

TOWARDD A HEALTHIER ENVIRONMENT AND MORE EFFICIENT TRANSPORT MANAGEMENT IN ASIA

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Abstract: The traffic congestion problem in Asian countries has become a serious concern. It has resulted in severe deterioration of quality of life in this region and huge economic losses due to longer travel times and lower productivity. In this paper, I will describe the impacts and root causes of traffic congestion, review past and current efforts by Government concerned and present a set of recommendations geared toward finding an appropriate solution to these problems.

1. INTRODUCTION

The scope and focus of this paper are defined to all transport sector in general and to public transport sector in particular in Asia , especially in the South Eastern Asian countries where they have faced common economic problems, such as a high level of accumulated loss, lack of capital for fleet modernisation, inadequate public transport services, people are not well educated , lack of consciousness in social regulation and high costs activities etc. that partly define and shape the environmental problems persisting in the public transport sector.

2. PRESENT ENVIRONMENTAL SITUATION

Today, With the urbanisation and motorization process, the increase of population and living condition standards, the number of motor vehicles in the most capital cities of Asian countries is increasing rapidly and it causes a lot of environmental problems, in which biologically dead rivers and waterways, hardly sustained problems relating to garbage and solid waste management and the smog visible in the atmosphere of some metropolitan centres of the Asian countries bear witness to the alarming environmental degradation. The air quality in the urban centers, for instance, in Manila, Philippines , Jakarta, Indonesia and Bangkok, Thailand, is already considered the poorest in the South East Asia as well as in the continent. Solely in Manila, Philippines, Annual Total Suspended Particulate (TSP) emission was 75,020 tons and PM10 emissions was 42,240 tons in 1992 which are frequently five times higher than the World Health Organisation Air Quality Guideline (WHO AQG). Whereas in Jakarta, Indonesia, faces a serious problem of air pollution, ambient levels of particulate matter exceed health standards at least 173 days per year, Vehicle emissions constitute the most important source of harmful pollutants with 44 percent of particulate, 89 percent of hydrocarbons, 73 percent of nitrogen oxides and 100 percent of lead. . In most Asian countries, the use of motorcycles accounts for 50 percent of motor vehicles for instance China , Vietnam, Thailand and India with the growth rate up to 20,7 percent per annum , thus the quality of air in the premier city of thousands of motorcycles that have proliferated in the recent years.

Laos, on the other hand, have also resorted to motorcycles with the growth rate 30-40 percent per annum, as the more convenient and reliable transport mode, specially, for those living quite close to Vientiane City. A variety of transport modes has dominated the city, many of them motorised tricycles. This situation has resulted to very poor air quality due to the emission of air pollutants from these vehicles.

There are three principal areas of environmental concern relating to public Transport in the Asian countries. These are:

2.1. Gaseous Emissions

The increasing number of vehicles and a lack of a commuter rail system in the capital are leading to increased total energy consumption and air polluting gases. Contamination of the atmosphere by gaseous wastes are endangering human health, reducing visibility, and producing undesirable odours. Traffic emission factors depend on traffic composition, vehicle age, average speed, and air temperature among others. The weather plays a vital role in the dispersion of air pollution. The major air pollutants caused by motor vehicles are PM10, Nox, Pb, HC, dust, CO and CO2. Certainly, the citizens have suffered the emission of these toxic gases.

Sulfur dioxide and Nitrogen oxides are the major source of acid rain.

Carbon monoxide causes to brain damage due to oxygen shortage.

Carbon dioxide released into the atmosphere produces a green house affect, heating up the atmosphere. Lead particulate accumulate in the body. This accumulation harms the central nervous system and disrupts the enzymatic activities. Dust may cause problems with respiratory system in addition to reducing visibility in the atmosphere.

