

Combating the Menace of Commercial Motorcycle Safety Challenge

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Abstract—This paper provides an overview of a type of para-transit common in many developing cities of the world. It shows why some of these para-transit are usually preferred by patrons and the operators. It also shows how para-transit generally have challenging operation. Looking at commercial motorcycles as a typical para-transit mode, it identifies its problems to include affordability, pollution, congestion, and accident. It goes further to note that accident is particularly notable amidst its challenges and points out how this is reported, especially in Asia and Africa. Generally, many of the literature reviewed does not show a distinction between motorcycles for public and private use in Asia, unlike it is in Africa. They, nevertheless emphasise the seriousness of the problems identified for motorcycle operation, especially those relating to its safety challenge. Three different attitudes are however identified from government and policy makers in response to the safety problem: some places adopt and regulate commercial motorcycle operation; some ignore it, taking its impact as insignificant; others fail in their attempt to adopt and regulate it. The failure is due to the very narrow nature of some of the measures put in place in these places, as they ignore other elements of the operating environment and their characteristics. But the need to regulate this transport is serious due to the scale of the impact of the safety problem. This paper thus suggests a more broad assessment of commercial motorcycle transport in policy designs to enable its safety problem to be tackled.

Index Terms— commercial motorcycle, para-transit, policy, public transport, regulation, safety, .

1 INTRODUCTION

INCREASING urbanisation and population growth taking place in cities of developing countries across the world has brought about increased transport needs which exceed the capacity of available services in these cities. This is more so as public transport in many of these cities is barely developed, with limited capacity for mass transit (Jones et al., 2014; Fasakin, 2001). The resulting shortfall in the provision of public transport has led to increase in the use of unconventional modes, often referred to as para-transit or informal modes (Fasakin, 2002; Guillen et al., 2013; Yakubu, 2012; Sietchiping et al., 2012). Para-transit modes are described as public transport vehicles which are usually small and majorly owned by individuals and mainly serve short haul routes (Urban Mobility for Indonesia, 2010). Common among these are pedicabs in South, Southeast and East Asia (Doucet et al., 2011), three-wheelers and minibuses in Indonesia, micro and minibuses in Mexico, Thailand, Philippines, and India, minibuses, pickups in Kenya, minibuses in South Africa, (Cervero and Gulob, 2007), three-wheeler, micro and minibuses in Nigeria, and commercial motorcycles in many of these places. These para-transit modes have not only emerged but have also grown in number to become a popular mode of transport in developing countries. In many cities of sub-Saharan Africa, the most dramatic para-transit mode emerging and growing in popularity is the commercial motorcycle (Konings, 2006a, Mahlstein, 2009).

In this paper, the challenges of commercial motorcycles are reviewed and safety challenge is reinforced as the most serious challenge. First, in section 2, the term commercial motorcycle is described and the uses and benefits of this mode are presented. This is followed by a description of the problems associated with commercial motorcycle operations in section 3. Section 4 discusses the subject of regulation and the limitations of some recommendations. Section 5 concludes by challenging on the need to expand enquiry beyond the drivers to the wider environment within which they work. It is important to note that in this

paper, references are made to places where there is no distinction between motorcycles for private or commercial use. In such instance, the characteristics identified for motorcycles cover both commercial and private motorcycles.

2 THE COMMERCIAL MOTORCYCLE: MEANING, USES, AND BENEFITS

Commercial motorcycle is the use of motorcycle for carrying passengers for a fare. This definition agrees with the understanding about the mode across the world (though naming varies). Junior and Filho (2002, p.1566), calling it “motortaxi”, described commercial motorcycle as “public transport services using motorcycles, operated like taxi”. Guillen and Ishida (2004, p.61) called it “habal-habal”, “a motorcycle used for hire”. Other names by which it is known include Ojek in Thailand, Bendskin in Cameroon, and motorcycle boda-boda in Uganda. Commercial motorcycles have become very popular in these places due to their perceived benefits (Junior and Filho, 2002; Konings, 2006a).

