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Implementation of Traffic Impact Assessment in Developing Countries: Case Study of Bangladesh

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***Abstract*—Due to unplanned development, traffic congestion in the cities of Bangladesh has become a serious problem. As a result, Traffic Impact Assessment (TIA) has become a necessity to control this unplanned growth. In Bangladesh, the concept of TIA has recently been introduced and is yet to be institutionalized. Here implication of TIA faces many challenges which are also common in most of the developing countries. In this paper, the issues and challenges are discussed as well as the possible solutions. The study further discusses the strategies for improving implementation of TIA in Bangladesh.**

***Keywords*— implementation process, issues and challenges, land use plan, traffic impact assessment**.

I. INTRODUCTION

All commercial and non-commercial (residential) developments generate traffic movements. This generation of traffic depends on the location and size of the development and has an impact on the surrounding areas and on the existing local and arterial transport network. Most of the time it creates traffic congestion, air pollution, and safety issues in public. These undesirable consequences of urbanization in many cities have made planners and decision makers realize that attempts to only encourage city growth by improving facility performances impose greater social costs than benefits. Therefore for the decision-makers, to take decisions regarding new developments, Traffic impact analysis or assessment (TIA) is used as a tool to guide them to assess each development. This is not only for local practices, but it has now become a trend in many countries. In developed countries it is performed routinely. However in developing countries like Bangladesh, it has been introduced just recently or is yet to be institutionalized.

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In case of Transit Oriented Development (TOD), integration of land use and transportation planning is recognized to be essential but is rarely practiced in developing countries. This is because of rapid and dramatic changes in city structures and various institutional problems.

All through the year many development projects are approved i.e. office, condominium, shopping complexes, hypermarket etc. without following any land use plan.

Many of these are even located in Central Business District (CBD) creating more traffic congestion. These congested conditions have prompted planners necessarily implement TIA in their cities. However implementation of TIA faces many obstacles in these cities. This paper deals with explaining current TIA applications in developing countries and comparing some strengths and weaknesses. Moreover, the obstacles are discussed together with possible improvements. Ultimately, the lessons learned and solutions developed are expected to be a basis for planners to learn how to effectively set up TIA for growth management in the future.

II. TRAFFIC IMPACT ASSESSMENT IN DEVELOPING COUNTRIES: BANGLADESH PERSPECTIVE

Being a developing country, Bangladesh faces economic constraints in every sector. However cities and key municipalities continue to undergo development in the present economic slowdown. Areas are becoming urbanized day by day and people are coming face to face with congestion. So TIA has become more relevant in the light of this continual development. Planners and developers nowadays try to alleviate if not totally solve the problems of traffic congestions in growing cities.

The need to determine and prepare countermeasures for the traffic impacts of an urban development cannot be overemphasized. In the major Metropolitan cities like Dhaka and Chittagong, locations of new commercial developments significantly follow the expansions of urban transportation system. So it is necessary to more carefully plan and control the developments. Otherwise, traffic bottlenecks or critical

areas will continue to emerge, even if new facilities are provided.

In recent years, often local governments demand TIA study before major constructions. Sometimes entrepreneurs or owners themselves hire consultants to conduct TIA as it is also a prerequisite for the project to perform well. A proper TIA conduction and appropriate measures to solve problems mean less congestion, easier access and hence more popular among people. Though proposed by local government and often the owners, guidelines for TIA have not been institutionalized yet.

A study on TIA institutionalization of the Philippines', which is a developing Asian country like Bangladesh, is done. Comparing the four institutional mechanisms [1] with the context of Bangladesh, this study suggests two strategies for implementation of TIA in Bangladesh.
1. Through EIA framework; 2.Through local government. The first strategy includes mechanism of implementing TIA under EIA. It focuses on evaluating and mitigating the adverse impacts generated by development projects. The second strategy is to control all developments through a Local Government Unit such as RAJUK (Capital Development Authority).In many neighboring countries like Thailand, The Philippines, TIA was firstly introduced focusing on environmental problem. In Bangladesh, this approach can be followed as EIA has been mandatory since 1995 (Bangladesh Environment Conservation Act).

III. . ISSUES AND CHALLENGES CONCERNING TIA

In developed countries, TIA is performed routinely, but it has been recently introduced in developing countries like Bangladesh. Therefore, there are some (or many) obstacles for implementing an effective TIA process in such countries. This study has been conducted based on the 'Training Course on TIA for Transportation Professionals'. Government officers in the organizations related with traffic engineering and land use planning were present here and expressed their views to institutionalization of TIA. The obstacles for implementing TIA were discussed and some TIA reports conducted for the development projects were reviewed. The training was conducted by academic persons and specialists. So, their opinions were also included. It was found out that the obstacles could be classified into five issues: weak urban land use plan, unavailability of standard process, lack of knowledge, budget limitation and political factors.

