

Chapter 7 Public Transport

7.1 Introduction

Previous studies have thoroughly reviewed and provided data on public transport in Colombo and the metropolitan area. This chapter does not repeat what has been done previously, but will update some of the major data points, and identify the current issues and the underlying relationships. Additionally, a public transport passenger survey of public and private bus passengers and rail passengers and a three-wheeler operator survey were undertaken for this study.

The Public Transport Working Group (PTWG) met three times as of 20 February and identified and prioritized the major public transport issues, which are reflected in the analysis below. The organizations involved are listed in Chapter 1, and their roles can be found in Tables 7.2, 7.6, and 7.11 as the organizations involved with buses, railway, and three-wheelers, respectively. In the below issue summary for each mode, the issues have been ordered as decided by the PTWG. The group has also begun to identify broad implementable solutions to the priority issues, which will be used to create short-term high priority projects for the Interim Report.

7.2 Review of Previous Study Recommendations

The studies reviewed in Chapter 2 have made a number of recommendations to improve the bus and rail sectors, but few of the recommendations have been implemented. Below is a review of the Colombo Urban Transport Study 1 (CUTS1) and Colombo Urban Transport Study 2 (CUTS2). CUTS1 did not propose projects, but instead, proposed overarching strategies and frameworks within which CUTS2 would propose specific projects.

(1) Bus Sector Projects and Proposals

The CUTS1 strategies included establishing a single regulatory authority for intra-provincial buses, introducing franchising for bus routes, and reorganizing the private operators, among others. CUTS2 subsequently outlined the specific projects that could be implemented to achieve these strategies. The majority of CUTS2 bus sector recommendations were focused on changing policies, including creating a clear fare policy, introducing franchising of bus routes, developing a bus sector regulatory authority, and implementing service levels. A list of projects can be found in Appendix 1.

Of these recommendations, NTC has made some achievements at the inter-provincial bus transport level by starting to implement rural bus contracts, school service contracts, and establish service planning guidelines. A bus fare policy was established in 2001 by NTC and it has been implemented annually, although the fare policy itself has not been put into law and therefore, is still subject to ministerial and political interference. In 2005, NTC created a procedure to clarify the process of providing passenger service permits and agreements for inter-provincial routes, which would be a step towards implementing Transport Provision Contracts (TPC). They have also advertised attempts to improve bus operations in daily newspapers, which include (i) regularizing permits that have been transferred among owners and (ii) requiring all new entrants for inter-provincial services to comply with crew dress codes, provision of crew identity cards, and payment of employees' pension funds. However, as of January 2006, the improvements have not been approved by Parliament, so again, while they can be implemented as a policy, they can also be easily stopped by political intervention.

WPRPTA has yet to implement any of the recommendations, other than applying the fare increases from the fare policy developed by NTC.

There are some pervasive issues as to why most of the recommendations have not been implemented. It is also worth noting that these issues are still apparent today and are reflected below.

Lack of Political Will: A review of the previous recommendations shows that they all require substantial policy changes. In concert with the policy changes, there must be leadership and an understanding of transport issues and a clear and cohesive strategy to move forward.

Lack of Project Prioritization: None of the projects presented are simple or easy to implement and none were prioritized. With the limited professional capacity in the government and the strong private sector, the lack of priority resulted in a lack of direction for the bus sector.

Limited Professional Capacity: Knowledge capacity in the organizations, especially the public sector bus companies and WPRPTA has consistently been low. To move from their current method of operation to developing a clear bus service regulator or developing TPCs may have been too great a step to make without a concerted political effort to pass laws and regulations to smooth the way towards improving the bus sector. Additionally, the limited professional capacity makes it difficult to counter the external pressures that want to keep the current environment.

Lack of Coordination: With the urban bus routes being provided by public buses under the central government and private buses under the provincial government, there is a significant lack of integration among the operators and on the routes, which complicates the implementation of any policy change.

The lack of implementation of projects and recommendations will be further discussed during the PTWG after the issues are prioritized. The group will identify potential projects/policies that can be implemented and likely barriers to implementation. A part of this step will be a review of previous study recommendations to understand their current validity, as well as more information on why they were not implemented.

(2) Rail Sector Projects and Proposals

The CUTS1 study did not study the operational and institutional aspects of the railway because restructuring was expected under a 1993 Parliament Act. In the short-term, CUTS1 recommended following the proposals made to bring about the restructuring. In the long-term, the study recommended focusing on moving from the current rail provisions to a mass transit system, which would include electrifying major parts of the lines and improving signaling and stations. Because the railway restructuring that was expected in the mid-90s did not occur, CUTS2 rail recommendations blended a combination of soft policies and infrastructure improvements, as well as studies for future development. Like the bus sector, very few of the rail sector recommendations have been implemented. A new non-cabinet ministry was created in 2005, Ministry of New Railroad Development (MoNRD), although the coordination between this ministry and SLR is still unclear. Discussions and studies have also been conducted regarding possible mass rapid transport options in Colombo, although feasibility studies have not been conducted. Additionally, as recommended, rail fares have been increase twice in the past three years, but a clear fare policy still does not exist. Other studies have been undertaken, such as *Establish Public-Private Partnerships for Railways* (2001) by the Asian Development

Bank (ADB), but like was seen after CUTS2, there has been a disconnect between recommendation and implementation in the rail sector. Below is a summary of the issues as to why most of the rail recommendations were not implemented; many are similar to that of the bus sector and are still apparent today.