Commercial motorcycle is a mode widely acknowledged for many of its benefits. The 2010 report on Urban Mobility for Indonesia notes that commercial motorcycles have the advantage of speed, door to door service and serve narrow roads less accessible to other modes (GIZ, 2010). They play an important role in serving the transportation system as gap filler as well as a source of employment for people. Moreover problems such as poorly developed road network, narrow streets, traffic congestions, and poor standard of public transport which are characteristic of many developing countries not only contribute to the rising number of commercial motorcycles but opens up a gap they are fit to fill (Konings 2006a; Junior and Filho, 2002).

The benefits adduced to commercial motorcycles in Thailand are

similar. Oshima et al. (2007) reports that commercial motorcycles satisfy users demand as a feeder in the narrow-dead-end side-streets that connect residential locations to major streets. Their role in Bangkok was recognised as a major connector in the transport network of that city. In the Philippines, the emergence of commercial motorcycle transport was adjudged a benefit as it provided employment for people as well as serve areas that are not accessible to “ordinary motor mode” (Guillen and Ishida, 2004, p.64). Because they help with the problem of infrastructural gap and serve areas where there are no alternative transport modes, they were described as “not causing any problem in the city and are actually solving mobility issues” (Guillen and Ishida, 2004, p.64). In Brazil, their emergence which dates back to around the year 1996 is described as an uncovering of a “repressed demand for this type of transportation” (Júnior and Filho, 2002, p.1567). Its spread in Brazilian cities is found to be “due to the lower cost when compared to a normal taxi and the higher average speed and route flexibility when compared to a bus system” (Júnior and Filho, 2002, p.1566).

Finally, similar use and benefits have been observed in Africa. Konings (2006a, p.36) states that the introduction of commercial motorcycles in Cameroon is of “great significance to neighbourhood development in that it offers employment and a reasonable secure income... provide a form of transport well adapted to local road condition and the people’s income level...(and) stimulate growth in other economic activities”. Bürge (2011, p.59) describes them as “nowadays enhance(ing) the physical and social mobility of others and themselves” in Sierra Leone. He reports that life in Mekení (Sierra Leone) “came to a halt” on a day when the commercial motorcycle drivers went on strike (p.59).

The discussion above points to the social and economic contexts that make commercial motorcycles readily acceptable to users and drivers. Nevertheless, with these benefits have also come challenges to the operation of this transport mode. These problems are introduced in the following section.

images as separate files.

3 THE COMMERCIAL MOTORCYCLE PROBLEMS AS A PARA-TRANSIT MODE

As mentioned earlier, commercial motorcycles are a para-transit mode. Para transit modes generally have some peculiar characteristics which make them less preferred by policy makers to conventional modes (Sietchiping et al., 2012). They are associated with “collectively damaging behaviour” which is reflected in poorly qualified driver, poor vehicle condition, and poor operating characteristics (Cervero and Golub, 2007, p.445). Drivers are often low skilled people who find a poorly regulated transport system as a ready source of livelihood. In many occasions, they are poorly trained, and have to work several strenuous hours, with some hired operators having to pay as much as “half or more of their daily in-take” to vehicle owners (Cervero 2000, p.47). This spurs competition amidst operators, forcing them to live on the margin of profit with the resulting inability to maintain their vehicles in good condition. This same view is advanced by Kubota and Joewono (2005) who state that para-transit forms of public transport are poorly regulated, poorly controlled, and some

operate illegally in developing countries. They further note that para-transit modes have the reputation of being dangerous and have frequently been accused as the main cause of traffic disturbance. The commercial motorcycle mode particularly exhibits these characteristics (Cervero, 2000) and some of the manifestations in its operation are described below:

3.1 Congestion

Motorcycles have carved a role for themselves in commercial passenger transport service complementing and competing with more conventional public transport forms (Sietchiping et al., 2012; Cervero and Golub, 2007). This competition has led to the view that commercial motorcycles are contributing to congestion problems in developing countries’ traffic (Kumar, 2011). For example, Junior and Filho (2002, p.1566) note that commercial motorcycle’s use is spreading in Brazil due to the perceived “higher average speed and route flexibility when compared to a bus system”, thus taking passengers away from buses. Similarly, Odumosu and Yaro (undated) in a study in Abuja, Nigeria, finds that more people changed from more capacity- efficient shared-taxi and mini-bus modes to commercial motorcycle mode than those from private cars to commercial motorcycle mode. In Asian cities too, (though available information does not put a distinction between motorcycles for private or commercial use with regards to congestion impact) motorcycles are generally regarded as contributing to congestion than bringing about a saving in it in these cities (Iyer and Badami, 2007; Pucher et al., 2007). These evidences suggest that the increasing use of commercial motorcycles might be increasing the number of vehicles on the road and can make congestion worse, thus explaining why the commercial motorcycle is often viewed as contributing to congestion.

However, this view about motorcycle and its congestion effect is not a consensus in motorcycle research. Some researchers are of the view that policies against the use of motorcycles have a way of increasing car use or at least a desire for a car, especially in the long run. In addition, lane-splitting is believed to bring about some savings in congestion through a more efficient use of road space (Sperley and Pietz, 2010). This view is however not supported by studies in high motorcycle population countries. Countries with high motorcycle population (such as Asian countries having up to 60%) adduce to congestion effect of motorcycles. It therefore remains a question whether the congestion effect in these countries is due to the high motorcycle population. However, in developed economies where motorcycle share is very low, (e.g., in UK where it is less than 5% of vehicle population), it should also be asked if congestion saving always applies in traffic, as implied in Sperley and Pietz (2010). The implication is that it is still not known whether the benefit from a motorcycle’s small size can always translate into congestion savings or whether congestion saving is possible only where car owners change to a more space efficient mode (in this case, motorcycles mode) in preference to their vehicles.

Finally, should it be the case that commercial motorcycle mode is contributing to congestions, the size of their contribution would likely vary from place to place depending on their share of traffic and the proportion between motorcycles for private use and those for commercial use. It may not be significant for places such as Brazil where they are less than 2% of the total traffic (Júnior and Filho, 2002). But what will it be in Nigeria where they are close to 20% of registered vehicles (Oni et al., 2011) and Thailand where motorcycles are six times the number of cars (Tien-Pen et al., 2003) and commercial

motorcycles are in this number?

3.2 Affordability

Accessibility is described as the ease of reaching a destination or having more choices in both destinations and modes of travel (Handy, 2002). As cities develop, motorised form of mobility is often required. This is more so with increasing socio-economic activities that characterise developing countries (Jacobs and Greaves, 2003). Commercial motorcycle meets this need particularly in remote settlements and locations with poor access roads and/ or poor/ inadequate public transport supply (Júnior and Filho, 2002; OSHIMA et al., 2007). But Kumar (2011) finds that the fare for commercial motorcycles is usually between 40% and 60% more expensive than conventional buses for some sub-Saharan African countries. Affordability might therefore be a barrier to the level of accessibility this mode is able to offer to poor dwellers in remote areas. While the extent of the seriousness of this is not known, any planning involving integrating commercial motorcycles into public transport may find this issue interesting.