A. *Traffic Impact Assessment under Weak Urban Land Use Plan*

It has been known that the urban land use plans and regulations of Bangladesh are rather weak in developing and enforcing a zoning system. The plan has little or no control over the intensity of development nor does it suggest the meaningful ranges or density in each type of land use. This implies that any development, regardless of its size and location, will be officially approved so long as it does not violate the basic regulations of land use type defined by existing Town Improvement Act 1953. There is usually no consideration of serious adverse development impacts, such as environmental or traffic congestion problems.
Occasionally, while development project is approved based on Town Improvement Act 1953, its TIA study may show unacceptable traffic impacts in that zone or area. For example, in Dhaka new hypermarkets were approved to be located near to the critical intersections, and they caused severe traffic congestions. Based on the Town Improvement Act, those developments are appropriate as long as they do not endanger *"the health of the inhabitants of buildings in any area, or in the neighboring buildings"*, Section 38(b).However it is also essential to consider their negative consequences on vicinity activity areas and local networks in detail. Again according Section 38 (d) also states that *"it is expedient to layout new streets or to alter existing streets (including bridges, culverts and cause-ways)",or* that*" it is necessary to provide in any area, parks, open spaces, playgrounds or similar amenities"*.
According to this, a new development may avoid providing alternate access roads if it provides 'any' parking space or open spaces, even if it causes severe congestion. This shortcoming was tried to be mended in Bangladesh National Building Code (BNBC), 2010. Here standards for parking have been established [2]. Still it does not specify the situations such as that of construction of a hypermarket in already jam prone area. The hypermarket may provide the required parking spaces according to BNBC, but may still cause severe traffic congestion.

Hence TIA guidelines should be independent from the law of existing land use plan so that it will avoid any conflicting condition that may arise.

B. *Unavailability of Established and Applicable Standards*

Bangladesh does not have the standard process of TIA to be used as the reference. In the U.S., they have developed their own standards to conduct formal TIA, and some famous standards are ITE's trip generation handbook and Highway Capacity Manual. In Dubai, British Columbia, South Korea, not only the standard process was identified, but also some parameters of the simulation program in estimating traffic impacts were defined clearly. In Bangladesh there is no discussion on this issue yet, though experts strongly recommend for them. Without the standard, the consultants are not able to prepare an appropriate TIA study, and the involved agencies also cannot correctly check a study and evaluate impact mitigation alternatives. One of the key factors to develop an effective TIA standard is the availability of trip rates. In recent years TIA has been

performed by consultants. They use trip rates from ITE's trip generation handbook. However this standard cannot directly be applicable in Bangladeshi cities. This is because of differences in travel characteristics, socio-economic conditions, and cultures. For example, in the U.S. the estimation of shopping trip generation is mainly developed for passenger cars, as to privacy concern and high car ownership, passenger car plays as the major mode for American people [3]. However in Dhaka, about 51% of the total trips are shared by non motorized modes and motorized transport modes contribute to the rest 49% trips [4].

It can be seen that determining TIA standards is an important factor to establish the TIA process. The government cannot ignore the need to develop the appropriate standards. Generally, TIA study lacking the detailed standards only determines the direct impacts at the ingress and egress of developed area. They do not usually consider the impacts on the adjacent networks. Furthermore the unavailability of regulations for traffic impact mitigation, external factors, including the influence of the developer, social factors, and political factors, can affect the assessment process directly or indirectly. Eventually, the TIA makes no provision for refusing approval, despite the findings.

C. *Lack of Sufficient Knowledge*

Without the experts or technicians having sufficient knowledge on TIA in the government and consultants, the implementation of TIA process will never be successful. The central government offices are doubtful about institutionalization of development impact assessment in Bangladesh, since there is a lack of potential staffs in local offices. At the same time, the experts in private sector are very limited, only a few academics are truly experienced in TIA. A few famous consulting firms are trying to train their engineers for this purpose. However the TIA performed by them comes out to be traffic reports which fail to suggest proper measures that are to be taken. So, Bangladesh government must train their people to have enough knowledge in transportation planning, traffic engineering, and using computer packages.