Lack of Resources: Lack of a consistent resource stream has been a large barrier in implementing many of the recommendations, as they primarily focus on infrastructure changes. The lack of funding has forced basic maintenance works to be postponed, let alone any additional large capital projects such as electrification of the railway or a people mover system.

Lack of Clarity in SLR's Role and Position: Since the 1993 passage of the Railway Authority Act (RAA), there has been talk of converting SLR from a government department to an authority, with the purpose to give the organization more autonomy. There was a 10-year gap between RAA's passage and an attempt to create the authority (which ultimately failed due to external pressures). This created ten years of ambiguity/lack of clarity of SLR's role and position within the government, which fueled the inactivity on many recommendations.

Limited Professional Capacity: This is similar to what was indicated for the bus sector. SLR has always been a government entity and its management and staff lack experience in commercialization and marketing to implement the more progressive policies identified in the recommendations.

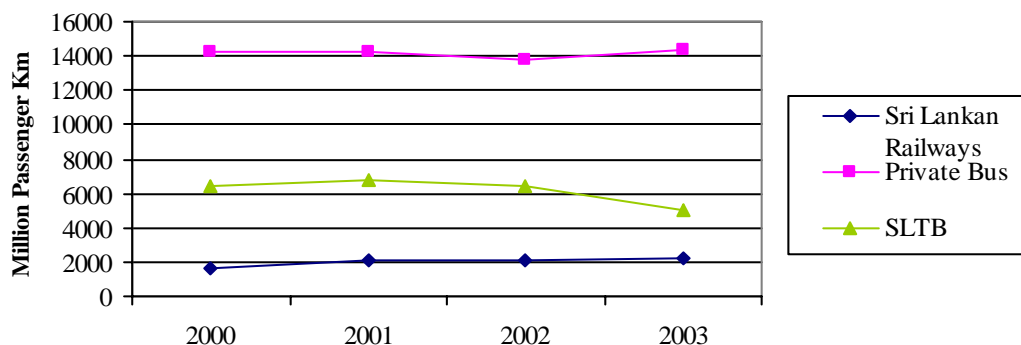
Lack of Prioritization: Similar to the bus sector, the wide variety of projects listed without priority and implementation order, combined with the capacity limits of SLR staff and lack of political will resulted in a lack of direction for SLR.

7.3 Public Transport

(1) General Overview

Public transport in the Colombo Metropolitan Region (CMR) consists of buses and rail. School vans, office vans, taxis and three-wheelers, which are forms of paratransit, also provide passenger transport in the CMR. Within Sri Lanka, modal share of bus, rail, and three-wheelers accounts for 75% of all passenger kilometers carried. Within public transport, buses carry 90.5%, rail 7.2%, and three-wheelers 2.3%.¹ Within Colombo, along the four rail lines, rail's modal share is a bit higher, but overall, buses are the main choice for public transport in the region. As incomes have increased and bus and rail services deteriorated, residents have opted for private vehicles. However, for the low and middle income residents, public transport remains the only option and they remain captive to a service that provides unreliable service, long and variable travel times, overcrowded vehicles, and unsafe conditions. The following figure shows the growth in the sector in the past few years.

¹ Kumarage, Amal. "Regulatory Impediments in the Land Transport Sector of Sri Lanka." Workshop on Regulatory Impact Assessment, Sri Lanka, 2004.



Source: Sri Lanka Central Bank Economic and Social Statistics, 2004

Figure 7.1 Public Transport Passenger-Km in Western Province 2000-03

(2) General Public Transport Issues

Issues were developed through conversations with relevant decision-makers, as well as through multiple meetings of the PTWG. It was found that there are a number of issues that are pervasive throughout the entire public transport sector. They affect all modes of transport, as well as the ability of the government to outline a comprehensive long-term transport strategy for the public transport sector that includes both public and private buses, as well as the railway and three-wheelers. These issues are in priority order, as decided by the PTWG on 31 January 2006.

Lack of Intermodal Coordination: Organizations and Facilities

During the 1960s and 70s, coordination existed between the railway and bus sector organizations. Buses were present when trains arrived in order to carry passengers to their final destinations, which demonstrated that coordinated timetables and facilities existed. Since decentralization and the subsequent fragmentation of the bus sector, there has been little coordination between SLR and bus sector. Since railway stations are not always adjacent to the major roadway and with the major development occurring on the roadways, not near railway stations, bus operators, especially private sector operators, have little motivation to serve the stations.

Railway stations have not been upgraded to facilitate private vehicle to rail connections either. All PTWG members agree that bus-rail and rail-private vehicle (Park N' Ride, Kiss N' Ride, Bike N' Ride) facilities and coordination should be undertaken; however, other officials indicated that SLR sees the bus sector as competition and therefore, views facility coordination as a threat to their ridership and income. There is movement in improving coordination, as the Minister of MoRT has requested NTC to identify 25 interchange points that can be used as a pilot project to introduce coordinated night bus services with the railway and this is expected to begin in the spring of 2006.² This service, while a step in the right direction, is still problematic because the rail stations are not designed to also serve as a bus stop (including a waiting area for passengers and buses), so infrastructure aspects of the issue still need to be considered. For example, PTWG members pointed out that there are insufficient parking areas at Dematagoda and Maradana rail stations for coordinated regular bus and school bus services. This would also need to be extended for pedestrian facilities and access to and from the stations/stops.