3.3 Pollution

Available information does not always put a distinction between motorcycles for private or commercial use with regards to pollution impact. But, generally, mobility and low operating cost advantages of the motorcycles are seriously diminished by their pollution disadvantages (Saleh et al., 2009; TranSafety, 1998). Nduka and Orisakwe (2010) find ambient level of lead mainly from exhaust fume of vehicles to be above the health standard in some Nigerian cities. While this is not only from commercial motorcycle, their contribution can be significant as their number in traffic increases. In addition, motorcycle generates more of most pollutants than other transport modes (Saleh et al., 2009; Dutta and Bhattacharya, 2009); motorcycles generate between 8 and 48 times the pollution levels of shared taxi and mini-bus respectively per person kilometre travelled. With commercial motorcycles, it is more serious as it was found, in India for example, that a large number of old motorcycles (and three wheelers) still rely on highly inefficient, poorly maintained, and very polluting two-stroke engines. These motorcycles are mainly commercial. Many drivers further increase pollution by illegally adulterating their gasoline fuel with up to 30% kerosene and 10% lubricating oil (Pucher et al., 2005; Pucher et al., 2007; Iyer and Badami, 2007). The situation in India is corroborated by TranSafety (1998) which finds traffic to be responsible for over 90 per cent of the ambient carbon monoxide levels, and between 80 to 90 per cent of nitrogen oxides and hydrocarbons, in city centres, where traffic congestion levels are high. In addition, lead emission from the combustion of leaded gasoline also was found to be responsible for "an estimated 80 to 90 per cent of lead in ambient air." (TranSafety, 1998). Although the use of leaded gasoline is reducing due to the awareness on its health effect, "ambient lead levels (still) greatly exceed the health standard" in most developing countries (TranSafety, 1998). Bearing in mind the higher polluting characteristics of motorcycles used for commercial purpose, its effect on human health and natural resources makes this transport mode challenging.

3.4 Crime

Crime is yet another challenge which is often attributed to rising use of commercial motorcycles. A number of recent bans on commercial motorcycle operation in Nigeria put crime as one of the reasons for the ban (Nwadiaro et al., 2011). Similar instance was reported in China (Xu, 2012). Generally, criminals are found to use motorcycle

as a getaway vehicle after perpetrating their vices (Kumar, 2011; Xu, 2012) and usually commercial motorcycles are blamed for it. In many places, it is difficult to distinguish between motorcycles for private use and those for commercial use (Xu, 2012). Thus, with the growing population of commercial motorcycles, it is possible to blame all crime-related motorcycle problems on commercial motorcycles. For example, it was only on one occasion that a ban on commercial motorcycles operation was extended to privately owned motorcycles in Nigeria¹. How this bias ultimately address the problem of criminality remains to be known. For example, Xu shows how a ban was inadequate to address the problem of crime (Xu, 2009). He studied Tianzhi in China where there were no distinctions between motorcycles for private and commercial use. In this location, a ban was imposed on both commercial and private motorcycles to deal with crime. It, however, turn out to be a short-term solution to crime prevention as criminals found alternative media to perpetrate their criminality. This method of crime prevention known as situational crime prevention theory (Hayward, 2007) has been found to only remove the problem in time and space and often brings it back after some time. In summary, while crime and commercial motorcycles have often been viewed as related, it is not known if they actually are. At least, China instance tend to query this view.

3.5 Accident

Accident is the most commonly reported challenge faced by motorcycle transport in general and commercial motorcycles in particular (Tien-Pen et al., 2003). The initial suspension of the attempt to regulate commercial motorcycles operation in Bangkok as opposed to a ban was premised on the fears about their safe operation (OSHIMA et al., 2007). The share of motorcycle accident in Asian road traffic has been found to be as much as 60% of total road traffic accident (though this includes both private and commercial motorcycles). Commercial motorcycles were regarded as "necessary evil" in Cameroon where drivers were perceived to be notorious for their reckless and dangerous driving that often results in "numerous accident" (Konings, 2006a, p.43). Commercial motorcycle drivers are viewed as usually engaging in high-risk behaviours, unsafe lane-splitting and weave in and out of traffic with little caution, putting passengers and other road users at great risk (Kumar, 2011). They dominate the road space, overtake along the wrong side of traffic, and drive against traffic. This high-risk behaviour largely contributes to the safety problem this mode faces. This has also been expressed in various studies (Verma et al., 2011; Morenikeji and Umaru, 2012).

3.6 Commercial motorcycle safety profile across the world

In this section, the variation across the world in the distinction between private and commercial motorcycles in the literature is first introduced. This is followed by a review of motorcycle safety in Asia.