D. *Lack of Budget*

Establishment of the TIA process in developing cities needs a lot of resources for developing the TIA standard process, details of required analysis components and methods, road classification, training staff, and for meeting among planners and developers. These steps require a huge budget from the government side. Therefore, it becomes a serious problem for them, and some planners give up to implement TIA. There is no doubt that the government has to face the financial problem to implement TIA process, as the social costs generated by unplanned developments are never charged to developers. So the policy of impact fee for urban development projects is proposed by the experts. However government officials deny this proposal as they are afraid of losing popularity. Certainly, the expenses of TIA study are not only imposed to government, but also to developers in hiring consultant team and mitigating negative impacts. The developers should be made to understand that while they are gaining profits, their projects are imposing social costs to the community. Therefore they should share in the responsibility of relieving additional costs.

E. *Political Factors*

As a developing country, Bangladesh has been undergoing political turmoil since its birth. This unstable situation severely affects the development projects at hand. Sometimes, when government changes, there are projects which stop receiving funds and as a result construction is halted, no matter how important they are. Introduction of new ideas and studies may face the same consequences. So in the political condition like ours, where development projects necessary for the evolution of the country do not see light, TIA's establishment will require huge effort. Again decision makers often take decisions on whim without thinking about the impacts. Most of the locations of transportation facilities are based on the orders of a political leader rather than by planner with long term sustainable plan. Very few of them are constructed where they will best serve the mass people, improve the road network or help in implementing the master plan of the city. So there may be cases when authority cannot take any mitigating measures even after conduction of TIA.

Definitely, the obstacles of implementing TIA process are not limited to the issues mentioned in this paper. There is a huge debate regarding the issue of impact fees. In terms of policy, it is not very clear who should pay for cost of conducting TIA study, whether it is the developer only or the developer and government. After all, a TIA study is also beneficial for updating traffic planning data of related agencies. In case of charging impact fee to developer for a budget in alleviating undesired traffic impacts, it is still ambiguous how the fee can be estimated. This article focuses on the obstacles in the beginning stage of TIA implementation. The lessons from other countries are yet to be studied.

IV. IMPROVING IMPLEMENTATION PROCESS OF TIA

This article emphasizes how to improve the implementation process of TIA in the cities of developing countries. What the study focuses is not the problems of technicality and practicality in each implementation stage, but on the strategic points that can help to accomplish the TIA implementation. This paper classifies the strategies into following points.

A. *The Concerned Parties*

Normally, when TIA implementation is discussed, it focuses on the enforcement of government. It might be unfair for the

government, if the society does not share the responsibility with them. As seen from the previous case studies of ineffective land use planning in developing countries, only the government's efforts are not enough to accomplish land use control measures, because many stakeholders might oppose such measures. This is similar for implementing TIA policy. To successfully implement the TIA process, we need the cooperation among various stakeholders or parties. According to Hokao et al, [5] five parties should play some significant roles in implementing TIA. They consist of government, developers, consultants, academic persons, and the community or civil society.

B. Co-ordination between Concerned Parties

Co-ordination between the concerned parties mentioned previously is one of the most important factors in the implementation of TIA. Government is the main party in conducting TIA as they are the one who take responsibility of city planning. They have to hold TIA as the tool to control land development. Most of the time developers try to avoid any assessment or mitigation process as they are directly affected from the policy in increase of budget, time and human resources. They should be motivated to realize the necessity and advantages of TIA. They should realize the fact that they also gain benefits from the accessibility improved to attract more customers. On behalf of developers, consultants are hired to perform a TIA study. The study team must collect on-site data, analyze impacts of new traffic, and propose mitigation measures. These tasks require the technical knowledge, so the consultants play an important role in preparing TIA study. To establish an accurate TIA framework and conduct evaluation of the process, assistance of the academic persons is must. In developing cities, most professional traffic engineers work in the universities which also true in Bangladesh. These experts should share their technical knowledge to other parties involved in preparing TIA study and also aware people of the necessities of TIA. The final party is the community. When a development project is located in a city, the community living nearby the project will be directly or indirectly affected in term of advantages or disadvantages. The community should have a chance to participate in the implementation and application of TIA. If proper co-ordination between these groups of people cannot be established, implementation of TIA will never be possible.

C. Promotion of the necessity of TIA

Although, most planners are very familiar with the techniques and tools in TIA process, such as classical four-step model, network capacity analysis, traffic managements, etc., only few really understand what the role of TIA is in land development control, or why it is essential to be established. The TIA does not intend to prohibit the developments, but it tries to minimize the effects of located project on the transport network and thereby assist both public and private planners to make major land use and other development decisions. At the beginning, it should make all parties in the society to realize the necessity and advantages of TIA. Academic persons who really have skills on TIA should motivate the government to make understand and encourage them to start utilizing TIA measures. They can give answers to following questions

- Why TIA studies are needed (benefits)?
- When a TIA study is to be conducted?
- What should be included in TIA?
- Who are to conduct the TIA?

