97. World Bank, 2010d.

98. UNCRD, 2008e.

99. World Bank, 2010f.

100. Cervero and Golub, 2007.

101. Cervero, 2000.



Figure 9. *Tuk tuks* in Vientiane, Laos



Photo: Ilya Plekhanov. 2010. *Tuk-tuk in Savannakhet 02*, Wikimedia Commons, [http://commons.wikimedia.org/wiki/File:Tuk-tuk\\_in\\_Savannakhet\\_02.jpg](http://commons.wikimedia.org/wiki/File:Tuk-tuk_in_Savannakhet_02.jpg)

(*tuk-tuk* or *samlor*) and hire motorcycles carrying pillion. In 2007 the number of informal vehicles operating in metropolitan Bangkok on any weekday is around 50,000<sup>102</sup> while the total number of buses was 120,000<sup>103</sup>

In some South-Eastern Asia countries, many of the privately owned motorcycles are used for informal public purposes. For example, it is common in Viet Nam and Thailand for motorcycles to be converted to *tuk-tuks* and serve as informal public transport vehicles.<sup>104</sup>

In Papua New Guinea, a popular informal motorized mode of passenger transport in Goroka is the public motor vehicles which are basically open-top pick-up trucks. Most of these operate as unscheduled buses.<sup>105</sup>

The informal motorized modes in urban areas of the Pacific islands are limited in number. However, as passenger demand is usually low these informal transport modes are more viable than large capacity scheduled buses. The number of informal vehicles in Fiji was 13,800 in 2009 forming about 8.4 per cent of all vehicles.<sup>106</sup>

Informal motorized modes are frequently used for tourism purposes in the smaller islands. In American Samoa, where there is no organized public transport system, travellers rely on the unique '*aiga*' or extended-family buses which are constructed from recycled trucks.<sup>107</sup> Similarly in New Caledonia, '*campervan*' are common tourist vehicles for exploration to places not easy to reach by bus.<sup>108</sup> In Solomon Islands, the only public transport modes are open-backed trucks or tractor-drawn trailers.<sup>109</sup> Similarly in French Polynesia, without public transport options, people use '*le trucks*' or trucks fitted with bench

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102. Cervero and Golub, 2007.

103. UNCRD, 2008c.

104. CAI-Asia, 2006c.

105. Lonely Planet, undated a.

106. BOS-FJ, 2010.

107. DOI, 2006.

108. Lonely Planet, undated f.

109. Lonely Planet, undated e.

seats in the back for passengers. *Le trucks* operate on fixed routes with well-designated bus stops and are generally adhering to a schedule.<sup>110</sup>

## 4.2. Trends and conditions

There is lack of information regarding the growth of informal motorized modes in South-Eastern Asia. Their evolution, existence and growth depend on a number of factors. Principally these modes come about because of a lack of adequate formal or organized public transport services. However, other factors such as ease of access, affordability, flexibility and convenience have made the business viable. The lack of rules and enforcement has provided easy employment opportunities to many.

Because these transit modes often operate with little or no regulations, the service quality can be poor and the operations can be unsafe and polluting. In Jakarta (Indonesia), the slower and smaller vehicles are confined to the peripheral parts of the city and on narrow roads, out of concern for safety and traffic discipline.<sup>111</sup> In Bangkok (Thailand), they are not licensed to pick passengers.<sup>112</sup> In Manila (the Philippines), *jeepneys* stop and pick passengers at their convenience without regard to road safety.<sup>113</sup>

Since 2000, Viet Nam has banned three-wheeled motorbikes with open cargo bins in the front, for goods transport for the reason that they are old and unsafe. In Ho Chi Minh City, these are considered inefficient modes as they take up nearly as much space as a car but easily contribute to slow traffic.<sup>114</sup>

There is a lack of information regarding the growth of informal motorized modes in the Pacific islands. The growth rate is 5.8 per cent per year in Fiji.<sup>115</sup> However, in other parts of the Pacific islands, including French Polynesia, such vehicles are gradually replaced by more comfortable air-conditioned buses.<sup>116</sup>

## 4.3. Impacts and challenges

It is generally difficult to determine the total number of *tuk-tuks*, *jeepneys*, pick-up trucks and a whole range of other informal transport vehicles in any urban area, let alone account for them. There is no formal registration and any estimates based on roadside observations do not give a true picture of the situation.<sup>117</sup> Some of these, like the motorcycle taxis, are registered as private vehicles but are converted for hire.<sup>118</sup> The lack of data makes it difficult to compute the overall impact of these modes, for example on the environment.

The operation of informal motorized transport in a shared road network with other transport challenges the sustainability of the economy, the environment and society. These informal modes affect the smooth flow of traffic and hence the efficiency of the road network. They can cause safety problems to other road users and they contribute to air and noise pollution in the urban areas. There are several challenges to make informal transport a more sustainable mode. First is the problem of accountability. Related to this is the issue of

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110. Virtual Tourist, undated a.

111. Cervero and Golub, 2007.

112. Cervero and Golub, 2007.

113. Cervero, 2000.

114. Chakravorty, 2008.

115. BOS-FJ, 2010.

116. Virtual Tourist, undated a.

117. Cervero and Golub, 2007.

118. Cervero, 2000.

Figure 10. *Jeepneys* used as cheaper form of taxi in Bangkok, Thailand



Photo: by author.

regulation and control. Finally as they are generally operated by and for the lower-income groups, the issue of social equity needs to be addressed.

Given their design and capability, *tuk-tuks*, *jeepneys* and the like, occupy as much road space as regular vehicles but travel at a lower speed.<sup>119</sup> The result of which is that they often retard the traffic flow, especially when they weave in and out of traffic. This leads to inefficiency in the road network, although it may be said that in many cases, they fill up all the unused spaces. Nevertheless Vientiane (Laos) has considered banning *tuk-tuk* in the city<sup>120</sup> and Phnom Penh (Cambodia) has banned *tuk-tuks* on the highways.<sup>121</sup> To enforce this ban on Phnom Penh's Norodom Boulevard, *tuk-tuks* were required to register and display a number plate and a penalty for violations was legislated. The implementation was not smooth as drivers complained about the scheme.<sup>122</sup>

The informal transport also creates environmental problems as they are powered with low-grade fuels. Making these modes more environmentally sustainable can be a challenge. For example, the *tuk-tuks* in Laos use the more polluting two-stroke engines. Converting them to cleaner four-stroke engines is a great task ahead for major cities.<sup>123</sup> Thailand is experimenting with a solar *tuk-tuk* to address this problem.<sup>124</sup>

Improving safety in operating informal transport is another challenge as there is no regulation on safe operation of such vehicles, especially when they are used for public service. There are few formal institutions to govern their operation and to provide support for service improvements. Some informal associations exist but they serve as informal union to represent the views and needs of the members, e.g. the *tuk-tuk* association in Vientiane (Laos)

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119. Wikipedia, 2010a.

120. Lee, 2007.

121. Channyda, 2009.

122. The National, 2009.

123. Nogales, 2004.

124. NNB-TH, 2010.

has negotiated on legislation<sup>125</sup> and a similar association in Phuket (Thailand) has negotiated on fares.<sup>126</sup>

Another challenge in the usage of some informal transport modes is the understanding of difference in classification between ownership and usage. In many South-Eastern Asia countries, motorcycles are privately owned but they are operated as informal public transport vehicles. In the Pacific islands, where the vehicle fleet is small, many of the private cars and jeeps may be used for informal public transport especially for the tourism sector.

Trying to regulate the operations of informal transport modes can be problematic as there is a need to balance between efficiency and social equity. These informal modes appear to be significantly important for economic and social sustainability as serve the lower-income group to travel to workplace and also provide employment opportunities for them. Therefore ban on these modes may adversely affect the economic situation of this group as well as national economy, as reported in the case of Viet Nam.<sup>127</sup> These modes compete with the regular taxis and even buses and light rail systems by providing low fares and better door-to-door services. There may be sufficient incentive for service improvements in the informal transport when the alternative modes are being promoted aggressively. For example, in an attempt to regulate *tuk-tuks*, Phuket (Thailand) will be introducing fare meters to be installed in all *tuk-tuks*<sup>128</sup> to ensure they remain viable in the midst of upgrading the public transportation system.<sup>129</sup>

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125. The National, 2009.

126. Sidasathian and Morison, 2009.

127. Chakravorty, 2008.

128. Morison and Sidasathian, 2010.

129. Sidasathian, 2010.



## 5. Private Motorized Transport

### 5.1. Brief overview

In South-Eastern Asia, motorcycles and cars are the main private transport modes with motorcycles as the dominant mode in the less developed countries. In Laos, motorcycles make up the major proportion of vehicles, forming 78 per cent of the vehicle fleet, followed by cars which form 16 per cent of the fleet.<sup>130</sup> Similarly in Cambodia, there are 248,000 motorcycles and 84,000 four-wheelers,<sup>131</sup> giving a vehicle ownership of 0.8 vehicles per 100 people. In the Philippines, there are nearly 2.15 million motorcycles, forming 42.6 per cent of the vehicle population and there are 1 million motorcycles in Metro Manila.<sup>132</sup> In contrast, car population in Metro Manila is only 150,000. In Bangkok (Thailand), motorcycles form 40 per cent of the vehicle population and trips made on motorcycles form 31 per cent of all trips.<sup>133</sup> However the proportion of cleaner four-stroke engines to the less-efficient two-stroke engines is 2:1. In Indonesia, motorcycles form 71 per cent of the population, while cars make up 13 per cent.<sup>134</sup> In Myanmar, there are 228,000 cars and 1,553,000 motorcycles, forming 12 per cent and 80 per cent of the total vehicle fleet, respectively.<sup>135</sup> In Papua New Guinea, cars and motorcycles make up 30 per cent of the total trips.<sup>136</sup> The number of car licences issued in 2009 in Brunei is 127,000.<sup>137</sup> With an average of 10 private cars and 3 motorcycles per 100 people, Singapore has 511,100 private cars and 147,300 motorcycles in 2010 which comprises 54 and 15 per cent, respectively, of the total vehicle population.<sup>138</sup> In 2009, the average annual

Figure 11. Motorcycles in Ho Chi Minh City, Viet Nam



*Photo: by author.*

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130. CAI-Asia, 2006a.

131. World Bank, 2010d.

132. CAI-Asia, 2006d.

133. CAI-Asia, 2006b.

134. World Bank, 2010c.

135. RTAD-MM, 2008.

136. UN-HABITAT, 2010a.

137. Government of Brunei, 2010.

138. LTA-SG, 2010.

Figure 12. High proportion of motor cycle traffic at Bangkok streets (Thailand)



Photo: Khaosaming. 2006. Scooters Bangkok Nana, Wikimedia Commons, [http://commons.wikimedia.org/wiki/File:Scooters\\_Bangkok\\_Nana.jpg](http://commons.wikimedia.org/wiki/File:Scooters_Bangkok_Nana.jpg)

kilometres travelled by a car and a motorcycle was 19,600 and 13,200 respectively in this city-state nation.<sup>139</sup>

In the Pacific islands, the type of motorized transport include cars, *jeepneys* and scooters, with scooters or less powerful motorcycles forming the main form of transport. The vehicle mix can be highly variable. For example, in Kiribati, private transport is dominated by cars and motorcycles and there are 2,000 registered vehicles, three-quarters of them which are motorcycles.<sup>140</sup> In the Marshall Islands 64 per cent of the vehicles are motorcycles.<sup>141</sup> In the Cook Islands, mopeds are a popular mode of transport. However, in Micronesia, most vehicles are cars while there are no motorcycles in Samoa, Wallis and Futuna and Tuvalu. In the Christmas Islands as well as in Pitcairn Island and Easter Island, cars, four-wheel drives and sport utility vehicles (SUVs) are the principal modes of private transport. However, in Fiji, the 87,000 cars form 53 per cent of the vehicle population and there are only 5,000 motorcycles or 3 per cent of the total vehicle fleet.<sup>142</sup>

Because of the land size in the Pacific islands, the vehicle population may be low but the vehicle ownership can be generally high. For example, in Palau, there is nearly one car per household.<sup>143</sup> Nauru has less than 2,000 registered vehicles but they are all privately owned.<sup>144</sup> The trend is similar in Niue.<sup>145</sup> Also in many of the tourist islands of Micronesia<sup>146</sup> and Polynesia,<sup>147</sup> there are a high proportion of cars and scooters used for rental purposes.

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139. LTA-SG, 2010.