Commercial motorcycles' occurrence has been reported in more Asian countries than other parts of the world (Xu, 2009; Guillen and Ishida, 2004; GIZ, 2010). However, while commercial motorcycle use is reported in many places across Asia, it does not seem to attract such special attention as it does in some other parts of the world, particularly, Africa. This is more so as there are more literature on motorcycle mode in Asia (usually without distinction between pri-

¹ This information can be confirmed online from <http://africanurbanism.net/2011/07/08/city-wide-motorbike-ban-in-maiduguri-nigeria-aims-to-halt-boko-haram-violence/>. It was accessed on October 10, 2014.

vate and commercial use) than there are on commercial motorcycles. One possibility for this is that commercial motorcycles are less in number compared to private motorcycles in Asia. This is more so as motorcycles are more in traffic than private cars in many of these Asian countries, being 2.43, 1.23, 15.76, 4.27, 5.54, 4.46, and 6.24 times more for Taiwan, Malaysia, Vietnam, China, India, Indonesia, and Thailand respectively (Tien-Pen et al., 2003). Alternatively, it is possible that the behaviour/characteristics of commercial motorcycle drivers in Asia do not differ substantially from private motorcycle drivers there - and so they do not warrant any special/separate study. This second possibility however, does not agree with findings that show that work-related drivers engage in a variety of less safe driving behaviours than the general driving population (Newnam et al., 2014). Whatever the case, commercial motorcycles in Asia do not have problems peculiar enough to warrant special studies as much as is the case in Africa. Notwithstanding, motorcycle mode (which includes commercial and private motorcycles) still have safety problems in these places.

As earlier noted, motorcycle mode is a subject of research in Asia and the literature points to this. For example, in a study conducted in India, Dandona et al. (2006) observe the prevalence of unlicensed drivers amidst motorcycle drivers. In addition, drivers often violate traffic laws, fail to maintain their motorcycles as well as ignore the use of helmet. In the study, half of the drivers acknowledged committing at least one violation within the previous quarter of a year, a situation which might be worse since people tend to under-report their bad behaviours. Similarly, (Verma et al., 2011, p.1373) notes that "inappropriate driving behaviour is considered as one of the major causes of accident in India", citing lack of lane discipline, disregard for traffic laws, and frequent traffic violations amidst others as causal factors. Pucher et al. (2007, p.392) corroborates this saying that the "combination of speed, open exposure and dangerous driving make motorcycle the most dangerous way of getting around" in India and China, with fatalities being about 20% for India and China (Pucher et al., 2007; Pucher et al., 2005). Similar situation about drivers' attitude to traffic law was observed in the Philippines by Guillen and Ishida (2004) who finds that commercial motorcycle drivers ignored the use of helmet and overloaded their vehicles. This disregard for traffic safety might be responsible for the response of users in a study, half of which expressed worries about commercial motorcycle safe operation. In Malaysia and Vietnam, motorcycle accident accounts for 49% and 68% respectively of traffic accident (Tien-Pen et al., 2003). Most of these studies do not make any distinction between commercial and private motorcycles. They are however both present in these countries as shown by Guillen and Ishida (2004).

The situation is a bit different in other parts of the world where motorcycle studies have been conducted with specific attention on commercial motorcycle transport mode. In Brazil, where the rise in the fleet of motorcycle coincided with a "boom in the number of motorboys (a courier commercial motorcycle)" (Breitenbach et al., 2012, p.205), 38.9% of accident victims reported being under the influence of some substance in a previous traffic accident. Konings' (2006a, p.43) study of commercial motorcycle drivers in Cameroon found that young drivers were "renown for driving recklessly; they tend to drive at high speed, ignore traffic lights...exposing themselves and their passengers to untold dangers". They were therefore described as necessary evil by users as they cause numerous acci-

dents so much that a ward in one of the local hospitals in Douala is named after commercial motorcycle accident victims (Konings' 2006a). The distinction in these other studies between commercial and private motorcycles indicates that the safety characteristics of both are different in these places and that it is more serious with commercial motorcycles. Nevertheless, the problem across the world is more with driver (violation) behaviour as chorused in all the references. This view of driver behaviour as the major problem is noted by Mirzaei et al. (2014, p.37) when they note that "Recent researches highlight the need to modify driver behaviour as a major target for traffic safety interventions".