Type	unit	Allowable limit (according EURO 2 standards)	Average in Asia
COx	g/kwh	4,0	7,2
HC	g/kwh	1,0	2,1
NOx	g/kwh	7,0	12,0
PM	g/kwh	0,1	0,16

2.2. Noise Pollution

In most of the Asian countries there are no regulations regarding maximum noise emissions of the road traffic. The motorised vehicles emit not only air pollutants but also a very big noise. The noise levels from road traffic obviously vary greatly in accordance with the distance between the traffic and related points, but there is serious problem of noise on many miles of road where the people are close to constant heavy traffic. Even though, where the volume of traffic may be light the noise level can be high, particularly from the motorcycles and motor tricycles. Noise from traffic is currently unacceptably high. As shown in recent studies which revealed that during peak traffic hours the level reached 95 db, particularly in Vietnam the noise level reach to 98 db. It is believed that this should not exceed 80 db. More important, the noise level standard in almost Asian countries is not enforced yet.

2.3. Loss of Green Areas

Almost all plants are subjected to strong genetic erosion as a result of which many species could become extinct, and certainly many valuable genes could be lost. The main threat to biodiversity and the cause of desertification is urbanisation.

3. THE PRESENT PUBLIC TRANSPORT SITUATION

In the field of public transport, it may well be said that the present public transport system in most cities of Asian countries consists of buses, trolleybuses, three-wheeled motor cycles, taxis, motorcycle-taxis and boats leaves much to be desired. In fact, it can be safely assumed that the irrational operation of various transport modes can be considered as a major culprit in the deterioration of air quality in the urban centers. As motorization became more and more accepted, the use of bicycle riding in most all of Asian countries particularly, in Vietnam and China even in Laos have turned to motorcycles as the new fad. Not to be outdone, motorcycle riders in the most Asian countries has substantially increased for example in Thailand there are over 9 millions motorcycles, and Vietnam over 4 millions. But more alarming is the unrestrained increase in the motorcycle-powered tricycles which have invaded every town and city in many countries in South East Asia, as can be seen in the Philippine and Laos.

The increase in the vehicular traffic has caused congestion in the major city in some Asian countries and today, we can say that Bangkok, Manila, Kuala Lumpur, Jakarta, Tokyo, Seoul, Beijing etc. are experiencing lower than 10 kilometers per hour travel speed, particularly, during peak hours. And while vehicles alarmingly increased, specially, low occupancy private cars, the road network has remained generally the same with the problems encountered in the acquisition of land space to build additional roads.

A number of the following defects currently hamper the performance of the public transport system in the most Asian countries :

3.1. Land Use Distortion

Present uncontrolled land use patterns have led to sprawling, inefficient cities and towns. This has negatively affected accessibility. Non motorised trips such as cycling or walking to work are often not possible. Long travel distances, long travel time and dispersal of residential, commercial, industrial and recreational developments have resulted in an inefficient transport system.

3.2. Fragmented Legislation

Responsibility for land passenger transport is fragmented amongst a number of authorities at various levels of government. Responsibility for the planning and implementation of functions such as land use, transport infrastructure is vested in local authorities. However Ministry of transport is responsible for the issuing of operating licences which is done freely without reference to local authorities. There is bad co-ordination between these levels of government.

3.3. Public Transport Regulatory Deficiencies

Although public transport is supposedly regulated through the issuing of permits, there are no statutory requirement to issue permits in terms of approved transport plans.

3.4. Lack Of Comprehensive Planning

In the past very little comprehensive planning of land transport was carried out at any level of government. Planning concentrated on the provision of transport infrastructure and traffic management in the cities, but the operational aspects of public transport were largely neglected. Planning has often given priority to the needs of private motorists rather than public transport. Little attention has been given to the co-ordination and integration of public transport services and modes. This has led to increased travel time and costs, and in turn, a poor quality of life.

3.5. Inefficient Municipal Bus Services

Municipal bus services have been operating inefficiently, requiring large central government subsidies. There is an air of complacency and job security by those employed who do not have the passenger's interest at heart.

3.6. Inadequate Funding For Public Transport

Sources of funding for public transport and the allocation and application of funds remain problematic. The levels of funding for public transport infrastructure and the subsidisation of passengers is inadequate to provide acceptable and affordable levels of service.

3.7. Inefficient Subsidy Policies

There is concerned that the funds spent of the subsidisation of public transport services are not being spent efficiently and productively. There is a lack of sense of responsibility to the passenger by both government officials and operators.