² In the short-term, the services will be introduced by the SLTB with a subsidy, with the potential for bidding on the service in the future.

Political Interference in Public Transport Sector

The use of transport institutions for political patronage has been an issue throughout the bus and rail sector's history in Sri Lanka. It has been recognized repeatedly as one of the largest issues that inhibits improvements in the sector. It is best observed by examples such as (1) railway fares, especially seasonal tickets, are kept non-commercial; (2) WPRPTA is unable to cancel permits even though the law gives them such powers; and (3) the bus fare policy created in 2001 has, at times, been applied differently to private and public buses.

Both the public bus company and the railway have been viewed as places to employ people, although this is a separate issue explained below. Three-wheelers are encouraged by the government through a lack of regulations, as well as through fuel subsidies and the offering of highly polluting two-stroke three-wheelers as a prize in a government lottery. Generally, three-wheelers are looked upon positively because they encourage self-employment.

Political interference also negatively affects the possibility of continuity of transport policies and programs in the government because it is exceptionally difficult to get laws and regulations passed by Parliament. Without Parliament's acceptance, policies are merely viewed as the opinion of the current administration, to be replaced with a completely different policy when a new administration takes office.

The largest outcome of this issue is that when politicians interfere with transport policies and decisions, the passengers' interests suffer. When interference occurs, it is to advance external interests, not to improve the public transport system or services.

Lack of Implementation and Enforcement of Existing Regulations

In parallel with political interference, there is a lack of implementation and enforcement of regulations that have already been passed by Parliament or the Provincial Council. PTWG members indicated that if the existing regulations were implemented consistently, many of the below issues would be minimized. Two examples are listed below.

- WPRPTA has repeatedly attempted to cancel permits, based on violations of permit conditions.³ This, in parallel with not issuing new permits on that route, would bring the supply of buses in line with demand. However, it has not been implemented due to political interference and subsequently, WPRPTA is unable to optimize bus supply.
- The Railway Authority Act was passed by Parliament in 1993 to modify the structure of SLR. It was expected that the development of the authority would increase the railway's autonomy. It was finally implemented in 2003 only to be challenged by the trade unions. The government gave up in early 2005 and SLR was converted back to a government department.

Without progress to ensure implementation of what has already been passed, it is likely that there will be difficulties in both getting the private sector (buses/three-wheelers) and trade unions (rail) to agree with proposals, as well as making other policy changes.

Lack of Institutional Capacity of Public Transport Institutions

Every institution that was interviewed, as well as previous studies that were reviewed, indicated that a shortage of institutional capacity and professional skills was a high priority issue and of

³ Power granted by the Provincial Road Passenger Carriage Services Statute No. 1 (1992)

serious concern. The fragmented bus sector along with the many-sided responsibilities of the rail sector has resulted in a highly complex public transport industry. Educational opportunities to gain professional transport knowledge are limited in Sri Lanka, so many of the government officials and bureaucrats are not well-versed in the intricacies of transport. In 1983-84 there was a Management Training Institute (MTI) at the Central Transport Board (CTB). Additionally, there was a World Bank project through which CTB managers were sent to the UK for three months to observe transport professionals. These staff members were then used to train local staff at MTI. However, training people abroad lasted only a year and those who were trained have either retired or changed jobs, limiting knowledge passed along. Those at the decision-making level often lack adequate experience in transport, which has resulted in an uncertainty as to how to move forward and has continued to allow external pressures to interfere in the sector, although they are not always in the best interests of the sector as a whole. The limited capacity and skills has also resulted in a loss of focus on the passenger in daily operations and decision making.

Lack of Passenger-centric Focus⁴

This issue ties into the politicization and ability of external influences to alter transport planning and implementation. The focus of the needs of the passengers has been lost in the decision-making of transport organizations – bus stands are converted for private vehicle parking, three-wheelers continue unregulated, low quality of service on bus and rail continues – issues that could be improved with political will and a focus on passengers, as opposed to other interests.

Limited Pedestrian Access

As discussed in Chapter 5, pedestrian access in the CMR is a challenge, with decrepit sidewalks, uneven pavement, hawkers, merchants, and vehicles on the sidewalks. This is especially pertinent for public transport users who need clear and safe access to rail and bus stations and three wheelers. Pedestrian crossings around the stations/stops often lack proper signals and signage, which decreases pedestrian safety. Types of crossings and locations have not been standardized, so some areas (i.e. Colpetty, Bambalapitiya) have crosswalks, while others in equally high-demand/high-traffic areas (Borella), have underpasses. Given that between 2001 and 2004 about 33% of all road users killed in Sri Lanka were pedestrians, focus should be given to improving their environment and access to stations.⁵

Government Focused on Employment Generation

After reviewing bus and rail history, it is clear that previous administrations have used both the public bus company(s) and the railway for political patronage. This has led to high staff size, which required continual government subsidies. For example, SLTB estimates that only 50% of its 41,000 employee workforce is needed for operations and SLR staff costs more than doubled from 1993-2003 to account for 74% of recurring expenses. Due to government regulations, the organizations are unable to easily reduce staff without paying a substantial redundancy package. Additionally, because staff who are hired are not always qualified for the positions, there has been low productivity, resulting in low quality of service.