140. EN, undated b.

141. MoH, 2010.

142. BOS-FJ, 2010.

143. DOI, 2006.

144. EN, undated a.

145. Wikipedia, 2010e.

146. Lonely Planet, undated d.

147. Virtual Tourist, undated a.

## 5.2. Trends and conditions

Rapid urbanization has resulted in motorization growth in the region. The growth and dominance of motorcycles is more obvious in less developed countries, as motorcycles are the more affordable means of private transport for the populace.

In Laos, motorcycle growth is 13 per cent per annum prior to the 1997 crisis but it has since stabilized at 9 per cent.<sup>148</sup> In Cambodia, motorization is increasing at a rate of 7 per cent annually with the vehicle population in Phnom Penh and Siem Reap doubling over a 12-year period from 1992 to 2004.<sup>149</sup> Every month 52,000 cars are added onto Bangkok streets (Thailand).<sup>150</sup> In the Philippines, number of private vehicles has grown steeply from 4,558,727 in 2007 to 5,216,646 in 2009 giving an annual growth rate of 7 per cent<sup>151</sup> In Myanmar, the number of cars are growing at a steady rate of 5.2 per cent per year during the 2004–2008 period.<sup>152</sup> The motorcycle growth rate was only 0.8 per cent per year before 2007. However in 2008, motorcycles have abruptly increased resulting in a growth rate of 138 per cent that year due to Myanmar authority's temporary permission of motorcycle registration.<sup>153</sup>

Brunei's new car registration has increased at a rate of 8.9 per cent per annum from 1999 to 2009 although the rate of renewal of vehicle licences is decreasing in recent years by 16 per cent per annum from 2007 to 2009<sup>154</sup>, indicating that the car population is becoming younger. Singapore's car population has increased at a rate of 3.4 per cent per year in 2000–2010 period while this figure is 1.2 per cent for motorcycles and scooters.<sup>155</sup>

Figure 13. Traffic congestion on a Bangkok street (Thailand)



*Photo: by author.*

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148. CAI-Asia, 2006a.

149. CAI-Asia, 2006b.

150. The Nation, 2010.

151. LTO-PH, 2010.

152. RTAD-MM, 2008.

153. Ruckphaopunt, 2008.

154. Government of Brunei, 2010.

155. LTA-SG, 2010.

In many South-Eastern Asia nations liberalization in motor vehicle import can be one of the principal reasons behind uncontrolled growth of private vehicles. In Laos, the motorcycle market is booming because of the import of cheap Chinese motorcycles.<sup>156</sup> In Indonesia, car ownership is increasing due to the liberalization of import motor vehicle rules.<sup>157</sup>

Among the countries of the Pacific, the vehicle growth rates are lower. In Fiji, the overall vehicle growth is 3 per cent per annum with the number of cars increasing at 3.6 per cent and motorcycles increasing only at 1.2 per cent.<sup>158</sup> Similarly in American Samoa, the number of registered vehicles has increased from 7,543 in 2002 to 8,122 in 2004 resulting in an annual increase rate of 3.8 per cent.<sup>159</sup>

### 5.3. Impacts and challenges

It is difficult to determine the actual number of vehicles in an urban area based on registration because often there may be vehicles registered elsewhere operating within the urban area. In some countries, the registration of vehicles is maintained manually and the vehicle database is either not up to date and the quality of data available may not be good. All these can make it difficult to be precise about the vehicle population.

Notwithstanding the lack of good information, there is general acceptance that the growth in vehicle population is a serious problem, especially when the road infrastructure is expanding at a much slower rate for a variety of reasons. Limiting vehicle growth may also be difficult. In Bandar Seri Begawan, Brunei, it has been claimed that car ownership could triple by 2030 as the public transportation in the capital is weak and has not kept up with economic growth.<sup>160</sup> In Singapore, vehicle growth is managed by the controlled release of certificates of entitlement accompanying each new vehicle registration or renewal beyond the ten-year lease. The pre-determined target of 3 per cent growth in cars was discovered to be not sustainable and has been recently halved.<sup>161</sup>

Private motorized vehicles are often indicators of affluence and economic growth but they are also blamed for urban decline.<sup>162</sup> In areas where the urban environmental quality is still not a major concern like Siem Reap (Cambodia), Chiang Mai (Thailand) and Da Nang (Viet Nam), private motorized vehicles are still allowed to grow uncontrolled but in large cities like Singapore, Jakarta (Indonesia) and Bangkok (Thailand), governments are studying ways to curb the growth of motorized vehicles.<sup>163</sup>

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156. CAI-Asia, 2006a.

157. World Bank, 2010c.

158. BOS-FJ, 2010.

159. DOI, 2006.

160. Noor and Norjidi, 2009.

161. Tan, 2008.

162. Government of Singapore, 2009.

163. Government of Singapore, 2009 (Singapore); BBC News, 2010 (Jakarta); UNCRD, 2008c (Bangkok).

## 6. Commercial Goods Transport

### 6.1. Brief overview

In South-Eastern Asia countries, it is difficult to separate commercial goods transport into urban and non-urban freight, largely because road transport is the predominant mode for commercial goods movements and there are few distribution centres to facilitate urban freight movements. For example, in Laos, road vehicles carry 86 per cent of freight traffic, totalling an annual tonne-kilometre of close to 160 million in 2002, but it is unknown how much of these are in the urban area.<sup>164</sup> Similarly, in Indonesia it is reported that road transport carries about 70 per cent of the total freight tonne-kilometre, without differentiating urban and non-urban figures.<sup>165</sup> Notwithstanding the lack of separated information related to urban freight, it may be possible to gain insight into commercial goods transport in South-Eastern Asia cities by reviewing the overall land freight figures.

The principal freight modes in road transport are trucks/heavy vehicles and pick-ups/utility/light goods vehicles. The proportion of these vehicles can vary widely in the region. In the Philippines there were 250,000 trucks and 1.5 million utility vehicles in 2005 which made up 5.3 per cent and 32.3 per cent of the total vehicle fleet of the country respectively. In Bangkok (Thailand), in 2007, there were 5.6 million vehicles of which 2 per cent were trucks and 20 per cent pick-ups. In Indonesia, trucks constitute 8 per cent of total road vehicles. In Papua New Guinea, there were 5,049 commercial vehicles in 2000 which formed 5.4 per cent of the total vehicle fleet. In Myanmar, there were 57,000 light and heavy trucks in 2008 making up 5.6 per cent of total road vehicles.<sup>166</sup>

Besides road transport, rail systems also carry a varied amount of freights in this region. In Phnom Penh and Siem Reap of Cambodia, large amounts of freight are carried on local 'nori' or lorry or 'bamboo trains' which use bamboo platforms and running on gasoline fuel.<sup>167</sup>

There may be a lack of adequate legislations regarding road-freight operations in some South-Eastern Asia countries. For example, in Timor Leste, there is no legislation governing vehicle maximum weights and dimensions.<sup>168</sup>

Among the Pacific islands, Fiji has 43,000 goods vehicles in 2009 which forms 26 per cent of its total vehicle fleet. Out of 2,487 vehicles in the Marshall Islands 4 per cent are trucks.<sup>169</sup>

### 6.2. Trends and conditions

The magnitude of freight transport flows vary from country to country in South-Eastern Asia. Overall freight traffic is increasing in this region.

On the whole, the number of trucks and goods vehicles in South-Eastern Asia has increased and this may translate to more vehicle trips made. These growth rates follow in tandem with the country's economic growth and hence consumption power of the population. In the period 1997–2001, the number of goods vehicles in Viet Nam has increased from

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164. World Bank, 2010a.

165. World Bank, 2010c.

166. Sheila, 2010 (the Philippines); ERIA, 2008 (Bangkok); World Bank, 2010c (Indonesia); EN, undated c (Papua New Guinea); UNCRD, 2008e (Myanmar).

167. De Launey, 2006.

168. World Bank, 2005.

169. BOS-FJ, 2010 (Fiji); MoH, 2010 (Marshall Islands).



Figure 14. Motor-cycle converted to goods van in Ho Chi Minh City, Viet Nam



*Photo: by author.*

69,000 to 194,000, giving a very high growth rate of 29.5 per cent. Similarly, in Cambodia the number has increased from 19,000 in 1997 to 30,000 in 2002 resulting in a very high annual growth rate of 9.5 per cent.<sup>170</sup> In the Philippines the annual growth rate of trucks and utility vehicles are 4.72 per cent and 5.88 per cent respectively for the period 1990–2007.<sup>171</sup> From 1997 to 2004, the number of Malaysian goods vehicles has increased from 575,000 to 772,000 resulting in an annual growth of 4.3 per cent. In Indonesia, 310,000 trucks were added in 5 years from 1997, giving a 3.8 per cent growth per annum. Similarly in Thailand, the number of goods vehicles has increased marginally from 653,000 in 2000 to 674,000 in 2001.<sup>172</sup>

Elsewhere the growth is modest. In Fiji, goods vehicles are growing at a rate of 1.8 per cent per annum.<sup>173</sup> Over the period 1997–2004, the growth rate of goods vehicles in Brunei is 0.8 per cent, an increase from 17,000 to 18,000. In Laos, the number of goods vehicles remained constant to around 10,000 for the period 1997–1999, while the number of goods vehicles has reduced from 57,000 to 53,000 from 1997 to 2001, declining at an annual rate of 1.8 per cent.<sup>174</sup>

The number of goods vehicles per 1,000 people is about the same in most countries hovering around 1 to 3 vehicles per 1000 population for Myanmar, Laos, Viet Nam, Cambodia, and the Philippines. The figure for Indonesia is 8 vehicles per 1000 population, and Thailand is 10 vehicles per 1000 population while Malaysia is 27 vehicles per 1000 population.<sup>175</sup> Without further study, it is unclear if these high numbers represent inefficiency in road freight transportation in these countries.

Based on annual freight-kilometres travelled from 1997 to 1999, road freight for Cambodia has increased at a rate of 43.3 per cent, Indonesia increased at a rate of 14.4 per cent. Thailand's annual freight-kilometres has increased at a rate of 4.3 per cent 1997 to 2004

170. ASEAN, 2005.

171. Sheila, 2010.

172. ASEAN, 2005.

173. BOS-FJ, 2010.

174. ASEAN, 2005.

175. ASEAN, 2005.

while Viet Nam's freight-kilometres has escalated at a rate of 9.9 per cent from 1997 to 2003.<sup>176</sup> Again without further study, it is difficult to determine the implication of such increases on transport efficiency.

One important consideration in road freight transport is the difference in operations between international freight forwarders and local freight forwarders. The latter tends to be smaller in businesses and less willing to invest in technology to improve operations. International logistics companies operating in South-Eastern Asia usually employ smart technologies in their operations, as they do in other parts of the world. For example, the vehicles used by international logistics company TNT Express in Thailand, Cambodia and Viet Nam, as in their global operations, are equipped with global positioning system (GPS) tracking system to facilitate navigation and freight tracking.<sup>177</sup>

While Viet Nam is named one of the world's fastest growing logistics hubs,<sup>178</sup> the road infrastructure is considered to be the weak link in the supply chain,<sup>179</sup> discouraging investments from international logistics companies. Logistics operators are eyeing on the development of the Asian highway to expand road freight in the region.<sup>180</sup>

### 6.3. Impacts and challenges

The key challenges for sustainable freight transportation are overloading, environmental damage, road and rail infrastructure capacity improvement as well as improved legislation and enforcement.

Overloading poses a great challenge to freight transport in this region as it damages the road pavement and increases the likelihood of accidents. In Laos, heavy overloading is a key problem. The government responded by lowering the load limit to 8.2 tons per axle which is lower than the 9.1 tons in Thailand and Viet Nam. This resulted in a lower number of overloading incidences. However, a lack of enforcement and reduced surtax for overloading remains a threat to inefficiency. Excessive loads on the vehicles conjures a culture of tolerance towards traffic violation and by allowing this, there is a tendency that other regulations, such as those related to emission, speeding and licensing, are likely to be breached.

The improvement of road infrastructure remains a key challenge in many South-Eastern Asia countries. In Cambodia, the road transport industry is embryonic and inefficient, reflecting the poor state of the network and comparatively low levels of transport demand. Most goods are carried on old, overloaded trucks with low levels of utilization.<sup>181</sup> In Timor Leste, the lack of proper regulations related to vehicle loads resulted in deterioration in pavements, which is made worse by lack of funding and resolve for road maintenance.<sup>182</sup>

Connectivity, integration and social equity are other significant challenges in freight transport efficiency in this region. For example, in Bangkok (Thailand) there is a concern that local logistics providers are not able to compete with international firms due to their lack of connectivity and inability to offer total-solution services<sup>183</sup> while international firms operate vehicle fleets with improved technology for vehicle navigation and freight tracking.