3.8. Inadequate Safety, Security And Insurance For Commuters

Commuters who are the victims of crime, violence and accidents associated with public transport are inadequately compensated for injury and loss of life.

3.9. Road accidents

Road accident is one of the serious problem in Asian countries. The number of deaths and injuries from road accidents are increasing and seems to be uncontrollable. Many countries in Asia rank among the nations with the biggest accident rates, especially in Laos .

These defects impact negatively on all involved such as public, users of the system the service providers and the authorities responsible for the management of the system.

4. PROBLEM FORMULATION

The effects on the public health from environmental threats are caused by an aggregate of emissions from different sources. The transport system constitutes the largest proportion of

in the sustenance of public health and good character. In Asia, particularly in some countries of South East Asia, for instance Bangkok, Thailand where the present environmental situation poses a serious threat to public health present transport policy merely places an emphasis on the provision of infrastructure and mobility alternatives. The vast potential of the public transport system to influence the state of public health has largely not been exploited as a result of the lack of appropriate measures to co-ordinate land use systems, traffic management and traffic volumes. Measures are therefore necessary to correct the present divergent development of public transport system in relation to the environment.

Motorization has also exacerbated the noise pollution in the Asian countries with little concern, if any, from both the citizenry and the political administrators. There are, simply, other priorities to be taken care of.

The continuing deterioration of air quality is exacerbated by the limited air pollution data currently available. There is inadequate data on carbon oxide and nitrogen oxide to make any conclusions at this time. But indicators of alarming high levels of pollution can be readily observed.

5. EXPERIENCES TODAY

Today, environment and public transport management is a top priority of the Asian country governments with both national and local government units working hand in hand in undertaking measures to improve current conditions with the active support and participation of the private sector. Unlike in the distant past when environment and public transport management was considered as the enforcement of laws, rules and regulations, the enhancement of environment and public transport management is now considered as a developmental activity requiring the concerted effort of all government agencies working together with all stakeholders -including the general public. Measures to improve mobility through the various transport infrastructure projects now being undertaken are being complemented by comprehensive and integrated air quality management strategy.

Clean air action plans which attempt to address to root cause of air pollution have been formulated and measures are now in place. Initial response from all sectors has been very encouraging. The approach of encouraging stakeholders to actively participate in environmental management, coupled with concrete government action appears to be bearing fruit in the transport sector, as can be seen in the following :

5.1. Unleaded Gasoline: Rather than issuing regulations to force the petroleum companies to introduce unleaded gasoline in the market, the government held a series of negotiations with petroleum companies and convinced them to produce unleaded gasoline. To show its commitment to cleaner fuels, the Government is actually subsidising unleaded gasoline by allowing sale to end-users at the same price as low-lead gasoline.

5.2. Anti-smoke Belching Campaign: In addition to a more vigorous enforcement of current vehicle emission standards being undertaken, transport service operators are being encouraged to undertake garage testing of the vehicles before these are allowed to operate. This approach has been very successful especially in the Philippines where at least 70 large companies have not only complied willingly but have also taken the step a

little further by refusing to do business with other companies, particularly haulers whose vehicles are smoke belchers.

5.3.]Motor vehicle Inspection System: While admittedly inadequate, motor vehicle inspection stations are now operating in some countries in Asia. To enhance the project, privatisation has been planned with limited government involvement.

5.4. Importation of used trucks and buses: Government policies to accelerate the development of transport has led to the nagging issue of some countries in Asia becoming the dumping ground of used vehicles coming from its more illustrious neighbours. Used vehicles, including motor cycles, most probably considered unfit for use in their countries of origin are being exported to many countries in Asia with great number of buses now being used to augment public transport in Asia. Today, guidelines have been issued to required second hand vehicles to undergo local emission testing standards.

5.5. New vehicle Emission Standards: Continuing efforts to upgrade and update standards for vehicle emission are being undertaken in accordance those set in the Asia Pacific region.

5.6. Phase- out of Leaded Gasoline: A concrete move is currently being undertaken to completely phase-out leaded gasoline by the year 1998.