⁴ During the brainstorming session that occurred during the 2nd PTWG meeting, this was identified as an issue. However, when prioritization was undertaken during the 3rd PTWG, it did not receive any nominations as a priority.

⁵ Traffic Police, 2005.

Discrepancies between Central Government Transport Policies and Provincial Government Actions⁶

When the 13th Amendment to the Constitution was created in 1987, its purpose was to decentralize many of the central government's responsibilities that could be handled by individual provinces. Intra-provincial transport was such a responsibility and is listed in List I of the Ninth Schedule (known as the Provincial Council List), which is what led to the creation of the WPRPTA. Best practice shows that urban public transport should be regulated/operated and generally handled by a level of government close to the passengers. However, the 13th Amendment also gives Provincial Councils authorization to override any parliamentary bill that touches on any of the responsibilities listed in the Provincial Council List. That is, national policies need not be implemented by the Provincial Council or provincial regulatory body with regards to intra-provincial (i.e. CMR) transport.⁷

The implications of this are that any public transport policies can be implemented by SLTB, but there is no requirement that private buses must implement the same, as they are regulated by the province. As this project's counterparts, and therefore those who must provide final consent, are from the central government, there is a possibility that those policies and projects approved by the central government will not be implemented by Western Province (WP).⁸ Secondly, professional skills at the provincial level are somewhat lower than their central government counterparts, thereby increasing the likelihood that greater political interference may occur, further weakening public transport in the CMR.

7.4 Intra-Provincial Buses

(1) Historical Conclusions

After reviewing the previous historical summaries of the bus sector, it is clear that numerous actions have been taken and a number of methods have been attempted that vary from complete nationalization to a mix of public and private operation and every combination in between. It is not so much what has been tried, but more importantly, what were the issues that led to changes – that is, what were the tipping points in each of these cases that led to the next organizational change. Appendix 13 includes a summary of the sector's history and tipping points. The conclusions can be found below.

Conclusions

Sri Lanka bus industry had gone through a full cycle for a bus industry. They began with state ownership under the notion of providing a public service, to decentralizing the sector and allowing the introduction of the private sector, to reestablishing mixed operations with state ownership and private involvement. Unlike some other developing countries, Sri Lanka appears willing and able to attempt significant changes in their effort to improve the bus industry. However, it is worth noting that there are obviously some fundamental issues in the urban public transport sector because for the wide variety of changes made, the service still does not meet the public's demand.

⁶ This issue was identified during the brainstorming session of the 2nd PTWG; however, it did not receive any nominations to be considered a priority issue.

⁷ Provincial Councils can ask for assistance from the central government regarding responsibilities listed in the PCL; however, the central government cannot impose their policies on the Provinces.

⁸ Western Province Road Transport Authority is a member of the Steering Committee, but WP is not part of the counterpart team.

There are some takeaways that can be observed that demonstrate some of the reasons why the different approaches have not been as successful as they should have been. Much of the rationale can be narrowed down to inappropriate or ineffective regulatory and supervisory mechanisms, as well as a low management capacity in the bus sector itself. Other rationale for the sector's failures includes:

- **Fares** have been consistently regulated throughout the sector's history due to the social aspects of the service and the large number of low-income citizens. Until 2001, a clearly defined fare policy did not exist and fares rarely increased in line with operating costs.
- **Management capacity** in the public bus sector has lessened over the years. The number of highly qualified transport professionals has always been small and when the public bus sector was disaggregated into many smaller companies, there were an insufficient number of highly qualified managers to handle them.
- **A lack of understanding of the transport sector at the political/decision-making level** has been pervasive, which has led to extensive political interference in the public bus sector. The pressure for employment generation led politicians to pad the public bus sector with unnecessary staff, regardless of the long-term consequences.
- **Public service obligations** were a requirement, regardless of the change in the sector's organization, but requisite subsidies to make the services profitable were not provided. This included the continuation of unprofitable rural routes, unprofitable night services, and the carrying of school children for 10% of regular fares.
- **Heavy competition from the private sector** occurred on the profitable routes, and because the regulatory structures for public and private were different and unable to be made compatible, public sector buses continued to lose market share.

(2) Current Bus Organizations

Because the bus system involves both public buses, operated and regulated by the national government, and private buses, operated individually and regulated by the provincial governments and NTC, there are a number of institutions involved. They are summarized below.

Table 7.1 Bus Sector Organizations

Name of Organization	Level of Government	Purpose	Functional Responsibilities
National Transport Commission	Central	Regulator	<ul style="list-style-type: none"> • Advise the National Government on passenger transport policy and services; • Grant permits in specified areas; • Ensure service on unremunerative routes; • Provide permits for inter-provincial bus services; • Provide managerial expertise and assistance to Provincial Transport Authorities;
Sri Lanka Transport Board	Central	Operator	<ul style="list-style-type: none"> • Provide public bus services in Sri Lanka; • Provide shelters/stations/terminals for SLTB buses; and • Provide service for unremunerative routes and times.

Name of Organization	Level of Government	Purpose	Functional Responsibilities
Western Province Road Passenger Transport Authority	Province	Regulator	<ul style="list-style-type: none"> Regulate intra-provincial private buses and routes; Provide annual permits for each bus on a specific route; and Provide shelters/stations/terminals for private buses.
Colombo Municipal Council	Municipal	Implementer	<ul style="list-style-type: none"> Provide bus stops along the routes.
Operator Federations	Private	Representation	<ul style="list-style-type: none"> Represent members' issues to the regulatory authorities; and Represent members during strike action.
Route Associations ⁹	Private	Route Oversight	<ul style="list-style-type: none"> Facilitate bus schedules on route if route timetable does not exist.
Private Bus Operators ¹⁰	Private	Operator	<ul style="list-style-type: none"> Operate both inter-provincial and intra-provincial private bus service.