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176. ASEAN, 2005.

177. TNT, 2009.

178. Viet News, 2010c.

179. Yun, 2009.

180. Venkatesh, 2010.

181. World Bank, 2010d.

182. World Bank, 2005.

183. The Nation, 2007.

Improved international trade also adds strain on the urban transport infrastructure.<sup>184</sup> To promote international trade and improve logistics operations, central governments have given priority to development of long-distance road and rail links, as these are valued more highly by international logistics companies and investors. The result of this is less attention is given to urban freight development and urban transport infrastructure. For example, in its transportation master plan, the Laotian government has given priority to developing connectivity with China but little attention to developing the transportation infrastructure of Vientiane.<sup>185</sup>

There are possibilities of international freight companies, as part of their corporate social responsibility, to introduce vehicles operating on clean fuel, e.g. compressed natural gas in their fleet. However the lack of proper infrastructure to support such technologies, e.g. insufficient charging stations, may deter such sustainable initiatives from being carried out. For example, despite its investment to increase the vehicle fleet in Viet Nam,<sup>186</sup> DHL has not deployed clean fuel vehicles as it has done in India where there are sufficient charging stations.<sup>187</sup>

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184. Nogales, 2004.

185. Asia News Network, 2010.

186. SFBJ, 2007.

187. DHL, undated.



## 7. Land-use and Transport Planning

### 7.1. Brief overview

Often, integrated land-use and transportation planning spring out of need rather than vision. It is usual that roads are planned because they are already congested or there is a lack of connectivity between areas. On the other hand, transportation connectivity offers new opportunities for urban activities resulting in urban developments. While transportation development and urban development are intrinsically linked, planners often grapple with the problem of treating the two as an integral whole.

With increasing urbanization, serious competition over land and the way it is used makes such integration more needful. The presence of a formal institutional structure can make such integrated planning more effective. But, even when there is a will, the planning process can be handicapped by a lack of knowledge of the issues and a lack of expertise to plan and to implement the plans.

It is easier to plan when urbanization is at its early stage, as in the current situation of the Pacific islands. In South-Eastern Asia countries, where there is already a high degree of urbanization, it can be challenging to plan with many constraints present in the system.

One of the outcomes of planning is the transportation infrastructure and in particular, an upgraded road and rail network, the quality of which depends very much on the commitment of the government to develop the transport system and on the availability of funding to expand on and rehabilitate the existing one. The existing infrastructure may also be seriously damaged by conflict, as in the case of Laos, and natural disasters as in several of the Pacific islands.

### 7.2. Trend and conditions

Thailand has a well-established transport infrastructure in the Bangkok area with an excellent network of paved roads and expressways and rail transit lines.<sup>188</sup> Nevertheless, road speeds in central Bangkok are low at 17.2 kilometres per hour in the morning and 24.2 kilometres per hour in the evening.<sup>189</sup> Furthermore, even though 97.5 per cent of the roads are paved, the quality and capacity of the roads still needs upgrading. There is a need to disperse metropolitan communities to new towns and to establish new central transport terminals.<sup>190</sup> The expansion of urban rail lines beyond central Bangkok will facilitate this move. There is an increasing trend of interest in integrating public transport infrastructure. For example, recently, the Bangkok Metropolitan Administration has started planning to integrate its public transport network.<sup>191</sup> It also plans to launch a single ticket for the BTS Skytrain and bus rapid transit services in early 2011 and with the subway at the end of 2011. The network integration is aimed at changing traveller's pattern from private cars to public transport services with improved access, convenience and comfort. The Thai government has set aside a budget of US\$12 billion for mega projects including the expansion of its rail network. There is also an increasing interest in deploying information technology in transport. For example, for the roads, the strategy is to deploy information technology to increase the capacity of existing roads and to preserve road assets through sustainable maintenance and long-term contracts. There is also a move to increase competition and transparency in the award of road contracts.

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188. World Bank, 2010e.

189. World Bank, 2010e.

190. ONESDB, 2001.

191. Lueng-uthai, 2010.

The city of Chiang Mai is also currently going through the Sustainable Urban Transport Project which aims to enhance the technical capacity of Chiang Mai Municipality to develop and implement sustainable transport plans with an efficient bus transit system and non-motorized transport covering walking, bicycles, bicycle taxis.<sup>192</sup>

Metro Manila (the Philippines) has a network of radial and circumferential roads connecting 16 other cities and municipalities, and accommodating a total 15 of million people. A recent World Bank report has noted the poor transportation infrastructure in the Philippines. There appears to be no comprehensive land-use and transport planning except a medium-term development plan (2004–2010) which prioritizes infrastructure projects that will stimulate trade and investment in Metro Manila. The target is to ‘decongest the Manila area’ with the expansion of rail and road infrastructure.<sup>193</sup>

It is more difficult to formulate a unified policy for Indonesia with its many islands and diverse urban centres. Many transport projects in the past are undertaken at the local levels, e.g. in Jakarta, Ciawi, Bogor, Cikampek, Karawang, Surabaya and Malang. Most of the urban developments are in Java which has 17 per cent of the land mass but 27 per cent of the roads. Land-use and transport planning appears weak, if at all present, among the many Indonesian cities, including its capital Jakarta.<sup>194</sup>

Of the 38,000 kilometres of roads in Cambodia, 52 per cent are in poor condition.<sup>195</sup> While this percentage may not be the same for urban areas, it is indicative of the general state of the road infrastructure, even in urban areas. During the rainy season the urban road condition becomes even worse due to flooding in Phnom Penh and other major cities as road maintenance is sporadic.<sup>196</sup> Urban transport is primarily road-based. Phnom Penh has 864 kilometres of roads but only 36 traffic signal intersections and is considered the least developed urban road network in the region.<sup>197</sup> There is already evidence that Phnom Penh is facing congestion problems. Some US\$20 to US\$45 million has been set aside for road rehabilitation plans to convert more roads to all-weather ones.<sup>198</sup> Nonetheless, there is no formal transport policy, which means that transport planning is problem driven and *ad hoc* in nature.<sup>199</sup> There is also no consideration on transport financing. The city-wide transport master plan tends to focus on better management of the transportation system rather than strategic planning and integration of the transportation system with land use.

In major cities like Ho Chi Minh City and Ha Noi in Viet Nam, roads are the only means of accessibility and there is an increasing interest in road infrastructure development. For example, the current policy is to reserve 15 to 25 per cent of the land for road infrastructure. With rapid economic growth forecast for Viet Nam, it is reported that, increase in travel demand will put a serious strain on the road network, especially if more cars are introduced as a result of increased affluence.<sup>200</sup> However, there are initiatives to integrate city traffic hubs with the aim to increase transport efficiency. For example, in 2010, Ha Noi has started work on its ‘Nhon-Hanoi Station urban railway project’<sup>201</sup> in an effort to ease traffic congestion in the capital city. The 12.5 kilometre route will pass through densely populated areas of the capital like the districts of Hoan Kiem, Dong Da, Ba Dinh, and Cau Giay and will target the

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192. GEF, 2010.

193. World Bank, 2010f.

194. World Bank, 2010c.

195. Chhoeurn, 2007.

196. Travel State, 2010.

197. Chhoeurn, 2007.

198. Chhoeurn, 2007.

199. World Bank, 2010d.

200. Truong, 2008.

201. Viet News, 2010a.

Figure 15. Integrated bus interchange and commercial complexes at Boon Lay MRT station, Singapore



*Photo: by author.*

burgeoning transport needs of suburban dwellers, encouraging them to use public instead of private transport. The route will also be linked to other rail and bus routes. The central city of Viet Nam, Da Nang, is also planning to build four metro routes with a total length of 90 kilometres.<sup>202</sup> However, although there is an ‘Environmental Sustainable Transportation Plan’ up to 2020, there is no clear policy on road development except for a programme to upgrade roads suitable for the elderly and disabled to address the social equity problem.<sup>203</sup> Instead, an urban rail system is being looked at in Ho Chi Minh City. Even in implementing the plans, Viet Nam faces a number of obstacles; the most important is the lack of knowledge and understanding in planning and environmental impact, and the lack of technical capability to bring about the planned changes.

The major urban development in Myanmar is in Yangon and Mandalay but the two areas are rather different. Yangon is more car dependent with 133,000 cars out of vehicle population of 181,000 while Mandalay is motor-cycle dependent with 217,000 motorcycles out of vehicle population of 282,000.<sup>204</sup> Transport measures are largely confined to resolving existing traffic issues, like insufficient and illegal parking and expansion plans in form of adding bus lines and taxi fleet are rather short term in nature.

The road network in Laos has been damaged due to years of war and neglect but the roads are gradually being upgraded to all-weather ones.<sup>205</sup> In Vientiane (Cambodia), the high proportion of motorcycles makes the roadway network somewhat disorganized, but the ease of motorcycles to redistribute themselves among less congested areas result in better utilization of the roads.<sup>206</sup> Development of the urban road network may encounter difficulties because national resources may favour intercity development over urban development. For

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202. VCCI News, 2010.

203. Truong, 2008.

204. UNCRD, 2008e.

205. World Bank, 2010a.

206. Toda, 2008.

example, at the national level, the ‘Laotian Transport Plan’ for 2020 seems to focus more on improving intercity connectivity than on urban development. This is largely to do with the national drive to facilitate international trade and travel, especially in the construction of the Asian road and rail networks.

By far the most successful country with integrated land-use and transport planning is Singapore. One of the examples of such integration is the integrated bus interchanges which are linked to almost all forms of surrounding facilities, e.g. shopping malls etc. along with easy connection to mass rapid transit (MRT) stations and taxi facilities. There are currently four integrated bus interchanges and another two will be open by 2011.<sup>207</sup> However this city-state too has undergone decades of early struggles in urbanization before reaching the current stage of an integrated system.<sup>208</sup> Even so, transportation developments must be progressive to accommodate the new aspirations of the citizens in a sustainable manner.<sup>209</sup>

In the Pacific islands, land-use and transport planning is nearly non-existent, except for Guam and Fiji. Guam has a 2030 Transportation Program<sup>210</sup> guided by the US Federal Highway Administration and Federal Transit Administration. In Fiji, the feasibility of a mass transit system along Suva-Nausori corridor is currently under consideration.<sup>211</sup> This is expected to bring economic enhancement through the integration of these two urban zones.

In larger areas, like Papua New Guinea, Vanuatu and Samoa, urban transportation planning is limited to the development of road maintenance programmes. There is a lack of funding for the maintenance of roads. Elsewhere, low traffic volumes makes transport planning less urgent and priorities tend to focus on developing better inter-town or inter-island connections which tend to bring about greater economic benefits.

### 7.3. Impacts and challenges

The need for land-use and transport planning is only understood among the more developed economies in the region. Singapore, Thailand, the Philippines, Viet Nam and Laos have articulated their long-term plans to develop more sustainable transportation systems. However there remain several challenges which will make planning and implementation difficult.

Many of the long-term transportation plans do not explicitly consider land-use planning as an integral component in planning. This deficiency will lead to future coordination problems. Already there are signs of poor coordination among the different agencies involved in places like Bangkok (Thailand) and Metro Manila (the Philippines). The result of this is poor connectivity in the transportation network, e.g. between rail and road modes or even between different urban rail lines as in Bangkok.<sup>212</sup> This may also imply a need for institutional strengthening in tandem with capacity building.

The most common and perhaps obvious challenge is one of funding. Many governments are not able to fund mega infrastructure projects completely and have to resort to international loans or private sector participation for supplementary, if not total funding for the projects. The need for borrowing has perhaps forced governments to consider sustainability issues more seriously as funding agencies now insist that this be addressed before funding approval. This is seen clearly in the presentation of national strategic plans of Viet Nam, Laos,

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207. Lim, 2008.

208. Chin, 1998.

209. LTA-SG, 2008.

210. GTP, undated.

211. MWT-FJ, 2010.

212. Cobb, 2010.

Cambodia, the Philippines and even Thailand. Even where the transportation projects may require less capital as in the Pacific islands, some demonstration of benefits in sustainability is required.

