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Traffic safety in Cambodia: effect of public transport facilities

Consultative document on request of the National Road Safety Committee of the Royal Government of Cambodia

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1. Introduction

The Four-Year Report 2006 - 2009 of the Cambodia National Road Safety Committee (ref. 1) shows that the number of traffic fatalities in Cambodia has almost doubled in the last five years. In 2008 an estimated 1638 people were killed and 7200 severely injured. Ref. 1 shortly describes the traffic safety situation in Cambodia.

Traffic characteristics:
- 1.1 million registered vehicles, 20% annual growth
- 79% motorcycles, 13 % cars, 6 % trucks

Fatalities: type of transport:
- 68% motorcycles, 13% pedestrians
- 4 % bicycles, 7% cars

Fatalities: types of collision:
- 35%: motorcycle – 4 wheeler
- 19%: motorcycle - motorcycle

A strong program of traffic safety measures is required and foreseen to prevent a renewed doubling of these figures in the coming years up to 2020. Important measures are about law enforcement (helmet wearing, speeding, drink driving, overloading), driver training and child education. In addition to this set of human behaviour related measures the National Road Safety Committee (NRSC) intends also to view the possibilities of a broader set of measures, including programs of infrastructure improvement and extension of the public transport facilities.

This document gives an estimation of the potential safety effects of extending the public transport bus services.

2. An integrated transport system.

Many countries are in the process of developing a sustainable and safe road traffic system as a component of an integrated transport system. Ref. 2 gives recommendations on sustainable road safety in Cambodia. Ultimately such a road system should be a component of an integrated transport system.
An integrated transport system is based on a vision of how road, water and air transport will be integrated and managed. It also gives a place to public transport facilities, which are needed in combination with private transport to regulate traffic, particularly in urban areas.
The integrated road traffic system provides safe and sufficient facilities for traffic participants of different modalities, i.e. pedestrians, cyclists, motorcyclists, cars, and trucks. Well developed public transport facilities are also a part of such a system. Taken together the mix of public and private transport gives the conditions necessary to regulate and manage traffic and transport streams.
From this perspective public transport is not only to be considered as an important instrument to regulate mobility and safety, but also pollution, parking problems, social problems, etc.
In the integrated transport system a public transport policy may strongly effect modal split behavior, i.e. the choices road users make to use buses, motorcycles, cars, bicycles or walking. As such this policy will also be helpful to improve road safety.

3. Model split effects

Given the present number and use of motorcycles and cars (ref. 3) the introduction of public transport bus service will particularly result in a decrease of the number of trips of motor cyclists, cyclists and pedestrians. The related road safety effects therefore will most strongly become visible in the traffic accidents involving vulnerable road users, i.e. motorcyclists, cyclists and pedestrians.

Table I illustrates the number of fatalities with vulnerable road users involved for 2009. Together these accidents comprise 1498 fatalities, which is 87.7% of the total number of 1717 fatalities in that year.

Table I: number of fatalities with vulnerable road users involved, (ref 3).

Motorcycle x motorcycle		300
Motorcycle x (bicycle + pedestrian)		113
Motorcycle x other modi	1218 – 300	918
(Bicycle+pedestrian) x (Other – motorcycle)	280 – 113	167

		1498

In the EU a well organised public transport system generally takes care of about 8% intercity and up to 18% inner city traveller kilometres (ref. 4). In some high income and strongly motorized countries these percentages are much lower, e.g. USA., but in some medium to low income countries also much higher (e.g. Turkey, Peru, see ref 5). For the Cambodian case we expect that on the long run the public transport system may take care of 12.5% of the traveller kilometres. This estimate is based on the assumption that public transport will be relatively cheap, based on origin-destination routes with high traveller intensities, high bus stop density in cities (every 500 – 800m) and frequent bus stops (every 10 to 15 minutes during rush hour in cities) . Such a public transport bus service will not only effect road safety, but may also be an answer to the mobility needs of the relatively low income people. We assume that 12.5 % of all traveller transport will use a future public bus transport system, including 2.5% additional transport as a result of public transport attracting extra travellers. 10% of the traveller kilometres will replace existing traffic, i.e. short and medium distance motorcycle trips and relative long trips for bicyclists and pedestrians.

4. Traffic safety effects

A 10% reduction in traveller kilometres for motorcyclists, bicyclists and pedestrians will result in the following change of fatality numbers:

81% remainder for motorcycle x (motorcycle + bicycle + pedestrians)
90% remainder for motorcycle x (other – pedestrian – bicycle)
90% remainder for (bicycle + pedestrian) x (other – motorcycle)

This gives a reduction in fatalities of 0.19 x (300+113)=78.5 and 0.10 x (918+167)=108.5. This makes a 187/1717 = 11% reduction in number of fatalities for the total of 2009.

A renewed public transport bus service will also result in more bus accidents. In these accidents the number of fatalities of the conflicting partners is 9 times higher than for the bus passengers. Also accidents may happen with passengers getting off the bus and crossing the street. In European countries the number of fatalities related to bus transport is almost 1% of the total number of fatalities (0.1% passengers, 0.7% other traffic, 0.2% passengers getting off). (ref.6).

For the 2009 Cambodia case a public transport bus service which takes car for 10% of the traveller kilometres would have saved 187 deaths, whereas likely about 17 persons would have been killed as a result of bus-related accidents (on the average 11 to 12 motorcycles, 1 to 2 car passengers, 0 to 1 bicyclists, 2 to 3 pedestrians, and 1 bus passenger).
In developing countries these numbers are sometimes higher as a result of accidents where people fall from over crowded buses or trucks. In India 15% of fatalities are of this nature, i.e. people fall from bus, truck, tractor, or rickshaw). We assume that this type of accidents can be prevented through vehicle design solutions.

Taken together we expect that on the long run a fatality reduction of 10% can be reached as a result of a high quality public transport bus service.

The annual economic savings through this 10% fatality reduction and through the reduction in injured people and vehicle damage will be about $ 25 million[1]. These savings are composed partly of immaterial costs (less pain, grief and suffering) and partly of material costs. In ADB (2004) (ref. 7) the share of material costs did amount to 75%. If the same share applies in 2009 the savings of material costs do amount to about $ 18 million.

In the years 2010 to 2020 the average annual reduction will be 5%, growing from 0% in 2010 to 10% in 2020. The total savings of material costs in this ten year period sum up to $ 90 million. This budget may be used for building a public transport bus service in Cambodia. First investments are needed for the Phnom Penh area and other cities. Intercity bus services may follow later on.

5. Conclusions and recommendations

- A high quality bus service may reduce the number of traffic fatalities with 10%.
- The economic savings of material costs through this 10% reduction sum up to $ 90 million in the period 2010 – 2020.
- These savings can be used for building a public transport bus service.
- First investments are needed in the larger cities. Intercity bus services may follow later.

[1] According to an update by HIB/IMOB of the ADB report from 2004 (ref.7) the total costs of road traffic accidents amount to $ 248 million in 2009.

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