

# Where Should We Focus For Road Safety Improvement? Case Study Of a Pedestrian Crash Investigation Using Socio-technical Approach In Bangladesh

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## Abstract

Pedestrians, the most vulnerable road user group in road-transport system, are over-represented (about 49%) in road fatalities in Bangladesh. In traditional approaches to road crash investigations, only drivers' speeding and recklessness have been identified as the causes of road crashes. Some other factors e.g. poor road design, vehicle body modification etc. have also been ascertained as secondary causes in small number of investigations by local road safety experts. In this study, a socio-technical systems approach has been employed to investigate a pedestrian crash occurred in Dhaka with an aim to unveil the other factors at higher levels of the road safety system.

## Background

Due to attributing 'over-speeding and reckless driving' as causes of road crashes - an almost constant outcome of traditional crash investigations in Bangladesh - the focus usually goes to fining drivers, along with some awareness programs for road safety improvement; however, many other factors responsible for those incidents remain untouched. Having both 'social' and 'technical' elements, the road transport system can be expressed as 'socio-technical' system (Walker et al., 2008) and investigation of accidents within such systems can be explored using Rasmussen's (1997) Risk Management Framework (see McIlroy et al., 2019). Aiming at identifying the contributing other factors, in this study we applied the extension of Rasmussen's AcciMap approach (Parnell et al., 2017), a method that provides graphical representations of accidents that can be used to identify the cause-consequence flow of actions of various actors within a complex socio-technical system.

The said crash occurred in May 2018 on a weekday. An older pedestrian (> 60 years) was hit by a bus while he was crossing a very busy intersection was severely injured. Police arrested the driver and he had been jailed after trial. This pedestrian crash was selected for investigation using AcciMap as this type of incident (crash during road crossing and driver jailed) is very common in Bangladesh except the relatively higher age of pedestrian.