The intensity of urbanization is weak in many of the smaller economies, especially in the smaller Pacific islands. The need for a comprehensive land-use and transport planning is less urgent. The challenge, however, is to raise the knowledge base of the transport authorities, if not the government as they have not demonstrated sufficient understanding of sustainability issues and the impact of these issues on urban development.

## 8. Social Sustainability of Urban Transport

### 8.1. Brief overview

Social sustainability is the ability to ‘*reflect a concern about the rights of individuals and communities to enjoy the pursuit of healthy and socially rewarding lives, free from discrimination, danger, crime and anti-social behaviour*’.<sup>213</sup> From the perspective of social sustainability, transportation projects should enhance the quality of life by ensuring safety and health to all road users, provide good access to key services, ensure equity between different community and generation groups as well as encourage citizen participation in decision making. The concept of social sustainability is relatively new although road safety and community severance have long been considered in transportation planning. This chapter addresses the aspects of urban transport that impacts upon the quality and sustainability of urban society.

Private motorized vehicles are not the most socially friendly modes because of its exclusive nature. Moreover, because of the negative consequences of road accidents, there have been numerous attempts to make private vehicles safer. Making private vehicles safer may be the vehicle manufacturer’s responsibility but safe operation will involve proper driver training and effective enforcement against anti-social behaviour. In South-Eastern Asia, there are adequate evidence that road safety objectives are given high priority in the transportation plans.

Similar to private vehicles, public service vehicles must also be made safer but this responsibility lies not so much with the passengers but with the service providers. There are good practices in South-Eastern Asia that ensure buses are roadworthy. However public transport security does not seem to be articulated in any of the transportation plans. With better technology and dedicated right-of-way, urban rail systems are a safer and more secure mode of travel than buses. Since there is a high degree of sharing and can be made affordable to a large population, they will also promote social equity.

Figure 16. Safety helmet laws are not strictly followed in Ho Chi Minh City, Viet Nam



*Photo: by author.*

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213. Housley and Atkins, 2007.

Commercial vehicles, like other classes of vehicles can be made safer to operate and hence may contribute towards social sustainability. There are adequate legislations to ensure safe operation of such vehicles especially when transporting hazardous cargoes. However, in some countries, overloading of trucks can be a hazard to other road users and for this, enforcement is somewhat lacking.

Being cheaper and more affordable, informal transportation modes may contribute towards social equity and improve access for the lower-income groups. However, the rules governing their operations, e.g. permissible loads and speeds are either lax or not strictly enforced. Non-motorized transport if operated in a safe environment can be more socially friendly.

Proper land-use and transport planning can promote social sustainability since transportation facilities will be better integrated into the community areas to enhance a high quality of living. However, there is little evidence in South-Eastern Asia that such planning, e.g. complete streets and traffic calming schemes have been introduced, except to some extent in Singapore. However, specific transportation infrastructure may be designed well to be socially equitable, e.g. light rail transit stations usually take into account the needs of the disabled and the elderly. There are limited examples that land-use and transport planning in the region has involved or even encourage citizen participation.

## 8.2. Policies, programmes and practices

There are numerous cases in Thailand which demonstrate that transportation projects are socially sustainable in some respect. The Bangkok Metropolitan Administration is planning to integrate its public transport network.<sup>214</sup> The city is initiating transport projects over the next few years to boost the number travelling by public transport through a better integration of bus and rail networks, and an integrated ticketing system across transport modes. Improved access and hence enhanced travel experience can benefit a larger segment of society, though it is unclear if the cost of such systems may also alienate the lower-income groups. Road safety in Thailand is also given a high priority through continued driver education and road safety audit requirements<sup>215</sup> and can bring about some social benefits particularly to the vulnerable road users who may belong to lower-income groups. In Chiang Mai, the Sustainable Urban Transport Project is expected to enhance technical capacity of Chiang Mai municipality to develop and implement sustainable transport plans, as well as increased the role of more effective and socially equitable forms of urban travel such as improved bus transit system and non-motorized transport.<sup>216</sup>

In the Philippines, the provision of the light rail transit lines to improve accessibility in the Metro Manila area is a good example of social sustainability. Marikina City has introduced a pedestrian and bikeway system that is not only a safer transportation scheme than private transport but may also facilitate better people-to-people interaction on a more human scale.<sup>217</sup> The integrated terminal at Iligan city is also a good example of providing better connectivity for the residents, which in turn may encourage greater social interaction.<sup>218</sup> To meet the aspirations of Davao city dwellers, the Davao Sustainable Urban Transport project,<sup>219</sup> is held as one that will make Davao City a sustainable city that promotes

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214. Lueng-uthai, 2010.

215. UNCRD, 2008c.

216. GEF, 2010.

217. UNCRD, 2008d.

218. Wikipedia, 2010c.

219. ADB, 2010.

Figure 17. Security system at Singapore buses



*Photo: by author.*

accessibility, affordability and social-acceptability to transport improvement options.<sup>220</sup> In 2013, Cebu City will set up a Cebu City Traffic Management Coordination Committee to improve the traffic operations, as both public and private sectors come under the same umbrella for better coordination and monitoring of traffic management plans, review of traffic engineering and management schemes and routing of public transport.<sup>221</sup> This is cited as an example that demonstrates greater public participation in the traffic management process and hence better understanding among different social groups.<sup>222</sup>

Improved connectivity may encourage greater social interactions across geographical barriers. In Viet Nam, the plan to construct a city subway for Ho Chi Minh City to be ready by 2013 is aimed at bringing about improved access for a larger population.<sup>223</sup> Similarly, the city of Ha Noi also plans to increase the public transport system capacity to meet the target of 55 per cent of travel demand by 2030 and 65 per cent thereafter, from the current 10 per cent.<sup>224</sup> Ha Noi's planned Nhon-Hanoi Station urban railway project is expected to bring together neighbouring districts of Hoan Kiem, Dong Da, Ba Dinh and Cau Giay, resulting in improved connectivity between communities.<sup>225</sup> The 2020 Ha Noi city plan also include schemes to introduce roadside walkways to promote safe walking, which can facilitate interactions at a human scale, compared to highways. In the area of road safety, which can have significant social benefits, Viet Nam has launched a new campaign to encourage more responsible road behaviour, particularly drink-driving prevention.<sup>226</sup> The Ho Chi Minh City transport department has decided to change street nameplate designs to increase legibility of street signs<sup>227</sup> and make transport safer and more socio-friendly.

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220. Positive News Media, 2011.

221. Cebu City Government, 2010.

222. Vergel, 2007.

223. Wikipedia, 2010b.

224. Vietnam Business News, 2010.

225. Viet News, 2010a.

226. Viet News, 2010b.

227. Viet Nam Society, 2010.



Figure 18. Real-time bus arrival information displayed at a bus stop in Singapore



Photo: by author.

In Myanmar, although the city planning of Yangon is not very comprehensive, there are programmes to improve road safety to reduce accidents by 50 per cent and deaths by 25 per cent and to improve social benefits.<sup>228</sup>

In Laos, the strategy to improve road safety in Vientiane translating into short-term as well as medium- and long-term action plans with continuous reviews demonstrates a sustained effort towards safety.<sup>229</sup> The strategic plan also includes a multi-agency project to study the social impact of transportation infrastructure. Furthermore, in promoting a people-friendly urban transport system, the Ministry of Public Works and Transport is also tasked to review road designs to incorporate the needs of pedestrians, cyclists and disabled people as well as to conduct a feasibility study on the introduction of pedestrian walkway and bicycle routes. There are also projects to improve public awareness and education programmes related to road matters and to encourage citizen participation in environmental and road safety initiatives.

In Jakarta, the planned mass rapid transit system finally approved in 2008 will bring about improved access for the populace.<sup>230</sup> The project is one solution to solving the chronic congestion problem in Jakarta which is claimed to be affecting the long-term health of city dwellers and officials due to stress.<sup>231</sup>

In Singapore, in the Land Transport Master Plan, the vision is to develop a more people-centred transportation system.<sup>232</sup> Giving greater considerations to the senior citizens as well as the physically challenged are some ways of ensuring that a more socially sustainable transportation is being provided.

Experiments of car usage reduction in the form of car-free days have been introduced in Jakarta (Indonesia), Surabaya (Indonesia) and Chiang Mai (Thailand) although many of these are events associated with 'World Car-free Day' rather than transportation schemes to restrict

228. UNCRD, 2008e.

229. MPWT, 2008.

230. MRT Jakarta, 2010.

231. Cochrane, 2009.

232. Lim, 2008.

Figure 19. Car free day at Jakarta, Indonesia



Photo: Gunawan Kartapranata. 2010. Jakarta Car Free Day, Wikimedia Commons, [http://commons.wikimedia.org/wiki/File:Jakarta\\_Car\\_Free\\_Day.jpg](http://commons.wikimedia.org/wiki/File:Jakarta_Car_Free_Day.jpg).

vehicle use.<sup>233</sup> As private motorized transport may not be socially equitable, such measures may have some social benefits.

### 8.3. Challenges

Providing social equity of transportation is often overlooked. Even in Fiji where there is equal access to education, there is no policy to access equality in public transport.<sup>234</sup> It is likely that with the use of advanced technology in the transport system, the social inequality may increase, if some segments of society are not conversant with the new technology.

Benefits from transportation developments may not always be perceived similarly by the different social groups. The lack of communication and common understanding has led to the stalling of the toll road project in Surabaya (Indonesia) for several years when the residents and mayor objected to the scheme.<sup>235</sup>

The lack of proper procedures and transparency in implementing policies and plans may cause fragmentation within society as disagreements become entrenched. This was the case in Indonesia when the people disagreed over the manner private developers can influence the urban development process.<sup>236</sup>

The challenge in social sustainability is often difficult as the needs of different segments of society must be taken care of. For example, the bus rapid transit system in Cebu (the Philippines) was planned specifically to integrate social needs and address environmental concerns. In particular, it will give accessibility to the neighbouring towns and cities around Cebu. However, concerns were raised about the social impact on displaced bus drivers and *jeepney* operators due to the bus rapid transit line.<sup>237</sup> Measures need to be taken to help those who are displaced by the introduction of new plans.

233. Jakarta Post, 2008 (Jakarta); Chamidha, 2003 (Surabaya); World Car-free Day, 2010 (Chiang Mai).

234. Fiji Times, 2008a.

235. Jakarta Post, 2010a.

236. Jakarta Post, 2010b.

237. Lato, 2010.

## 9. Urban transport and the environment

### 9.1. Brief overview

In many South-Eastern Asia cities, carbon emission from the road transport sector is becoming an increasing concern. The contribution in the transport sector is significantly high, although varying among South-Eastern Asia cities. For example, in Viet Nam the carbon emission from the transport sector has increased tenfold, from 2 million tonnes in 1980 to 20 million tonnes in 2005 while that from other sectors in the same period, has only increased fivefold, from 12 million tonnes to 60 million tonnes.<sup>238</sup> Over the same period, in the Philippines and Viet Nam, the contribution of carbon emissions in the transport sector has increased from 15 per cent to 37 per cent and 14 per cent to 25 per cent, respectively; while in Malaysia it has remained the same and in Indonesia and Thailand it has decreased from 26 per cent to 22 per cent and 28 per cent to 26 per cent, respectively.<sup>239</sup> Road transport contributes more to carbon emissions than rail transport. For example, in Viet Nam and the Philippines, road transport accounted for 92 per cent of total transport emissions with rail transport sharing only 0.8 per cent.<sup>240</sup>

There is also a need to reduce energy consumption from the transport sector. Among the South-Eastern Asia countries, transport energy consumption is high. In 2005, Malaysia has transport energy intensity (units of energy required per unit GDP created) of 53 kilotons oil equivalent per billion US\$, Thailand has 38 kilotons oil equivalent per billion US\$, Indonesia, 34 kilotons oil equivalent per billion US\$, Viet Nam, 28 kilotons oil equivalent per billion US\$ and the Philippines, 22 kilotons oil equivalent per billion US\$.<sup>241</sup> For Singapore, this figure is 37 kilotons oil equivalent per billion US\$ according to 2009 estimate.<sup>242</sup> Fuel consumption is often taken as a direct measure of carbon emission. Among the different modes, road-based vehicles contribute more to energy usage. For example in Thailand, the transport sector accounts for about 25.4 billion litres of fuel per year and road-based vehicles used more than 99 per cent. Energy demand forecast for 2025<sup>243</sup> shows that the demand of the transport sector in Thailand is expected to reach 64.7 megatons oil equivalent nearly 2.5 times increase from 1995. In Fiji, the transport sector consumed 17.1 per cent of energy in country, which may not be particularly high by international standards, but significant to be considered for reduction.<sup>244</sup>

Another big concern in urban transportation is air pollution, which results in reduced air quality, threats for human health and well-being, diseases and premature mortality. In Vientiane, rapid increase in vehicles has resulted in serious decay in air quality.<sup>245</sup> In Cambodia, it is recognized that vehicle emissions have a serious impact on the environment, health and eventually on economic growth.<sup>246</sup> In most mega cities of South-Eastern Asia, as in Bangkok (Thailand), two-stroke motorcycles, diesel trucks (both heavy and light duty) and aging bus fleets have been identified as major contributors to air pollution.<sup>247</sup> Recent stringent emission control efforts are reducing these emission levels to some extent, for example, the

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238. World Bank, 2010g.