Source: This Study, 2006

(3) Colombo's Bus Sector

General Operations

Road-based passenger transport in Sri Lanka and Colombo is provided by both the public and private sectors, with the private sector controlling a greater modal share, as shown below.

Table 7.2 Bus Passenger-km and Modal Share within WP and inside Outer Circular Highway

	2003		2004		2005	
	Passenger Km (m)	Modal Share (%)	Passenger Km (m)	Modal Share (%)	Passenger Km (m)	Modal Share (%)
WP						
Public	5,075.9	29.8	4,983.9	30.4	4,749.4	28.5
Private	11,958.7	70.2	11,390.4	69.6	11,921.2	71.5
Inside OCH						
Public		Unavailable			4,540.5	36.4
Private		Unavailable			7,923.2	63.6

NTC and SLTB, 2006

As the private sector is completely profit focused, they tend to operate the more profitable routes, leaving SLTB to cover the unprofitable routes. In 2005, a total of 11.9 billion passenger kilometers were carried by the private sector and 4.7 billion were carried by the public sector in WP. One indicator of bus sector productivity is the average number of passenger km driven per bus per day. In comparing the private and public sector in 2005 in WP, the public sector averaged 11,866 passenger km per bus per day, which was significantly more productive than the performance of the private sector, which averaged 6,231 passenger km per bus per day.¹¹

SLTB has been restructured into a single enterprise, as explained previously. They continue to look to expand their operations, although this is mainly by adding the new buses from India

⁹ Route associations are not present on every route. There is a wide variety of oversight by route associations.

¹⁰ Typically an individual who owns a single bus, although there are a few operators who own more than one bus.

¹¹ This Study, 2006

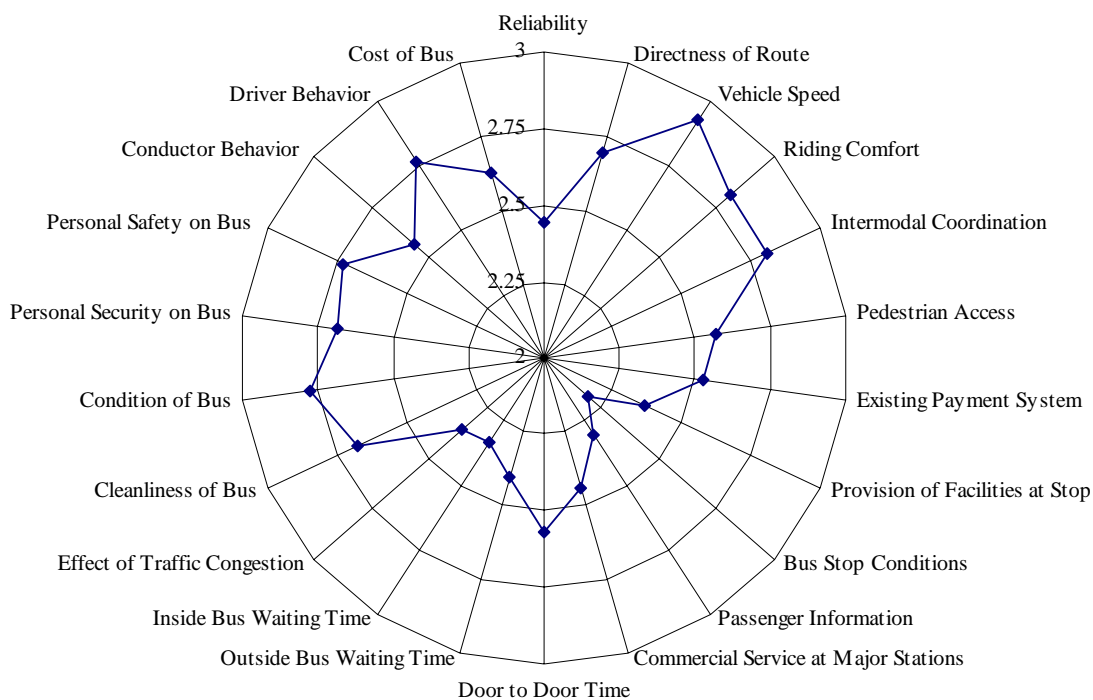
onto already crowded routes and roads. This will further complicate WPRPTA's job in optimizing the number of buses on each route, because these new buses are added to the roads without a coordinated timetable.

Most private buses operating on the same route have formed a route association, which has joined one of the private bus operator federations. The route associations vary in structure, with some enabling the implementation of rotated timetables or carrying of school children for a reduced fare, while others have little effect on the individual operators. The private bus operator associations represent the individual operators with the provincial and national governments. The largest operator association is the Lanka Private Bus Operators Association (LPBOA), which claims to have 75% of all private operators as members. LPBOA indicated that they are relatively happy with the fare increases/fare policy; are in favor of timetables, although they feel that they (and the individual route associations) should be consulted regarding timetable formation and implementation; in favor of the formation of limited liability corporations (LLC), but require a law that is implemented before doing so; and view the implementation of franchising as problematic, since current operating permits would have to be terminated and removing those operators from the routes would be difficult.