## Method

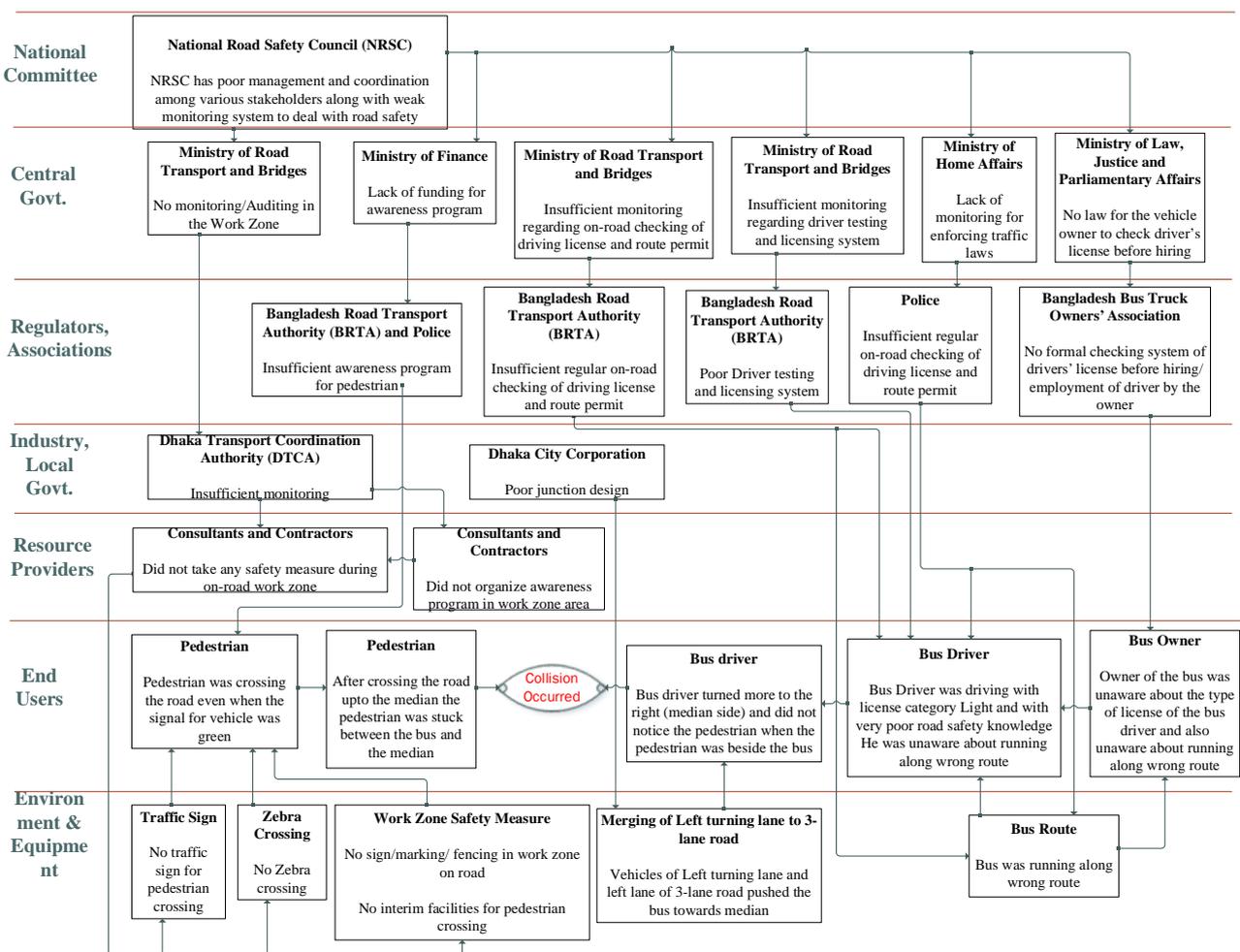
First, we developed an ActorMap. This incorporates all the relevant actors (organizations) in seven different levels, from end user and equipment at the bottom, to national committees at the top. In the second step, the specific actions performed by those identified actors were incorporated in order to produce an AcciMap. The relevant information came from CCTV footage, personal interview with the driver, the bus owner, the victim, local police staff and relevant stakeholders. The information related to driver license, vehicle route permit etc. had been verified by the licensing authority (Bangladesh Road Transport Authority- BRTA). The developed AcciMap framework is presented in Figure 1. Analysis started from the bottom and propagated to the top of the system.

**Results**

At the environment and equipment level, there are several factors contributing to the crash. For example, at the incident spot there were no Work Zone Safety (WZS) measures despite on-going road improvement works. Due to the lack of designated crossing facilities the victim of this crash was crossing even though the signal for vehicle was green. Poor geometric road configuration led other vehicle drivers to push the said bus to the right in order to accommodate themselves within the lane and ultimately the bus hit the pedestrian.

At the end user level, it was found that the bus driver was driving heavy vehicle with license issued for light vehicles. The owner of the bus was unaware of this. Moreover, the driver was driving along the wrong route. All these illustrate the weaknesses of regulatory authorities i.e., Police and BRTA. Additionally, the bus driver’s poor knowledge regarding traffic sign-marking reflects the inefficient driving license issuing system maintained by BRTA. Dhaka Transport Coordination Authority (DTCA) had insufficient monitoring system to check whether the consultants and contractors took any WZS measures.

Inefficient coordination and monitoring system was found as the common deficiency at the central government and national committee level which made the organizations at lower level non-answerable to their duties.



**Figure 1. AcciMap representing the various interrelated factors contributing to the said pedestrian crash**

## Conclusions

Despite some limitations (e.g. pedestrian age along with his perception and attitudes towards risky crossing could have played a role, however, we could not infer anything as detailed information was not available), the Accimap analysis revealed that various authorities at the upper level and road environment as well as end users (e.g. driver, pedestrian) at lower level had played a significant role in this crash causation. Some may argue that road safety practitioners are doing work at different levels of the system to guarantee pedestrian safety. However, they usually work at individual levels (lower levels of the system), and very rarely work across levels. This highlights the importance of connections, or vertical integration, and the need to change the mentality towards blame. Therefore, aside from blaming drivers alone we should focus more on system (organizational interconnectedness) reformation and system management.

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