239. Timilsina and Shrestha, 2009.

240. World Bank, 2010g.

241. Timilsina and Shrestha, 2009.

242. Economist Intelligence Unit, 2010.

243. Srisurapanon and Wanichapun, undated.

244. Fiji Times, 2009.

245. UNCRD, 2008a.

246. Chhoeurn, 2007.

247. ERIA, 2008.

Figure 20. Increased number of cars affecting the urban environment of Kuala Lumpur, Malaysia



*Photo: by author.*

average ambient concentration of PM<sub>10</sub> and PM<sub>2.5</sub> have been reported to decline over the period 1997–2007.<sup>248</sup>

Another concern is noise pollution. In Vientiane, Laos, the noise level is between 79.5dB and 85.0dB, which is much above the international norm of 70dB. In Viet Nam, noise pollution from transport has been reported to be a serious urban concern which needs urgent attention.<sup>249</sup>

## 9.2. Policies, programmes and practices

To combat air pollution in urban areas, governments have adopted strategies to control emissions at source, to use alternative clean energy and to reduce motorized travel demand. The first requires a set of stringent vehicle emission standards which may be applied at the point of vehicle import. The standards adopted among South-Eastern Asia countries are varied. The Philippines and Cambodia follow the Euro I emission standard while Indonesia, Malaysia and Brunei follow the Euro II standard. Viet Nam and Thailand adopt the more stringent Euro III standard. Thailand plans to upgrade to the Euro IV standard by 2012. In Singapore, the emission control initiatives appear to be the most stringent adopting Euro IV standard since 2006. However, Myanmar currently has no emission standard and the practice in the Pacific islands is unclear.<sup>250</sup>

The initiatives in maintaining fuel quality is also varied among South-Eastern Asia nations. In Laos, the national fuel standards are: (1) minimum octane number of 87 for regular gasoline and 94 for premium gasoline, (2) maximum lead content of 0.15 g/l and sulphur content of 0.5 to 0.15 per cent by weight for both regular and premium gasoline and (3) minimum octane index of 47<sup>251</sup> and maximum sulphur content of 0.25 per cent<sup>252</sup> for diesel.

248. CAI-Asia, 2006c.

249. Truong, 2008.

250. ERIA, 2008 (Thailand); The Business Times, 2010 (Singapore); UNCRD, 2008e (Myanmar). The Euro I standard was applied in Europe in 1993, Euro II in 1996, Euro III in 2000, Euro IV in 2005, and Euro V in 2008.

251. UNCRD, 2008a.

252. UNEP, 2010a.



Figure 21. Variable Message Sign (VMS) in Singapore



Photo: by author.

The Laos government is planning to produce and use bio-fuel under the ‘sustainable tree plantation and livestock promotion’ programme.<sup>253</sup> In Cambodia, the maximum sulphur content for diesel fuel is 0.15 per cent since 2004.<sup>254</sup> On emission control, Thailand has banned leaded gasoline and the standard for sulphur content in diesel is reduced to 0.035 per cent<sup>255</sup> and for petrol fuel it is maintained at 0.05 per cent<sup>256</sup> since 2002. In Manila, emission controls set the maximum hydrocarbon emissions from vehicles operating in urban areas at 7,800 parts per million and maximum sulphur content of automotive diesel fuel at 0.05 per cent by weight since 2004.<sup>257</sup> In Malaysia, the maximum sulphur content in diesel fuel is maintained at 0.05 per cent since 2005 which is planned to reduce to 0.005 per cent by 2012.<sup>258</sup> In Myanmar currently the maximum sulphur content of diesel fuel is higher at 0.2 per cent.<sup>259</sup> In Viet Nam, the sulphur content in diesel fuel is 0.05 per cent since 2007.<sup>260</sup> Singapore has set the maximum sulphur content at stringent 0.005 per cent for diesel fuel since 2006. For petrol fuels current maximum sulphur content is 0.05 per cent which has been planned to reduce to 0.005 per cent by end 2012.<sup>261</sup>

The move towards more environment-friendly fuel options is also receiving growing attention in South-Eastern Asia urban transport policies. In Phnom Penh (Cambodia), there have been recent initiatives by the taxi operators and private car owners to convert their engines to run on gas.<sup>262</sup> The incentive is that the price of gas is half that of petrol and private garages facilitating this by providing charging services for gas. As *tuk-tuks* are the biggest polluters in Bangkok (Thailand), their numbers are reduced and the remaining are required to

253. Concern Worldwide, not dated.

254. Bathan, 2010.

255. UNEP, 2010a.

256. Warapetcharayut, 2008.

257. CAI-Asia, 2006d.

258. UNEP, 2010a..

259. UNEP, 2010a.

260. Bathan, 2010.

261. The Business Times, 2010.

262. Sokha, 2006.

run on liquefied petroleum gas (LPG) since 1980s.<sup>263</sup> From 2003, the government has promoted the use of gas alternative fuel in the transport sector. Currently, about 10,000 vehicles, mainly taxis, city buses, and municipal garbage-collection trucks run on natural gas. In Manila (the Philippines), the use of natural gas is promoted under the Natural Gas Vehicle Program for Public Transport, while initiatives on the use of LPG in automotive fuel are led by the private sector.<sup>264</sup> In Malaysia, an environment friendly version of diesel called 'ENVO Diesel' comprising 5 per cent palm oil and 95 per cent petroleum diesel was introduced in 2006, which emits less carbon monoxide (CO), hydro-carbon (HC) and nitrogen oxides (NO<sub>x</sub>).<sup>265</sup> The natural gas vehicles are also promoted and currently there are 30,600 natural gas vehicles on the road.<sup>266</sup> Myanmar's plan for a better urban environment involves the use of cleaner fuel.<sup>267</sup> In the short term, it plans to use compressed natural gas in place of petrol and diesel and in the long term, bio-fuel. However, the targeted extent of conversion is unknown. In Ho Chi Minh City (Viet Nam), environmentally sustainable measures include the conversion of street lamps to the less-polluting and more energy-efficient LED (light emitting diode).<sup>268</sup>

There is also diversified range of initiatives in travel demand management and modal shift in South-Eastern Asia cities with an aim to reduce emissions from urban transport. On reducing motorized travel demand, Vientiane (Laos) promoted the concept of 'environmental and people friendly urban transport infrastructure' with the target to achieve 6 per cent of total travel by cycling, 19 per cent by walking compared to the existing walking to work of 2.8 per cent.<sup>269</sup> Vientiane has also planned to introduce new efficient and environment friendly modes like the hybrid bus and the light rail transit.<sup>270</sup> In Bangkok (Thailand), the strategy for environmentally sustainable transport is to have better public transport services thus reducing the vehicle-kilometres travelled by cars.<sup>271</sup> Improved traffic management in the city and toll charging have been reported to contribute to lesser vehicle-kilometres travelled for cars.<sup>272</sup> Efforts to reduce motorized travels include public campaigns promoting car pools, car-free-day and walking as well as introducing tax penalties and incentives to promote cleaner vehicles and fuels.<sup>273</sup> Elsewhere in Thailand, e.g. in the city of Udon Thani, there are programmes to promote non-motorized vehicles such as cycle rickshaws.<sup>274</sup>

Vehicle engine management, inspection and maintenance, roadside monitoring and regulation on noise level are some of the legislative measures that are being used to reduce environmental impact from urban transport. In Bangkok (Thailand), since 1993, all cars are installed with catalytic converters and over 80 per cent of motorcycles are now operating on the less environment polluting four-stroke engines.<sup>275</sup> Roadside inspection for smoky vehicles is carried out every day in Bangkok. In Manila (the Philippines), to improve air quality, fines collected from emission violators is added to the Air Quality Management Fund which works for restoration, research, outreach, technical assistance as well as for regulatory activities for

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263. ERIA, 2008.

264. CAI-Asia, 2006d.

265. Kalam and Masjuki, 2011.

266. UNCRD, 2008f.

267. UNCRD, 2008e.

268. Viet Nam News, 2010b.

269. UNCRD, 2008a.

270. UNCRD, 2008a.

271. ERIA, 2008.

272. ERIA, 2008.

273. CAI-Asia, 2006c.

274. SUTP, 2008.

275. ERIA, 2008.

air pollution control.<sup>276</sup> Under the 9<sup>th</sup> Malaysia Plan, measures to reduce air pollution from mobile sources were introduced.<sup>277</sup> This includes the introduction of 51 automatic air quality nationwide monitoring stations including roadside stations in major cities. Commercial vehicles are subjected to six monthly inspections for emissions. In Singapore, a chassis dynamometer smoke test in vehicles has been implemented in place of free acceleration smoke test since 2000.<sup>278</sup> In traffic noise management, Myanmar adopts a maximum noise level 115dB but how this is enforced is not clear.<sup>279</sup>

American Samoa, Palau, French Polynesia, Northern Mariana Islands, Federated States of Micronesia and Guam<sup>280</sup> are moving towards using clean fuel (gas or hybrid fuels) vehicles, especially in new buses.

### 9.3. Challenges

South-Eastern Asia countries face several challenges in pursuing environmentally sustainable transport.

One major challenge is the lack of understanding or even awareness of environmental sustainability. This may result in plans devoid of environmental considerations or programmes without sufficient technical details to be carried out effectively. Lack of such awareness at the political level may result in a weak institutional set up to promote environmentally sustainable transportation. This appears to be the case with Laos which has no national noise standard<sup>281</sup> and government sector to champion environmentally sustainable transportation. It is true also in Cambodia which has no research and monitoring capability for health and environmental<sup>282</sup> and there is limited knowledge on the effect of pollution and noise on public health.<sup>283</sup> There is also a lack of public awareness on environmental and transportation laws.<sup>284</sup>

Even in countries which have vehicle and emission standards, some of which are quite stringent, the quality of enforcement is uncertain. For example, in many South-Eastern Asia countries there is lack of adequate institutional and instrumental set-up for inspection and maintenance, as in Vientiane (Laos) which have only 10 inspection centres and no roadside inspection controls.<sup>285</sup> Vehicle inspections cover only 25 per cent of the vehicles and vehicles are inspected only once in two years. Myanmar has also been reported on poor inspection and maintenance facilities. In Myanmar there is no legal instrument or institutional mechanism to monitor air quality.<sup>286</sup> In Cambodia, instances of unregulated conversion of engines in motorcycles to four-stroke ones have led to leakage with release of hydrocarbons into the atmosphere.<sup>287</sup>

Another challenge is the lack of infrastructure to support clean-fuel vehicles. For example, in Thailand which has ambitious plans to improve air quality and promote clean fuels, there are currently insufficient gas stations which are concentrated in Bangkok and few

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276. Krupnick et al., 2003.

277. UNCRD, 2008f.

278. The Business Times, 2010.

279. UNCRD, 2008e.

280. DOI, 2006.

281. UNCRD, 2008a.

282. UNCRD, 2008b.

283. Sokha, 2006.

284. Chhoeurn, 2007.

285. UNCRD, 2008a.

286. UNCRD, 2008e.

287. CAI-Asia, 2006b.



conversion facilities to attract more alternative-fuel vehicles. Similarly, the inspection and maintenance stations in Cambodia are also not decentralized for the convenience of drivers.<sup>288</sup>

In many South-Eastern Asia cities, there is no reliable information on vehicle usage, which is really the key determinant for measuring sustainability. Hence, even if the vehicle population is maintained, higher vehicle usage will still result in greater damage to the environment. Congestion charging may only influence traffic flow at specific points on the road network unless the whole areas are covered, e.g. by entering the city centres from particular points. With vehicles re-routing to avoid the charge points, it is uncertain if actual travel distances are reduced. Hence transportation efficiency from reduction in congestion effects may be compensated by inefficiency due to increased travel distances. There is a need to conduct studies at the network system level to assess the overall environmental effect.