5.7. Low-sulfur Diesel and Fuel Oil : A similar action had been undertaken to convince petroleum companies to introduce low-sulfur diesel and fuel oil in the market. For diesel, the initial target is 0.5% weight while a 3 % weight is being eyed for low-sulfur fuel oil.

5.8. Industrial Air Emission Control Project: A parallel move is also undertaken to quantify the contribution of industries to air pollution; develop emission factors and standards; identify the priority industries to be monitored and /or controlled.

5.9. Master Plan for Air Pollution Control : Today, a master plan is being formulated for air pollution control.

5.10. Master Plan for Public Transport Management: The ever growing concern on problem relating traffic and transport has led the countries in Asia to formulate its own master plans.

6. VISION, GOALS AND STRATEGIES

6.1. Vision

The vision for public transport in Asia is

“ A safe, reliable, effective, efficient, co-ordinated, integrated and environmentally friendly public transport system managed in a accountable manner to ensure that the people experience improving levels of mobility and accessibility.”

6.2. Goals and Strategies

A key ingredient to future success will be the sharing of the vision by all the key role players, backed by co-ordinated and integrated planning and decision making. This requires the formulation of broad goals and translating them into specific measurable objectives relating to public transport and environment.

The following goals have been identified:

1. spatial

- To encourage more efficient land use structures, correcting spatial imbalances and reducing travel distances and time for commuting to a limit of 20 km or one hour in each direction.
- To promote rural development by providing reliable and attractive regional public transport services.

2. Modal

To promote the use of public transport over private car travel with the goal of achieving a national, regional, and local ratio of 80:20 between public and private car usage.

3. Customer-based

- To ensure that public transport services address user needs, including those of commuters, pensioners, the aged, the disabled, tourists and long distance passengers.
- To improve accessibility and mobility, limiting walking distances to less than 500 meters in urban areas.
- To promote safe, and secure, reliable, and sustainable public transport.
- To provide readily-accessible information for the assistance of public transport users.

4. Planning and regulatory

- To provide appropriate institutional structures, with facilitate the effective and efficient planning, implementation, funding, and regulation of the public transport system, devolved to the lowest competent level.
- To encourage, promote and plan for the use of non-motorised transport where appropriate.
- To promote and implement a system of a regulated competition for public transport routes or networks based on tendered contracts.

5. Operational

- To ensure that the public transport operations become economically viable, requiring the minimum of financial support.
- To encourage a professional approach to the management and operation of public transport with an efficient use of all resources.
- To ensure that public transport modes are integrated in respect of scheduling, routes, ticketing and passenger information systems.
- To ensure that all facets of public transport are carried out to the highest possible standards of safety to both passengers and operators alike.

6. Funding

To ensure sustainable and dedicated funding for public transport infrastructure and operations.

7. Environmental

- To ensure that public transport operations are environmentally sensitive in terms of gaseous emissions and noise pollution and are sustainable and energy efficiency.
- To ensure that the transport system does not intrude unnecessarily into green areas and that any depletion of green areas by the transport is countered by complementary planting of vegetation.

8. Setting priorities

From statistic and facts, Pb (lead) causes serious problem for human health. Thus , this should be tackled first . The PM10, CO, HC, CO2, NOx...should be prioritised to be solved consequently. The strategy is to find out the root cause of problems and the proper measures should be set and strictly implemented.

7. SET OF MEASURES

In the past, government's dominant role has been as a regulator of bureaucratic detail, a provider of infrastructure and as a transport operator, but it has been weak in policy formulation and in strategic planning. Government intends to reverse this legacy and to focus on policy and strategy formulation which are its prime role and substantive regulation which is its responsibility, with a reduced direct involvement in operations.

Today, with the advent of the modern communication facilities, more and more people in the Asian countries are now becoming aware of the importance environment and public transport in their daily lives. Certain set of measures have been introduced in major urban centres to improve air quality and curb pollution. Vehicles are now inspected and tested before granted licences to operate in most Asian countries. Air pollution monitoring systems have been installed in some countries, although these are considered hardly adequate by today's standards. Organisational structures are now being focused in the institutionalisation of environment and public transport management with metropolitan and local administrators given the task to undertake the responsibility to implement measures for both concerns.