Passenger Survey

A passenger survey was conducted for this study. The detailed results can be found in Appendix 14. Below is a brief summary of the major results:

- 61.5% showed no preference between public and private buses, which indicates that there is little difference between the two types of service;
- 77.6% do not have access to a private vehicle, which indicates a highly captive ridership;
- 28.4% transferred from another bus before this trip and 23.3% were transferring to another bus after this trip, which indicates that intermodal connections are somewhat common and should be a focus of future projects/policies;
- Cost (37.3%), time (18.0%), and convenience (16.4%) were indicated as the reasons for using public transport, indicating that modal choice is primarily a financial one;
- Passengers had an equally low impression of the quality of SLR, SLTB, and private buses;
- Vehicle speed, riding comfort, and intermodal connections had the highest level of satisfaction. However, traffic congestion was indicated to be somewhat bad, which is a direct affect on vehicle speed. Passenger satisfaction on other indicators can be seen below;
- Bus stop conditions and reliability had the lowest level of satisfaction; and
- All indicators were deemed almost equally as important, which is problematic for identifying possible solutions that will most benefit passengers.



Legend: 1=Unsatisfied 2= Somewhat Unsatisfied 3=Neutral 4=Somewhat Satisfied 5=Satisfied
Source: This Study and Appendix 14

Figure 7.2 Passengers' Levels of Satisfaction of Bus Indicators

Route Network

The urban bus sector is a highly competitive and complicated system, typical of many large developing cities. The original route network was developed in 1958, with new routes added based on requests from operators, citizens groups, etc. Demand planning has seldom been used as an input to route development.

There are 452 private sector or jointly-operated intra-provincial routes and sub-routes within WP, although only 397 routes are currently functioning. SLTB alone operates an additional 187 routes and subroutes, for a total of 584 routes and subroutes in operation in WP.¹² Additionally, there are another 139 inter-provincial routes that begin/end in Colombo, all of which utilize the three Pettah bus stands.¹³ The current route network is designed as a radial network, that is, starting from outside the city and providing direct service to the city. In theory, these inter-provincial buses would not provide local services, but in practice, because short-distance fares provide a higher profit, they are carrying local/urban passengers as well.¹⁴

Bus Fleet

As of 2005, SLTB had a fleet of 2,897 buses available to operate the routes in WP. To operate the timetable requirements (TTR), they estimate that they need 2,147 buses, but due to low maintenance and/or absent crew, were able to operate only 1,039 (36%).¹⁵ About 50% of SLTB

¹² NTC, SLTB, and WPRPTA, 2006.

¹³ Central Bus Stand (Public), Bastian Mawatha (private), Gunasinghe Pura (private)

¹⁴ This is in the process of being rectified by the fare policy, created in 2001 by NTC.

¹⁵ Sri Lanka Transport Board, Consolidated Profit and Loss Statement, Cluster Bus Companies. September 2005.

buses are between the ages of 5-10 years old, with another 38% between 11-15 years of age. The intra-provincial private fleet consists of 6,649 private buses, of which 5,235 (79%) are operational on any given day. According to WPRPTA, the 47.3% of private buses less than 5 years old, with another 36.2% between 5-10 years old. The private fleet licensed for inter-provincial transport is 2,143, although WPRPTA estimates that only about 70% operate on any given day. The majority of private operators own one or two buses, despite attempts by the government to encourage the formation of associations or companies.¹⁶ 40% of the private fleet seats between 40-49 passengers and only 3% seat 50 passengers or more. 31% have only 20-29 seats.

The productivity of the bus fleet, measured as the average number of kilometers driven per operating bus per day, was about 132 km/bus, island-wide, for the private bus sector between 1996 and 2003, while it was about 200 km/bus for the public bus sector during that same period. International best practice sets the norm for this indicator as 230-260km/bus/day for urban routes, as there are multiple shifts/bus and well organized timetables and schedules. However, in Colombo, it appears that the private sector is operating at about 50% of the best practice indicator, due to the limits of one shift/bus, few turns/shift, and an ineffective (or in many cases, negligible) scheduling system.

International indicators have identified an average load factor, the ratio of total passengers to the number of seats on the bus, of 65% of seating capacity as the norm, taking into account peak and off-peak conditions. In Sri Lanka, the average private sector bus's seating capacity is 35, while the average capacity of public buses is 42 seats. Previous studies indicate between 1996 and 2003 that the load factor for the private sector is 150%, while for the same period, the public sector averaged 105%, which indicates a level of overcrowding on both types of buses, with the private sector demonstrating severe overcrowding.

Infrastructure

WP builds and operates 73 bus terminals across the province, including the two private terminals in Pettah. SLTB operates the Central Bus Stand (CBS) in Pettah, while the UDA is tasked with obtaining the land and building the SLTB bus stands. The bus stands serve both local and inter-provincial buses. Additionally, CMC constructs and maintains 234 individual bus stops throughout the municipality. Of those, 138 are a simple pole with a flag and the remainder is of the shelter variety.¹⁷ Passengers and drivers alike tend to ignore the bus stops, as buses will stop anywhere to pick up passengers.

Regulations

Regulations are created at both the national and provincial levels to govern the provision of public transport. Most of the regulations are geared towards the private sector, while those services provided by SLTB are exempt from provincial level regulations. The following table outlines some of the regulations that have been created and their status.