The safety challenge of commercial motorcycle mode is serious enough to undermine its benefits, thus the view of Júnior and Filho (2002). Junior and Filho (2002, p.1571) remark that "The national expansion of the (commercial motorcycles) phenomenon should be analysed with...more...studies. The transport specialists should study, analyse and present solutions instead of ignoring the mode". The following section addresses response to this call and the challenges being faced with these responses.

4 COMMERCIAL MOTORCYCLE REGULATION

In this section, the attitude of regulators to commercial motorcycle operation is first discussed. This is followed by a review of some measures being adopted in commercial motorcycle regulation.

4.1 Attitude to commercial motorcycle regulation

Following from the numerous benefits of commercial motorcycles and their problems, there have been attempts to develop policies that can put this mode within an efficient regulatory framework – a framework that sustains its benefits while minimising the problems. Oshima et al. (2007) show that Thailand was the first country to come up with an attempt. In Thailand, three areas of motorcycle operations were addressed in regulation. These included formalising the operation, improving vehicles' safe operations, and controlling driver behaviour. Specifically, Oshima et al. (2007) note that regulations included setting fares, adopting additional safety equipment for passengers, and setting penalties for traffic violations and other inappropriate behaviours. This example acknowledged the necessity to deal with driver behaviour as part of the regulatory measures. However, the study did not show how the regulation improved driver behaviour. Nevertheless, it notes that the regulation "has noticeably influenced service level" (Oshima et al., 2007, [no pagination]) and so was adjudged successful. But this is not the case for most other places.

In Brazil, Júnior and Filho (2002, p.1569) quote the national lawmakers that "The Council decides, with majority of votes that the present traffic legislation does not contemplate the motorcycle as an appropriate vehicle for passengers transportation". Notwithstanding this resolution, commercial motorcycles' regulation was left to cities' administration's volition: as at 1998, as many as 10% of cities where commercial motorcycles were in use have adopted one form of regulation or the other. But the majority still ignored this mode, preferring to keep "the service in an informal way" (Júnior and Filho, 2002, p.1567). The situation reported by Guillen and Ishida for the city of Davao in the Philippines was not so different. They note that enforcers applied "maximum tolerance" (Guillen and Ishida, 2004, p.63) to the presence of commercial motorcycles even when provi-

sions for motorcycles “such as use of helmet and restrictions on overloading is not strictly followed” (Guillen and Ishida, 2004, p.65). Similarly, the report of Urban Mobility for Indonesia (GIZ, 2010) observes that while commercial motorcycles are growing in number in Indonesia, they do not have any legal permission for operation, indicating that definite regulatory effort has not been undertaken. It therefore proposes a form of regulation that will reduce them by the provision of alternative service for users. Generally, in these places, commercial motorcycle operation does not have any formal regulation yet. Some of these instances also point out that, perhaps, the operation of commercial motorcycles has not been observed to cause any significant problem (as Guillen and Ishida (2004) write). This is not the case in some other places where the problems of commercial motorcycle safety have caused serious worries. Douala (Cameroon) is one of such places.

(Konings, 2006b) notes the repeated clashes between the police and commercial motorcycle drivers, and even revenue collectors in Douala, in the bid to enforce law. This which is related to the flagrant violation by the drivers has come to give the drivers the name “master of the road” and “master of the city” (Konings, 2006a, pp.37, 43). The repeated effort of the police to subject the drivers to traffic law is always resisted by the drivers who feel the police always want to extort them or cheat them in some other forms. Thus the attempt to provide some form of regulation in Douala has not been successful in spite of the reported need for one. In China, the problem was not as serious as Cameroon before commercial motorcycle was ban (Xu, 2012). China’s case was however related to crime management. The above discussion shows three different attitudes to commercial motorcycle operation: in some places, their benefits are acknowledged and some form of regulatory framework is designed to put the problems under control (Oshima et al., 2007; Sietchiping et al., 2012); in some others, policy makers and enforcers behave as if they are not aware (Guillen and Ishida, 2004; Júnior and Filho, 2002); and in the third group, it has been difficult to control commercial motorcycle operation despite repeated attempts. Some places have therefore ignored their benefits and a ban is implemented in response to their problems (Ayodele, 2010; Xu, 2009; Odumosu and Yaro, [undated]). These differences point to the poor performance in regulating the operation of commercial motorcycles. This is despite various studies that have been conducted about commercial motorcycle operation. In the next section, the outcome of some of these studies in terms of recommended regulatory measures are reviewed.