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288. CAI-Asia, 2006b.

## 10. The Economics of Sustainable Urban Transport

### 10.1. Brief overview

Economic sustainability has to do with efficient distribution and use of resources, in this case in transportation projects. While economic assessments may be more familiar and possibly used in some of the South-Eastern Asia countries for prioritizing projects, economic sustainability is less understood. This becomes a challenge in considering this aspect of sustainability as there appears to have been little study or documentation made in South-Eastern Asia and Pacific which are directly related to economic sustainability issues. The following sub-sections reveal a brief overview of the economic investments and evidences for economic impacts and sustainability of urban transport in this region.

The expenditure in urban transport in South-Eastern Asia cities can be varied but tend to be related to GDP. In the fiscal year 2010, the total expense in Singapore's urban land transport was S\$4,653 million, which is 1.5 per cent of the country's GDP, of which S\$4,186 million and S\$467 million, respectively, are for the development and operation purposes.<sup>289</sup> In year 2004, the total expenditure in road transport of Bangkok Metropolitan Region was 10.2 billion Thai baht.<sup>290</sup> In Viet Nam, the proposed investment in the urban transport infrastructure development in Ha Noi and Ho Chi Minh City over 2011–2020 period is 423,595 billion Vietnamese dong, which is 32 per cent of the total transport sector investment of Viet Nam.<sup>291</sup> Over the period of 1999–2004, the average annual investment in the transport sector of Malaysia and Thailand comprised of 1.9 and 1.7 per cent of GDP respectively, although the specific share in urban land transport is not known. Except for Singapore, Brunei and the Pacific islands, the total transport expenditure is often handled by national, provincial and local governments and the urban specific information is often not segregated, as in the case of Viet Nam.<sup>292</sup>

Revenues from urban transport are generated in the form of taxes and toll roads. Singapore incurred S\$1,716 million and S\$1,729 million of revenue collection in 2010 from vehicle quota premium and motor vehicle related taxes, respectively, the total of which holds 1.0 per cent of GDP and 8 per cent of total government operating revenue.<sup>293</sup> The annual revenue from toll-roads in the form of electronic road pricing is about S\$100 million dollars.<sup>294</sup> In Bangkok Metropolitan Region, the total revenue from urban transport in year 2004 was 33.6 billion Thai baht.<sup>295</sup> In year 2009, the total revenue from all Indonesian toll roads was US\$360 million although the urban share is not known.<sup>296</sup>

Shifting from private to a greater dependence on public transport will bring about a better and more sustainable use of economic resources as there are more opportunities of sharing. There is evidence that some governments are encouraging the use of public transport by investing in public transport infrastructure and in improving public services, as seen in the

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289. Singapore Budget, 2011. At an exchange rate of S\$1.22 per US\$ (as of 10 May 2011), this translate into US\$3,814 million, US\$3,431 million, and US\$383 million respectively.

290. World Bank, 2007. At an exchange rate of 40.76 Thai baht per US\$ (as of 30 June 2004), this translate into US\$263 million,

291. World Bank, 2006. At an exchange rate of 16,000 Vietnamese dong per US\$ (as of 30 June 2006), this translate into US\$26.5 billion,

292. Luu, 2008.

293. Singapore Budget, 2011. At an exchange rate of S\$1.22 per US\$ (as of 10 May 2011), this translate into US\$1,407 million, US\$1,417 million, and US\$82 million respectively.

294. Ee, 2008. At an exchange rate of S\$1.36 per US\$ (as of 30 June 2008), this translate into US\$73.5 million.

295. World Bank, 2007. At an exchange rate of 40.76 Thai baht per US\$ (as of 30 June 2007), this translate into US\$824 million,

296. Jakarta Post, 2010d.

Figure 22. Integrated bus hub in Kuala Lumpur, Malaysia



Photo: by author.

case of Singapore.<sup>297</sup> This is perhaps the most promising approach to economic sustainability. However the huge capital investment in road and rail infrastructure may also impose a heavy burden on the financial resources of the country and thus far, the issue on whether this is too much for the next generation to bear has not been well addressed in South-Eastern Asia.<sup>298</sup> There is also a need for sustainable structure of sources for financing the subsidy of urban public transport, as reported in the case of Ho Chi Minh City and Ha Noi in Viet Nam.<sup>299</sup>

Informal transport services can be small businesses offering employment opportunities to the lower-income groups.<sup>300</sup> This supports the objective of economic sustainability. However unregulated services can also result in poor service quality and other negative impacts, such as increased likelihood of accidents, as for example, increased road safety hazards caused by *tuk-tuks* in Vientiane (Laos) and increased emissions due to the use of poor-grade fuel, as seen in Manila (the Philippines).<sup>301</sup>

Non-motorized transport such as walking and cycling are considered economically sustainable modes, as they support sound human health and increase productivity.<sup>302</sup> Many South-Eastern Asia cities – such as Singapore, Vientiane (Laos), Marikina (the Philippines), and Mandalay (Myanmar) – are promoting cycling and pedestrian walkability.<sup>303</sup> However, there are limitations in their use, especially when trips are long and beyond the normal range of operation. Reliance on non-motorized transport is found more in the Pacific islands where built-up areas are smaller. Nevertheless, there are opportunities to promote walking in urban areas and to a limited extent cycling in tropical South-Eastern Asia.

Compared to moving people, it is easier to achieve more efficient deployment of resources for moving goods and hence commercial vehicle transport. This is because freight transport is more influenced by the business sector. In South-Eastern Asia, there is evidence

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297. Wong, 2009.

298. Kiggundu, 2009.

299. World Bank, 2006.

300. World Bank, 2010b.

301. ADB, 2005 (Vientiane); Camagay et al, 2005 (Manila).

302. UNEP, 2010b.

303. Wong, 2009 (Singapore); Toda, 2008 (Vientiane); UNCRD, 2008d (Marikina); UNCRD, 2008e (Mandalay).

Figure 23. Ticketing area of integrated bus hub in Kuala Lumpur, Malaysia



*Photo: by author.*

in some countries that the more established logistics providers are using more fuel-efficient vehicles and deploying intelligent devices to facilitate optimized deliveries.<sup>304</sup> However, this cannot be said of smaller logistics operators or retail transporters who by their nature and size of business may not consider it so important to support global economic sustainability, as in the case of Vientiane (Laos).<sup>305</sup>

Integrating transport with land use can minimize trips and trip length, increase efficiency and this contributes towards better use of resources, in terms of land and infrastructure. Again, there is economic loss if such transportation infrastructure does not support a high quality of life, without which, no amount of tax incentives and benefits will be able to attract foreign investment.<sup>306</sup> Many of the more developed South-Eastern Asia cities – such as Singapore, Bangkok (Thailand), Kuala Lumpur (Malaysia), and Manila (the Philippines) – are promoting integrated transport-land use developments.<sup>307</sup>

Economic sustainability is still an area not completely understood in the region and the planning of much of the transportation infrastructure does not seem to go along well with land-use planning. This will form a major challenge in the effort of promoting economic sustainability. Nonetheless, there is some evidence of resource optimization, when transparency and competition is incorporated into the award of infrastructure contracts.

## 10.2. Policies, programmes and practices

The growing urban transportation problem in terms of congestion, accidents and environmental damage will exert an economic impact on the region, especially so among the rapidly expanding cities. Congestion in Metro Manila (the Philippines) cost US\$12 billion a year in 1996 or 4.6 per cent of the GDP.<sup>308</sup> Similarly the congestion in Jakarta is estimated to

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304. TNT, 2009.

305. Carruthers et al, 2004.

306. The Nation, 2010.

307. Wong, 2009 (Singapore); Paha, 2011 (Bangkok); The Star, 2010 (Kuala Lumpur); and Guzman, 2011 (Manila).

308. UNCRD, 2008d.

be US\$1.4 billion in 2005.<sup>309</sup> The economic cost of accidents is also high taking into account the loss of current and future resources resulting from accident occurrence as well as medical, property damage, administrative costs and human costs of suffering.<sup>310</sup> For example, in Singapore the cost per traffic fatality is S\$1.273 million while that of a serious injury and a slight injury is S\$163,000 and S\$12,000 respectively.<sup>311</sup> Among South-Eastern Asia cities, in 2005 Phnom Penh (Cambodia) suffered 105,800 car accidents and 380,000 motorcycle accidents increasing to 122,800 car and 448,000 motorcycle accidents in 2006.<sup>312</sup> In Yangon (Myanmar) 2,498 injuries and 208 fatalities were registered from road accidents in 2008 and this is likely to be grossly under-reported.<sup>313</sup> It has been reported that the bad conditions of the roads are to be blamed for 45 per cent of accidents in Thailand.<sup>314</sup> Similarly, poor road surfaces have made the roads a death trap.<sup>315</sup> The amount of pollution generated in cities like Bangkok (Thailand), Manila (the Philippines) and Ho Chi Minh City (Viet Nam) is also high. Bangkok emits 10,000 tons of particulates from traffic each year.<sup>316</sup> In Viet Nam about 20 million tons of carbon is emitted from transport sources and these are concentrated in the urban areas.<sup>317</sup> Converting this to health impact, it is expected that all these will result in high economic costs, although specific estimates are not available.

Nonetheless there are initiatives in some South-Eastern Asia cities in moving towards economic sustainability. For example, Bangkok (Thailand) has introduced a number of measures that can contribute towards economic efficiency.<sup>318</sup> In budgeting US\$12 billion for transportation development to ease Bangkok's transport problem, prioritizing of projects are made along the lines of: (a) working with the private sector so as to tap on the efficiency of the business sector; (b) using information technology and advanced technology to improve efficiency; (c) considering sustainable maintenance and long-term impact; and (d) increasing completion and transparency in awarding projects. The push for rail development will certainly reflect some aspects of these considerations. However, it is still unclear if these are extended to road transport. In Singapore, the move towards integrated land transport system focussing on a shift towards quality public transport options, improving walkability and bicycling, deploying information technologies and discouraging private mode options through vehicular and road pricing mechanisms are some clear movements towards economic sustainability.<sup>319</sup>

In some South-Eastern Asia cities, modernizing traffic system and transportation infrastructure has been realized to facilitate economic sustainability. In Metro Manila (the Philippines), the modernization of transport infrastructure at minimum cost, to move goods and people, was outlined in 2006 to increase the Philippines' international competitiveness.<sup>320</sup> A number of planned projects supporting this strategy will potentially promote economic sustainability. Some of these include the introduction of new technology such as radio-frequency identification for traffic management, the deployment of higher capacity buses such as bus rapid transit and double-decker, the reduction of wasteful travel by integrating

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309. MRT Jakarta, 2010.

310. Chin, 2003.

311. Chin, 2003. At an exchange rate of S\$1.76 per US\$ (as of 30 June 2003), this translate into US\$0.72 million, US\$92,600, and US\$6,800 respectively.

312. UNCRD, 2008b.

313. UNCRD, 2008e.

314. Khamchu, 2010.

315. Viet Nam News, 2010c.

316. CAI-Asia, 2006c.

317. World Bank, 2010g.

318. UNCRD, 2008c.

319. Wong, 2009.

320. UNCRD, 2008d.

Figure 24. Electronic road pricing system in Singapore



*Photo: by author.*

terminals and traffic restriction, the rationing of public transportation routes, as well as the switch to energy-efficient modes and alternative fuels.<sup>321</sup> In introducing area traffic management measures to make the road network more efficient, Cebu City is also a good example to show economic sustainability.<sup>322</sup> Similarly, Cagayan de Oro City has modernized the traffic system that will improve traffic flow and enhance network efficiency.<sup>323</sup>

The use of fiscal measures can raise funds for transportation development and efficiency improvement at the same time applies controls over vehicle ownership and usage. For example, to purchase a vehicle in Singapore, owners pay a hefty sum comprising import duties, registration fees and a certificate of entitlement.<sup>324</sup> The certificate of entitlement is a scheme introduced to limit vehicle growth initially to 3 per cent per year. Further, vehicle usage is controlled by road tax and road pricing, which also serve as a fund-raising source. The electronic road pricing scheme makes use of roadside communication system to interact with the on-board units within vehicle to deduct the relevant congestion charges.<sup>325</sup> Charges vary by time of day, location and vehicle type. The electronic road-pricing scheme has resulted in reduction in traffic flow at the charging points and it is assumed that this has translated to a reduction in travel demand and hence potential improvement in transport efficiency. Jakarta (Indonesia) is also considering an electronic road pricing system but no firm details have been announced.<sup>326</sup>

The Viet Nam National Strategy for Transport Development 2020 specifically addresses the issue of economic sustainability under which several targets are planned.<sup>327</sup> One is the reduction of death tolls in accidents by 30–35 per cent from 2005. Another target is the reduction in vehicular trips by increasing public transport share to 50 per cent and the non-motorized trips to 10 per cent. In addition to these, there are several planned and on-going

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321. UNCRD, 2008d.