Table 7.3 Bus Sector Regulations

Regulation Summary	Created By	Year	Status
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¹⁶ Some operators followed through, but formed Companies Limited by Guarantee, which are route associations. These CLG or route associations have minimal control over operations and have had negligible impact on the system.

¹⁷ Colombo Municipal Council, 2005.

Bus Fare Policy	MoT	2001	Approved by Cabinet
Procedure to Issue a Passenger Service Permit	NTC	2005	Estimated to be taken up by Parliament in 2006
Consolidation of private sector operators into entities of 50 buses or more	NTC	1996	Amendment, approved by Parliament, deadline revoked in 2003
Granting of Passenger Service Permits for Intra-Provincial Routes	Western Provincial Council (WPC)	1992	WP Statute No.1 (1992)
Records kept by intra-provincial buses for Intra-Provincial Routes	WPC	1992	WP Statute No.1 (1992)
Cancellation of Passenger Service Permits for Intra-Provincial Routes	WPC	1992	WP Statute No.1 (1992)
No transfers of Passenger Service Permits for Intra-Provincial Routes	WPC	1992	WP Statute No.1 (1992)

Source: This Study, 2006

(4) School Transport Services

General Background

In the CMR, older and low-income students tend to use either buses or three-wheelers, while younger (primary and early secondary age) and middle-income students use school vans. Of all school trips within CMC, 35% are made by school vans, 30% by public/private buses, and the remainder by rail, three-wheeler, private car, and on foot.¹⁸ It is estimated that there are 4,000 privately operated school vans in use in the CMR.¹⁹ Vans provide door-to-door convenience for about Rs. 1500/month/child, more than the cost of buses and three-wheelers. Vans help to minimize individual private vehicle trips that parents could make; however, the vans themselves are underutilized and during school operating hours, they park near the schools, often on the street or sidewalks, which reduce road space and impacts traffic flow.²⁰

Parents of young children also seem unwilling to allow their children to use big buses as they are unreliable and considered unsafe, especially the regular buses. As a result, parents of younger children who live near the school choose to use three-wheelers for school transport. A few parents combine resources to pay for three-wheelers services. The driver is typically a neighbor and he drives three or four children round trip. The cost is about Rs. 150/day/trip or about Rs. 1100/month/child, which is about 25% less than the cost of school vans. Because the driver is a neighbor, there is an increased level of reliability and perceived safety, in comparison to SLTB buses.

Non-dedicated School Transport: Originally, when creating the overall fare policy, the government created a monthly student pass that cost 10% of a regular monthly ticket.²¹ On 1 June 2006, the Minister of MoRT passed regulation mandating free transport on all regular SLTB buses for school children who possess a 6-month season pass.²² This has led to a three-fold increase in the issue of season tickets. Because overall supply of SLTB buses in CMR is insufficient, some children who possess the 6-month pass must still travel by other modes.

¹⁸ Refer section 3.4 for school and office traffic details.

¹⁹ 40 % of private operators register with AISCTS

²⁰ Due to the current security conditions, school vans must park in designated places in CMC as of July 2006.

²¹ This is arbitrarily permitted by bus drivers. SLTB buses transport children at the fare discount, but since private operators do not receive a subsidy, some will pick up children for ½ the regular adult fare, while others go out of their way to avoid picking up children (do not stop, leave the stop when children approach, etc.).

²² Note the 6-month season pass is FREE, but students must have one. They cannot receive free transport just by wearing a uniform or seeming to be of school age.

While the scheme has increased public transport use by students, potentially leading to a decrease in private vehicle usage, the sustainability of the scheme is at risk as it is not supported by physical and financial resources. The major problem is that SLTB is not compensated for the service and they are unable to cross-subsidize the service as they are operating in a deficit. The private sector, which makes up the majority of buses in operation, does not want to participate as there is no compensation.

Dedicated School Transport: In September 2005, NTC re-started dedicated school bus services (*Sisu Sariya*) in Western, Southern, and North-Western Provinces. That is, these buses carry ONLY school children – no adults are allowed on the bus, except for a few teachers per bus for safety purposes. Historically, this used to be the main method of school transport, but failed as the service was not economically viable. Under *Sisu Sariya*, both SLTB and private buses are utilized, although the majority countrywide is SLTB. In WP, 7,000 students/day are transported by 135 buses covering 88 schools. Within CMR, 76 SLTB buses supply dedicated services to 30 schools and an additional 6 provide service to multiple schools. NTC contracted with SLTB to either (i) provide the service based on season passes that are 90% off regular fares or (ii) 50% off regular fare without a season pass. NTC contracted with private operators at 50% off regular fares. NTC then provided subsidies and oversight. It is expected that by increasing the service area of the buses, demand for school van transport will be reduced. However, the private buses in this scheme are threatened from regular SLTB buses that are providing free school transport. The result is that some private operators are leaving the scheme. Most of the schools served are government schools and it may be worthwhile for NTC to expand the scheme to include private and international schools utilizing private operators. These schools have a large percentage of private transport and options to reduce this demand could help to reduce overall congestion. Additionally, since the income levels at these schools are higher, the parents may be more amenable to paying higher fares for better service from dedicated services.