4.2 Regulatory measures in commercial motorcycle operation

Studies on commercial motorcycle transport mode often make recommendations on what can improve its safety. Some specific recommendations include the compulsory use of crash helmet, improved licensing scheme, provision of motorcycle lane, and in the extreme, a ban of commercial motorcycles. Provision of motorcycle lane has often been advocated for in research looking at ways to improve commercial motorcycle operation (Arosanyin et al., 2011). This is based on the premise that an opportunity to separate motorcycle traffic from other traffic can substantially reduce traffic incidences involving motorcycles. This was found to have limited impact however in Malaysia where motorcycle accident still accounts for about 49% of total accident despite separate motorcycle lane (Tien-Pen et al., 2003).

The use of crash helmet is another measure commonly recommended. The use of crash helmet has been shown to substantially reduce

fatality resulting from motorcycles accident as well as the treatment cost. Hyder et al. (2007, p.19) show that treatment cost for motorcycle victims without helmet crash could be as much as three times those with helmet. The use of crash helmet also has the capacity to reduce serious and fatal head injury (Dandona et al., 2006). Nevertheless, crash helmet use does not prevent or reduce the incidence of accident. Tien-Pen et al. (2003) find that accident number fell in the year crash helmet was introduced to Thailand but rose again the following year. Thus while helmet use is an important policy, more is required of the policy makers to reduce the scale of commercial motorcycle safety problem.

Another recommendation Verma et al. (2011) show is that driving test should be enforced before licensing as an important part of the selection process for issuance of driver license. They advocate pre-license training as an effective countermeasure for road safety problems. But Nantulya and Reich (2002) observe that vehicle and driver licensing issues are usually undermined by corruption. As Anbarci et al. (2006) note corruption is a major problem in developing countries’ transport system which also has a relationship with accidents. Enforcing this test would therefore be difficult under a corrupt enforcement system as is the case in many places (Anbarci et al. (2006) lists some examples and illustrations in the study).

5 CONCLUSIONS

Owing to the complexity involved in identifying a suitable measure to reduce commercial motorcycle incidence, a number of studies have either called for a ban or even reported one (Ayodele, 2010; Morenikeji and Umaru, 2012; Xu, 2012). These have often been hinged on the seemingly intractable problem of this mode. This however is at variance with the identified role of this mode as gap filler in many developing country cities. A better understanding of the difficulty with improving the operation of this mode as well as tackling the safety problem is therefore required. Rasmussen for example, asked the rhetorical question: “Do we actually have adequate models of accident causation in the present dynamic society?” He went further to note that the “socio-technical system involved in risk management includes several levels ranging from legislators, over managers and work planners, to system operators. This system is presently stressed by a fast pace of technology, and changing regulatory practices and public pressure”. (p.183). Rasmussen indicates by this that the characteristic of drivers, for example, may be the consequence of many other factors, some of which may not even have a direct link with the drivers. Defining commercial motorcycle service characteristics based on drivers’ characteristics alone without considering the interaction with other system components might make the solution proffered less effective. Speaking in this vein, Leverson (2004) argued that models should not treat just safety events and conditions; rather, the process involved should be treated. This process, according to him, controls a sequence of events and describes system and human behaviour over time. He concluded that safety in a system can be maintained when the process leading to safety compromise is constrained to operate within safety limits. Thus it is not about preventing an event from occurring in the system; it is about maintaining the characteristics of the system. It is therefore suggested that policy recommendations for improving commercial motorcycle safety should look beyond drivers’ behaviour

to the influence of the environment on drivers' behaviour, as well as other associated factors, including the conditions under which the transport mode operates.

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