322. Cebu City Government, 2010.

323. Word Press, 2010.

324. Motorcar, 2009.

325. LTA-SG, 2011.

326. TTT, 2010.

327. Truong, 2008.

projects targeted at increasing transportation network efficiency which in turn is expected to improve mobility, trade, productivity and reduce travel time and fuel loss in congestion, all of which will eventually uplift economic growth. The proposed transportation infrastructure in Ho Chi Minh City will include new tram routes, elevated roads, metro lines and upgraded traffic intersections, according to the city Department of Transport.<sup>328</sup> Similarly, Da Nang is planning to build four metro routes with a total length of 90 kilometres.<sup>329</sup> The ‘Nhon-Hanoi Station urban railway project’ in Ha Noi will ease traffic congestion and enhance economic development in the capital city.<sup>330</sup>

In Yangon (Myanmar), motorcycles, trishaws and bicycles are prohibited from entering the central business district.<sup>331</sup> This traffic restriction scheme is one way of improving traffic efficiency and hence economic viability in the city but may not be socially equitable.

In Fiji, the feasibility of a mass transit system along Suva-Nausori corridor is currently under consideration,<sup>332</sup> and this is expected to boost its economic sector.

Guam has several economically sustainable initiatives by improving efficiency in vehicle use, for example, promotion of carpooling and sharing through facilitation and public information programmes, introduction of park-and-ride facilities to encourage use of public transit service, development of small neighbourhood zones to reduce travel, installation of tune-up centres to facilitate and advice on vehicle efficiency and maintenance.<sup>333</sup>

Most of the Pacific islands do not consider economic sustainability explicitly in their planning strategy, if there is one. Nevertheless, there are some practices that may support economic sustainability. In those islands which have a tourism industry, some of the residents are providing transport services for tourists using their own vehicles. Such enterprises encourage sharing of resources between personal and enterprise use.<sup>334</sup>

### 10.3. Challenges

Economic sustainability has not been well articulated in many of the transportation plans. Nevertheless, some of the measures and programmes introduced in Thailand, Viet Nam and the Philippines do support economic sustainability objectives of optimizing economic resources and reducing waste. However there are other aspects of economic sustainability that may not have been addressed or perhaps difficult to measure. Employment creation, economic prosperity and economic stimulation<sup>335</sup> also serve economic sustainability. One of the greatest problems faced by many of the transportation planners is the lack of comprehensive understanding of economic sustainability so that it is not specifically articulated in the plans and assessed in the implementation of the plans. There is a need to build capacity among the transportation planners in the region.

Even when economic sustainability objectives are spelt out in some of the transportation plans, the lack of evaluation programmes will make it difficult for these objectives to be validated. Specific data have to be gathered in the process. For example, it is important to determine the increase in efficiency following the implementation of radio-frequency

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328. Vietnam Financial News Network, 2010.

329. VCCI News, 2010.

330. Viet News, 2010a.

331. Wikipedia, 2010d.

332. MWT-FJ, 2010.

333. GTP, undated.

334. Virtual Tourist, undated b.

335. Rodrique et al, 2009.



identification technology in toll charging in Manila (the Philippines).<sup>336</sup> A more difficult case would be to assess what and how much resources are saved by making contract bidding in Bangkok (Thailand) more transparent and competitive.<sup>337</sup> It is unclear if any evaluation study is planned, even for the simple case of computing fuel saved at the system level, for example following the introduction of double-decker buses in Manila.<sup>338</sup>

Economic measures that impose user charges to bring about equity may not be always welcome. Although successfully implemented in Singapore, policies restricting vehicle usage are considered harsh measures and do not receive public acceptance.<sup>339</sup> Jakarta (Indonesia) intends to implement some form of road pricing to control congestion in the city centre but this has met with public resistance.<sup>340</sup>

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336. UNCRD, 2008d.

337. Meakin, 2005.

338. UNCRD, 2008d.

339. Yasutsugu et al., 1999.

340. Primanita, 2009.

# 11. Urban Transport Institutions and Governance

## 11.1. Brief overview

Ensuring transportation projects are sustainable will require strong institutional support to reduce the likelihood of them collapsing during or even after their implementation. The key functions of urban transport institutions involve soliciting and coordinating participation and ownership of projects, building capacity and training stakeholders, aligning with government policies, monitoring and managing financial processes, developing management and organizational structures, studying social and other impacts, managing new technologies, managing external political and economic factors and managing uncertainties and continuity. The following sub-sections provide a brief overview of the institutional strengths and weaknesses with regards to the urban transport sustainability of South-Eastern Asia.

In South-Eastern Asia, the institutional structure is rather varied for a number of reasons. There are different forms and levels of government as well as development histories, e.g. colonial rule and influence, and the evolution of the political process. For example, Singapore has made numerous changes in the ministries overseeing urban transport,<sup>341</sup> while the Philippines Ministry of Transportation and Communications has for two centuries overseen the transportation needs of Manila.<sup>342</sup>

It is also common that many of the responsibilities related to transportation are entrusted to different ministries such as transport, environment, land control, police and labour, often resulting in coordinating problems. For example in Jakarta (Indonesia), transport planning, financing and development processes are divided among the Ministry of Public Works, Ministry of Home Affairs, National Land Agency, Ministry of Trade and Industry, National Planning Agency and the Ministry of Agriculture.<sup>343</sup>

Besides government ministries, there are also numerous transport operations associations, trade associations and non-government organizations that may exert significant influence over the urban transportation planning process. For example, Singapore has numerous non-governmental organizations, such as Motor Traders Association, Automobile Association, Singapore Logistics Association and National Transport Workers Union. Vientiane has a *tuk-tuk* association<sup>344</sup> and Fiji has a taxi association.<sup>345</sup>

Institutional changes are sometimes a result of a specific need, one of which is public transportation. Consequently, many countries have set up specific public transportation agencies to oversee the various aspects of planning, financing, licensing and operation of public transportation. In Singapore, the Public Transport Council, linked to the Land Transport Authority, is set up to regulate the bus and train operations.<sup>346</sup> In an attempt to promote public transport for 'a better coordinated and managed public transport system' in Kuala Lumpur (Malaysia), a Land Public Transport Commission, was formed recently.<sup>347</sup> In Penang (Malaysia), a Citizen for Public Transport non-governmental organization was also formed to represent the public transport users.<sup>348</sup> A similar public transport body, the Metro Manila Transit Association, has been proposed to oversee public transport operations in

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341. Chin, 1998.

342. DOTC, 2011.

343. Susantono, 1998.

344. Lee, 2007.

345. Fiji Times, 2007.

346. Chin, 1998.

347. Yunus, 2010.

348. Pemudabbendera, 2006.

Metro Manila (the Philippines) because the current institutional structure is not streamlined to tackle public transport issues.<sup>349</sup>

## 11.2. Policies, programmes and practices

With a single-level government taking a pragmatic approach to tackling transportation, Singapore has the strongest institutional structure for transportation. The Land Transport Authority under the Ministry of Transport has authority over all national transport planning processes and vehicle operations matters, including vehicle registration and public transport planning and operation.<sup>350</sup> The model adopted in Singapore is that whenever the need arises, an inter-ministry committee is set up to coordinate the different agencies involved in the programme. In an attempt to provide a more people-centred transportation system, the Land Transport Authority has, in recent years, been engaging various focus and user groups in public consultations on many transportation issues.

With a single-level government, Brunei has fewer problems in coordinating the different agencies involved in the transportation projects. The Land Transport Department is solely responsible for urban transport and traffic management, which works under the Ministry of Communications.<sup>351</sup>

Under the socialist system, Viet Nam has a simple line of authority between the national Department of Transport and the municipal People's Committee. Thus, the urban transport study and master plan that includes budget and recommendations for land space allocation for transport, proposed by the local Land Transport Department of Ha Noi need only be presented for approval to the local People's Committee, National Transport Ministry and finally the Prime Minister's Office.<sup>352</sup> There are also examples of good collaborations between ministries on transportation sustainability programmes.<sup>353</sup> For example, the programme spearheaded by the Ministry of Transport, on health impact assessment and economic damages due to air pollution was done in collaboration with Ministry of Health. Another Ministry of Transport programme to monitor air quality in road networks was done together with the Ministry of Natural resources and Environment. In a programme to control emissions from vehicles and motorcycles in large cities (primarily Ho Chi Minh City and Ha Noi), the Ministry of Transport worked with the Provincial People's Committee of those cities. The Ministry of Transport also has several work programmes on road safety with the National Committee for Transportation Safety, and an Urban Transport Planning and Management programme with the local governments. The funding support for transportation projects in Ho Chi Minh City from donors and banks, including the promotion of public-private partnerships, is perhaps testimony to the strong institutional set up found in Viet Nam.<sup>354</sup> The Viet Nam government also demonstrates leadership in getting things to work. For example, in order to improve the public transport in Da Nang city, a Public Transport Authority was recently set up at Da Nang.<sup>355</sup>

Even though there are different levels of government, Myanmar's style of government seems to provide strong institutional coordination on urban transport issues. For example, the Road Traffic Administration Department is empowered to carry out air quality control in Yangon.<sup>356</sup> Riding on the Vehicle Emission Control under the Motor Vehicle Law (1964) and

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349. Lira, 2010.

350. LTA-SG, 2008.

351. Government of Brunei, 2010.

352. Vietnam Business News, 2010.

353. Truong, 2008.

354. DOT, 2009.

355. SUTP, 2010b.

356. UNCRD, 2008e.

Motor Vehicle Rules (1989), the Road Traffic Administration Department is tasked with annual inspection of vehicles, random roadside checks and to strictly enforce this through punitive measures. Also, with the Road Traffic Administration Department taking a more active role in use of compressed natural gas, some 14,884 compressed natural gas vehicles were introduced with 38 charging stations.

On the other hand, the collaboration between ministries in Thailand is weaker.<sup>357</sup> The urban transport function is undertaken by several key ministries: Ministry of Transport with specific responsibilities on highway planning and construction, land transport operations, including bus operations and vehicle registration and licensing, Prime Minister's Office overseeing the planning of mass rapid transit. While the Department of Highways is responsible for major transport infrastructure management, the Department of Land Transport is solely responsible for the systematization and regulation of land transport at the country level. At the municipal level, local administration will include transport management so that, Bangkok has the Bangkok Metropolitan Administration and Chiang Mai has the Provincial Land Transport Office of Chiang Mai.<sup>358</sup> Major sustainable urban transport projects are coordinated between several levels of government, for example, the on-going Chiang Mai Sustainable Urban Transport Project, is undertaken by Chiang Mai City municipality in coordination with Office of Transport and Traffic Policy and Planning of Thailand.<sup>359</sup> The Bangkok Skytrain system (BTS) is operated not by the Bangkok Metropolitan Administration but the national Mass Rapid Transit Authority.<sup>360</sup>

In Manila (the Philippines), the Metro Manila Development Authority is responsible for development planning including transportation and traffic management and urban renewal and land-use planning. But it does not have full jurisdiction for the transport sector<sup>361</sup> which rests with the Department of Public Works and Highways, the Department of Transport and Communications which oversees Light Rail Transit Authority, the Land Transport Office in charge of vehicle registration and licensing, the Land Transport Franchising and Regulatory Board which regulates the operation of public transport vehicles and the Department of Interior and Local Government which supervises the national police that runs the Traffic Management Command.

In Fiji, all forms transport planning and developments are undertaken by Ministry of Works and Transport.<sup>362</sup> The ministry also has an urban planning unit. It also works in coordination with Fiji Department of Energy. In Papua New Guinea, while the Department of Works is responsible for transport infrastructure development and maintenance, urban traffic management and sustainable transport planning is undertaken by the Office of Urbanization and the Department of Transport and Civil Aviation.<sup>363</sup>

In most of the Pacific islands, there is no separate department or ministry to regulate urban transport. Transport functions are often managed in conjunction with tourism or communication department. For example, in Kiribati, the Ministry of Communication, Transport and Tourism is responsible for transport management along with many other functions. In Solomon Islands, the Ministry of Infrastructure Development is responsible for transport planning and management. In the case of Guam, Northern Mariana Islands and American Samoa, the transport functions are managed and regulated by the US Department of

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357. Meakin, 2002.