Simultaneously, academic persons also can discuss with consultants on how preparing TIA study is important. Government should promote TIA to developers and to the community by themselves. Academic persons are not needed to deal with them directly. However, academic persons can support through sharing the knowledge in public workshop or meeting. In Bangladesh, we are still in the promotion stage.

D. Formulation of TIA process

The detailed TIA standards should be completed and used as the reference of the society. These activities can be conducted under the support of an academic person. They can develop the vital standards by cooperating with government planners and experts in consultant firms. A step by step framework of TIA should be developed depending on our socio-economic condition. Human resources are essential in the TIA process. So, the academic can train the staffs of government and consultants on how to employ the developed standards in appropriately estimating and mitigating traffic impacts. During the application of TIA in the real world, it can create the consultations among the government, developers, and consultants about predicted impacts and alternatives to relieve such impacts. Definitely, the community should have opportunities to make clear what they want in allowing the development inside of their areas.

E. Evaluation of TIA process

The evaluation process is a key part for successful TIA application. Previously, due to informal evaluation process, many incomplete impact studies were approved. Eventually, such development generated a lot of problems on traffic congestion and environmental damage. Two good evaluation systems proposed for implementing TIA are the TIA review committee and accreditation system (Hokao et al 2005) [5]. First, to evaluate a report of traffic impact study, it should set up a committee to check for completeness and adequacy. Second, it is a system to guarantee that those who perform a TIA study are only qualified persons or firms in terms of knowledge and experience, such as academic background and more than three years of experience in TIA. The qualified groups get a certificate or accreditation. Absolutely, if they carry out a low-quality TIA study, the accreditation can be withdrawn.

In evaluating a TIA report, government will discuss with developers or consultants, the representatives of developers, in order to find the most suitable mitigation alternatives. Additional, the community should be notified as to how the adverse impacts will be alleviated. If they have any other requirements, they can propose to the government and developers for the consideration. It is strongly recommended that the evaluation process is not merely finished at the roundtable meeting. The evaluators should track or monitor the implementation of mitigation measures of approved projects. At the same time, they must provide opportunities for the community to assess the changes. If developers do not follow the final agreement, there should be some punishment such as penalty charges. There is a case in Dhaka city where the developer had agreed to provide an open space in front of their shopping complex for loading unloading as a condition to the granting of the development permit. But later on they turned that open space into a theme park. Nowadays, that complex causes huge congestion due to loading unloading activities on street.

A specific committee composed of TIA evaluators will play an important role in enhancing the quality of TIA study. It should be composed of senior technicians from various related fields, including traffic and transportation engineering, land use and urban planning, legalizing land development regulations. They should come from academic, government, and private organizations, and also have experiences on assessing and mitigating traffic impacts, so that the committee is highly qualified and independent from political issues. Moreover, in long-term vision this committee can play the significant role in developing and standardizing all related components of the formal TIA process, such as setting up the necessary parameters of traffic simulation, identifying of impact mitigation requirements etc.

v. CONCLUSION

Traffic Impact Assessment (TIA) is a powerful tool for engineers and planners to determine possible effects of a project on transportation and traffic system. In recent years, there is a growing awareness in Bangladesh on this issue. Though governing bodies have lately shown interest, the institutionalization of TIA needs to be more systematic and efficient. Usual practice of TIA has been superficial. The legal tools to control land use of the city may conflict with TIA made suggestions. This study recommends that in a weakly planned country like Bangladesh, the TIA should be under a different law or guideline independent from the land use plan, so that it can efficiently function as an investigator of land development control.

For the obstacles of TIA process, five main issues consisting of weak Urban Land Use Plan, unavailability of standard process, lack of knowledge, budget limitation and political factors have been identified. Development of the required human resources and home grown TIA standard are needed to perform a serious and meaningful TIA. Because, in the cities the trip characteristics are much different from the developed cities, the utilization of foreign standards may fail to provide an appropriate result. Particularly, there is some uniqueness in mode choice and travel behavior of people, such as high proportion of public transport and paratransit riders.

The study recognized that one of the most critical difficulties in implementing TIA in cities is the lack of motivation and cooperation among important stakeholders in the society. Therefore, strategic points for implementing TIA have been proposed. Definitely this is only a first step in institutionalizing TIA in Bangladesh. We still need to conduct in-depth study for the successful implementation of TIA in healthy infrastructure development program.

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