The following sets of measures will have to be carefully weighed up and given to public comment before being implemented:

7.1. Land Use Development

Policy actions necessary to provide for urban restructuring and efficient land use transport interaction include:

1. Establishment of structures which facilitate integrated planning of infrastructure, operations and land use in an co-ordinated manner.
2. Regulation of land use development at local level so that development approval is

3. Formulation of land use frameworks, guidelines and policies to channel development, particularly employment activities, into public transport corridors and nodes.
4. Containment of urban sprawl and sub-urbanisation behind the urban limits through provincial and municipal spatial development plans.
5. Discouragement of decentralisation which disperses employment activities, discouraged except in specific cases when it is favourable in terms of decreasing total transport costs and travel times on the basis of an integrated land use transport plan.
6. Containment of unrestrained car usage and subsidised car parking through the application of policy instruments such as strict parking policies, access restrictions for private cars and higher licence fees, road pricing and area licensing.

7.2. Environment Management

Policy actions necessary to provide for good environmental management include the following:

1. Cleaner fuels

New technology can be introduced on selected vehicle fleets or on certain applications locally and individually. To achieve these measures, the highest international emission standards will have to be adopted. Another important feature will be provided information to consumers of the different transport modes and fuels and to influence them to choose environmentally friendly alternatives. The preliminary goals for greenhouse gases, acidification of land and water will be achieved. Levels of carbon oxides as well as nitrogen dioxides will fall below current criteria values.

The pollution emissions such as Particles, Nitrogen oxides, Carbon monoxide and hydrocarbons should be reduced.

These can be reduced with the cleaner fuels and diesel engines.

The following emission standards should be applied in Asia :

Type	unit	Allowable limit (according EURO 2 standards)	Allowable limit for Asia
COx	g/kwh	4,0	6,5
HC	g/kwh	1,0	2,0
NOx	g/kwh	7,0	11,0
PM	g/kwh	0,1	0,15

For these reason it is necessary to start using the Natural gas, Bio-gas, Alcohol, Liquefied petroleum gas, Dimethyl ether, Electricity and other as types of fuels for all modes of transport.

2. Cleaner Emissions

- Use diesel oil without sulphur
- Use catalytic converters on vehicles ' exhausts which reduce both NOx and HC

- Each vehicle should be tested each year for compliance with emission control regulations, and only issued with a valid permit to enter traffic if it complies with the required standards.
- Permit may be withdrawn by a policeman if the vehicle is seen to be belching. The permit will only be reinstated once the vehicle has been repaired satisfactorily.
- The vehicles that are more than 5 years old will not be imported into the country.
- Vehicles, especially trucks, may not be overloaded.
- Prohibit the use of freon in air conditioners in vehicles.
- Asbestos fibres should not be used in vehicle's brake shoes.
- Trucks carrying dusty cargoes should be obliged to completely cover their loads to prevent dust on the roads.

7.3. Traffic Management

Policy actions necessary to provide for good traffic management

1. Establishment of a traffic research centre which will be responsible for carrying out of traffic counting programme and undertake studies that are necessary for improving the management of traffic in the country. The following specific information should be gathered:
 - 24-hour automatic traffic counts on all major rural and urban routes.
 - Manual turning movement counts at the intersections of the roads of metropolitan significance.
 - Household studies in metropolitan areas to determine residential and work opportunities and travel patterns, modes and car ownership.
 - Origin - destination studies to determine the amount of through traffic in cities.
2. Develop traffic plans for the metropolitan areas with purpose of removing through traffic from cities centres.
3. Provision of facilities for pedestrians and bicyclists.
4. Enhancement measures to fully implement road safety plans, programs and projects including the following:
 - Enforcement of guidelines on road networks traffic management.
 - Road safety audit.
 - Strict enforcement of vehicle safety standards.
 - Enhancement of traffic safety awareness through various means of communications.
 - Strict enforcement of general requirements and standards for motor vehicles including parts.
 - Strict enforcement of the updated planning and road design standards
5. Set up an area traffic control system to remotely monitor the traffic signal and optimise traffic flow.
6. Review the road signage and road marking system and implement a sign management system for the maintenance thereof.
7. Investigate the provision of priority lanes for buses in the CBD.
8. Set up a pavement management system for the rehabilitation of the road network