358. LTO-CM, 2010.

359. GEF, 2010.

360. <http://www.bts.co.th/en/corporate.asp>, last accessed 13 May 2011.

361. Meakin, 2002.

362. MWT-FJ, 2010.

363. UN-HABITAT, 2010b.

Transportation. They only have local transport authorities (e.g. Guam Transit Authority) to coordinate the operational plans. The lack of agencies empowered to carry out specific functions in transport planning may lead to confusion, delays and conflicts at the implementation stage, resulting in wastage of resources.

### 11.3. Challenges

One of the major challenges is the coordination of roles between the national, provincial and municipal governments. There are no clear models in this as each country struggles to organize its ministries to oversee transportation plans and projects. The coordination weaknesses between the different levels of government in the Philippines and Thailand<sup>364</sup> may not be easily resolved as these are directly linked to the elected political parties in government.

Weak institutional structures can delay project execution, even if the plans are sound and feasible. For example, in Vientiane (Laos), the Water Resources and Environmental Administration is responsible for establishing noise standard but despite much monitoring of noise levels in Vientiane done in 2002, it has yet to establish a national noise standard.<sup>365</sup>

The difficulty faced when there is a weak institutional set up is illustrated in the Cambodian report at the Environmentally Sustainable Transport Forum.<sup>366</sup> While there is a national policy on emission control, the programmes were weak in implementation due to a lack of institutional support at the local level which also may not have the capacity to follow through on the programmes. In particular, emission controls were not sufficiently detailed and rigorous, e.g. emission standards are not differentiated by vehicle type so that there is confusion when it comes to inspection. Also there was poor enforcement because there was no mechanism to allow vehicle inspections to cover the entire vehicle population. The solution was to set up a National Environmentally Sustainable Transport Working Group to strengthen institutional cooperation.

Weak institutional structures can also give rise to conflict of interest in following through of programmes. For example, German Technical Cooperation (GTZ) has highlighted this problem for the Surabaya Road Traffic Office in administering the road worthiness inspection programme (Indonesia).<sup>367</sup> While it is logical to transfer authority on administering road worthy inspections from the Provincial to the municipal government, the move has been resisted.

Despite instances of weak institutional set up, there are good examples of how progress can still be made in the pursuit of sustainability in urban transportation. One good way is to take ownership of the sustainability agenda at the local level. This is seen in Nakhon Ratchasima (Thailand), where the mayor and his city government set out to make the city environmentally sustainable and to initiate programmes to gain public acceptance.<sup>368</sup> Another example is Surabaya. The Department of Transport in Surabaya (Indonesia), under the direct administration of the governor of Surabaya, championed various initiatives, such as Car Free Days and the Blue Sky Programme for air quality management by actively involving the communities and other government ministries.<sup>369</sup>

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364. Meakin, 2002.

365. WREA, 2009.

366. UNCRD, 2008b.

367. GTZ, 2001.

368. UNCRD, 2008c.

369. Chamidha, 2003.

Another challenge is the lack of technical know-how. This is particularly evident in countries with lower GDP. Officers in the various ministries need to be trained not just in capabilities in planning, design, monitoring, and assessment, but also in understanding sustainability issues. This is extremely important as sustainability concepts can only gain acceptance by the people, politicians and local business, only if there are ambassadors of sustainability in the country. In Laos, the lack of technical know-how at different levels of administration has resulted in fragmentation in implementation of the emission control programme.<sup>370</sup> Similarly in Myanmar, there is no unit to undertake air quality monitoring.<sup>371</sup> The solution is to build capacity at the different levels so that project implementation can be carried out professionally.

Smaller countries, particularly in the Pacific islands region, may not have the capacity to administer the entire range of transportation functions, let alone address issues of sustainability. For example, in Fiji, the weak institutional set up in the Land Transport Authority has resulted in laws being drawn up but without proper enforcement.<sup>372</sup> Vanuatu is considering the establishment of a Land Transport Authority within the Ministry of Infrastructure and Public Utilities to better organize the road network, improve administration and regulate land transport service, review infrastructure Master Plan to prioritize projects and construct new roads.<sup>373</sup> This move may have been motivated by the difficulty to obtain loan assistance.<sup>374</sup>

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370. UNCRD, 2008b.

371. UNCRD, 2008e.

372. Fiji Times, 2008b.

373. Jasons, 2010.

374. ADB, 2009.

## 12. Towards Sustainable Urban Transport

This concluding part summarizes the findings of the regional conditions and trends and associated policy responses and presents the future policy directions towards a sustainable urban transport. Several courses of actions are also recommended.

### 12.1. Introduction

The system sustainability of urban transport can only be achieved when the 3 elements – environmental sustainability, economic sustainability and social sustainability are adequately addressed. A sustainable policy or programme is one that can be implemented in the long term with sufficient available resources such as financial and administrative capacity. On the other hand, they must not create wastes or undesirable consequences which will have long-term effect on the society.

Countries in South-Eastern Asia have undergone high economic growth and rapid urban developments. Some countries like Viet Nam, Cambodia and Laos are expected to experience sustained growth in the next decade. While the Pacific islands have a lower level of economic growth compared to the South-Eastern Asia countries, they are also experiencing some degree of urbanization. These urban developments, accompanied by an increase in population within the urban areas will require sufficient transportation infrastructure to serve the travel needs of the people. Hence in the next decade or so, there will be a high demand for transportation infrastructure expansion and upgrading as well transportation services, which in turn will need billions of dollars of investment. There are already many projects and programmes that have been committed, if not due for delivery.

The South-Eastern Asia and Pacific region, which has some of the fastest growing economies in the world, will have to embrace the increasing demand for travel with strong resolution in the urban transportation policies, plans and programmes. The future transportation systems need to be designed to meet the basic travel demands as well as they need to be planned and operated in a sustainable manner, i.e., one that will not consume resources beyond what the current generation can absorb and without weakening the ability of the future generations to maintain.

The amount of available resources and the capacity to absorb the waste and undesirable consequences will differ widely from country to country within the South-Eastern Asia and Pacific region, largely because of the different stages of urban and economic developments. Hence, it is likely that each country will have to adopt its own strategy towards sustainable urban transportation developments. Nevertheless, there is greater urgency among those economies with high rates of urbanization, to formulate sustainable strategies and pursue sustainable programmes.

### 12.2. Need for action

The critical understanding of the sustainability in the urban transport context, mixed with the holistic consumption of the relevant facts about the South-Eastern Asia and Pacific region will help to identify opportunities to promote sustainable transportation in this region. What is most vital is ‘sustainable thinking’ in the urban transport planning that will lead to ‘sustainable policies’ and eventually to ‘sustainable actions’.

Several courses of action are recommended:

- Concepts of sustainability must underpin all urban transportation policies and these need to be properly understood and articulated in the plans at all levels of government



- Institutional changes at various levels of government ministries may need to be introduced along with involvement of non-government bodies to coordinate various urban transportation initiatives and plans. There should be representation from all stakeholders with good communication and working relationships among them. The relevant units and committees should also be empowered to ensure effective follow through of projects. Where capacity needs strengthening, measures to build capacity must be introduced. The local government in Ho Chi Minh City (Viet Nam) recognizes this need.<sup>376</sup>
- While it is natural to give priority and urgent action to areas which are experiencing serious urban decay, attention should also be given to areas which may not face such an imminent threat. For example, in pursuing the national agenda of promoting international trade and improving regional connectivity, Laos is placing priority on the Asian highway<sup>377</sup> and high speed rail projects<sup>378</sup> with less attention on building sustainable urban transportation developments in Vientiane. However, in many cases the national authorities may not be expected to emphasize urban projects, leaving it to the municipal authorities with less funding. The local governments need to take initiative to promote sustainability in their own cities; a good example is Nakhon Ratchasima (Thailand).<sup>379</sup>
- Transportation planning should be well integrated with land-use planning. Spatial planning should promote social cohesion. Developments should be sited to minimize trips and/or to shorten trip length. There is a need to re-examine the way transportation is planned and operated. Bangkok (Thailand) in a recent announcement noted that a new direction of planning must be introduced under the programme 'Bangkok – Getting Ahead'.<sup>380</sup> This is also motivated by the desire to make it a liveable city.
- Considerations to restrict private vehicle usage should be given priority as a planning policy rather than as a knee-jerk reaction to tackling congestion. A good example of this is Singapore with its aggressive car limitation policies in controlling car ownership and congestion charging.<sup>381</sup> This should also be applied in countries where the private vehicles are predominantly motorcycles (e.g. Ho Chi Minh City, Viet Nam).
- The urban transportation policies and practices should promote the use of public transportation. Not only must public transportation services be affordable and accessible by all segment of societies, the public transportation infrastructure should facilitate travel convenience and comfort, e.g. through integrated ticketing and integrated transfers. While the urban rail solutions may provide effective mass movements, the heavy capital investments and subsequent operating costs should be carefully examined to ensure that the country has the capacity to maintain the service. The cheaper form of bus rapid transit can be considered as seen in places like Chiang Mai (Thailand).<sup>382</sup>

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375. Truong, 2008.

376. DOT, 2009.

377. Asia News Network, 2010.

378. AFP Business, 2010.

379. Weerahsak, 2007.

380. The Nation, 2010.

381. Replogle, 2007.

382. Wikipedia, 2010f.

- Non-motorized transportation should be incorporated in urban transportation plans. In high-density urban areas, there are many short trips which can be accomplished without the assistance of motorized vehicles. The tropical climate in the South-Eastern Asia and Pacific region can be a hindrance to greater use of non-motorized transportation but movements can be accommodated by providing all-weather travel and terminal facilities.
- Clean energy should be phased into the transportation system to reduce greenhouse gas emissions. It is relative easy to require newly registered vehicles, especially in the public transportation sector, to use clean energy. Nevertheless, measures including legislations and incentives should be considered to enable a greater buying in of the new technology. Strategies to encourage efficient use of fuels should be considered.
- The use of advanced transportation systems leveraging on the capabilities of information and communication technologies should be considered to improve travel efficiency and safety. Travellers should be able to make intelligent and informed choices of modes and routes so as to minimize unnecessary delays, fuel consumption and risk of injury. Some of these are already deployed in the new urban train systems<sup>383</sup> and in fleet management of international logistics providers.<sup>384</sup> Among the South-Eastern Asia countries, Singapore is the most advanced in its 'intelligent transportation systems' and a new generation of road pricing using global positioning satellites and mobile networks is now being pursued.<sup>385</sup>
- One of the best ways to encourage sustainable transportation is to share information and best practices, especially those concepts that are relevant to the region. In order to achieve this, there is a need for greater study and research on transportation sustainability in the region. The impacts of sustainable policies need to be properly identified and the effectiveness of sustainable programmes needs to be evaluated. At the same time, lessons can be learned from the process of implementing sustainable projects, including best practices and mistakes. There are already a number of studies to measure environmental impacts in the region, especially in the area of emissions, e.g. in Ho Chi Minh City (Viet Nam).<sup>386</sup> Limited work is done on economic impacts, e.g. on accident costing and more can be done to understand the full scope of economic sustainability, e.g. impact on employment. Studies on social sustainability in transportation in the region are less common and many of such studies may require long-drawn longitudinal analysis. It is important to initiate these studies early.

### 12.3. Concluding remarks

More can be done to promote sustainable urban transport. In highly urbanized areas as in major South-Eastern Asia cities like Bangkok (Thailand) and Metro Manila (the Philippines), the need for action is urgent as the adverse consequences of congestion and deterioration of air quality are already evident. However, attention must also be given to emerging urban areas in these countries, such as Da Nang (Viet Nam), Cebu (the Philippines), Surabaya (Indonesia) and Vientiane (Laos), so that sustainable developments can properly integrated into their city planning. On the other hand, even in areas where there is still capacity in the urban environment to absorb more traffic growth, e.g. in the smaller economies among the Pacific islands, it is imperative that the concepts of sustainability be understood and the problems associated with unsustainable developments can be averted.

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383. Channel News Asia, 2010.

384. TNT, 2009.

385. Almenoar, 2010.

386. Duc, 2002.

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