7.4. Transport Management

1. Establishment of the Public Transport Authority which will monitor the following public transport service levels :

- Frequency of service : The average frequency of each service route should be planned to ensure that passenger waiting times do not exceed 10 minutes on average.
 - Waiting time
 - Fare level
 - Co-ordination of travel modes at transport interchanges
 - walking distances to and accessibility of the bus stops
 - Travel and journey times
 - Comfort of passengers, particularly the elderly and disabled
 - Availability of transport information
 - Reliability of services
2. Continue the implementation of vehicle restraint measures, review parking policies and introduce road pricing scheme where feasible.
 3. Study and implement measures to decongest city centers through various schemes including tax incentive measures for industries.
 4. introduction of High Occupancy Vehicle lanes wherein only vehicles with four or more passengers shall be allowed to travel.
 5. Update and sustain the conduct of education and information campaign in support of traffic and transport projects.
 6. Introduction of the bus way system patterned after the existing systems in Canada.

7.5. Regulation of noise pollution

1. Regulation of noise emissions
 - Annual or bi-annual mandatory vehicle checks
 - Check at random
 - Prohibition of the use of horns or noisy driving
 - Regulation on the duration of burglar alarms
2. Traffic regulation
 - Prohibition of certain vehicle types in certain areas
 - Prohibition of traffic at certain times of day
 - Stricter speed limits in sensitive areas
3. Maintenance of road surface using tyre noise reducing pavements
4. Provision of noise barriers such as plants and constructed screens
5. Improvement of sound insulation in building

7.6. Regulations for the protection of green areas

1. Plant 20 trees or more for each building and parking construction licence as a condition to that licence.
2. Municipalities should start to establish public parks .
3. Trees should be planted on both sides of the arterial roads through towns
4. Municipalities will be encouraged to more trees in public places including squares, avenues and parks.
5. Awareness in schools and media information should take place for planting trees and non deforesting.
6. A permit should be obtained for the cutting of trees on private land. Penalties should be imposed on those who do not comply.
7. Livestock shall not be permitted to graze in protected green areas. Penalties should be imposed on those who do not comply.

8. Environmentally unfriendly pesticides shall not be permitted to be used. Penalties should be imposed on those who do not comply.

8. ORGANISATION AND FINANCING

8.1. Organisation

These activities shall be undertaken by an inter-agency group comprising of the various national agencies tasked with responsibilities on traffic and transport, road engineering and environmental management with the active participation of concerned local and regional Government units and the full support of the media and the private sector.

8.2. Financing

Source of financing for the programme will have to be investigated by the department of transport. The following sources should be considered:

1. Department of Transport Budget
2. Department of Environmental Budget
3. Department of information Budget
4. Public Transport Authorities collection of public transport fares
5. Increased vehicle licence fees
6. Additional Environmental Taxes
7. Additional Taxes on leaded Fuel
8. Additional Taxes on New Cars
9. Fees for Annual Gaseous and Noise emission tests
10. International funding agencies.

9. EVALUATION AND CONCLUSION

9.1. Evaluation

It is necessary that toward a healthier environment and more efficient transport management in Asia be evaluated from time to time. Key Performance Indicators (KPI's) will have to be devised by each department for the evaluation of aspects of the programme for which it is responsible. These KPI's will have to be approved by Cabinet. Each Department will then be responsible for measuring itself against the KPI's and submitting an annual report to the office of Cabinet for approval of the evaluations.

The following aspects of the programme must be included in the evaluation process :

1. Public transport route tender design
2. Public transport route contract implementation
3. Land use transport plans
4. Spatial development plans
5. Emission control standards
6. Noise control standards
7. Protection of green area standard

9.2. Conclusion

In this work, we have found that Toward a Healthier Environment and More Efficient Transport Management in Asia is a long term and difficult process indeed because the constraints in most all Asian countries are the serious lack of funds, people are not well educated and the lack of consciousness in social regulation. Thus enforcement is always needed. Meanwhile the transport system is not efficient to meet the travel demand. The tendency of using private transport is increased rapidly.

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