(5) Bus Sector Issues

Issues were developed through conversations with relevant decision-makers, as well as through multiple PTWG meetings. The bus sector took up the majority of the discussions at the WG meetings since it is the major mode of transport in Colombo as well as because it is the most complex mode. The issues below are not new – they have been apparent for some time. But the Study Team and the WG members have attempted to identify the underlying issues, as opposed to the causal links that are most often discussed. Similar issues have been raised in Southern Province and the Southern Province Road Passenger Transport Authority has undertaken initiatives to resolve the issues including tendering passenger transport service permits, creating shared bus terminals for public and private buses, and initiating school bus transport. Case studies can be found in Appendix 15.

Insufficient Road Capacity and Lack of Bus Priority

As previously discussed in Chapters 5 and 6, road capacity is insufficient to handle the quantity of vehicles, private and public, on CMR's roads. This is due to both an overabundance of vehicles on the roads, as well as a lack of road space due to Colombo's road hierarchy and traffic management, including traffic signalization, among others. It becomes a public transport issue for road-based passenger transport because buses and their passengers also sit in the same congestion, thereby increasing the travel time and lowering the quality of service. Bus priority measures (priority signaling, bus lanes, contra-flow lanes) have been recommended previously, but have not been implemented. The need for bus priority measures has also been addressed by the Traffic Management Working Group and Chapter 6.

Lack of Timetables on Bus Routes

Timetables are rarely implemented on routes with only private sector operations. In 2004, after a request by WPRPTA, the University of Moratuwa created rotated timetables for 43 private routes. However, only 34 were implemented and as of late 2005, only 14 were still in operation. Examples of these timetables can be found in Appendix 16. Operators of these routes who were interviewed indicated that they were happy with the timetables. Overall, only 33% of those routes are utilizing timetables. As with improving intra-modal route coordination, timetables on private routes would reduce competition, unsafe driving practices, and passenger travel and waiting time. Additionally, timetables would help to reduce congestion by limiting the number of buses on the roadway. They would help to increase the efficiency of the buses, as they would reduce the time spent by bus crews waiting for the next trip.

Lack of Skills/Discipline Among Private Bus Drivers and Conductors

In 2004 in WP, of the accidents involving public transport, private buses were involved in 40.7% of the accidents and received 42.7% of the citations. Within OCH boundaries, the percentages were 35.0% and 33.1%, respectively. In comparison to the public bus company, in 2002, the private buses in WP experienced 0.021 accidents/thousand km operated, while public buses experienced 31% less accident/thousand km operated (0.015). In the same year, private buses had 0.40 violations/thousand km operated, while public buses received 77.5% less (0.090 violations/thousand km operated). NTC is trying to rectify the lack of private driver/conductor skills by providing a two-day training course for all private bus drivers and conductors, with successful completion necessary to renew permits. However, once the drivers go back to their regular duties, the old method of driving takes over – swerving, overtaking, speeding to the next stop, etc., due to the fact that the route causes of high competition and low profitability have not been resolved. Considerable enforcement should also be considered in parallel with NTC training courses. NTC's two -day course mirrors the course SLTB uses as their refresher course, along with a three-month training course when SLTB drivers/conductors join, followed by three months of driving with a supervisor. It is worth noting however, that after the increase in fines in September 2005, the traffic police have noticed a 15-20% reduction in accidents, although this cannot be verified by data as of now.

Oversupply of Bus Permits

Private bus operators and government officials both agree that there are too many buses operating in the CMR. As of December 2005, 40.6% or 130 of the operational routes had more buses in operation than were estimated to be required.²³ For these routes, WPRPTA has indicated that they have stopped approving new permits; however, that has not brought supply of buses in line with demand. This is because, although it is against WP regulations, when an operator leaves the sector, he sells his permit and bus to another operator via a transfer. Due to political pressures, WPRPTA approves the transfer, thereby missing an opportunity to align supply and demand. Additionally, the issue is a central government/ministerial one, in that the Ministry of Trade continues to provide licenses to import buses, without coordinating with MoRT and WPRPTA (and other provincial RPTAs) to see if there is a need for additional buses, which demonstrates a lack of coordination between WP and the central government and understanding of outcomes from policies.

²³ NTC and WPRPTA, 2005. There are 397 routes operating in WP. Only 320 routes have a "required number of buses" calculated. Of that, 130 routes have outstanding permits that exceed the number of required buses, inclusive of a 10% allowance of stand-by buses.

Although the mismatch is primarily a private sector issue, it will be supported by the arrival of an additional 2,200 SLTB buses, 200 via grants from Japan and the United Kingdom and the remainder purchased from India.²⁴ SLTB has yet to decide how many of the 2,000 Indian buses will be used in Colombo, but it is likely that around 30% will be, based on current operations.

The high number of buses on certain routes allows for only an average of 3.2 turns per bus, which results in high competition along the route, low profitability of private sector operators, higher congestion, inability to maintain timetables, and longer travel times for passengers. Furthermore, since profitability is kept low, while operators indicate that there are sufficient resources for general bus maintenance, purchasing new buses is generally not an option for most operators. The potential policy solution is to implement the regulations that have been passed, primarily allowing WPRPTA to gradually bring supply back in line with demand.

Overall, the quality of bus services is quite low in Colombo. Observations include poor bus conditions, unsafe driving, long in-bus travel times, unprofessional driver/conductor behavior, low frequency of service during off-peak periods, and crowded buses, the result being that bus services are not meeting demand for quality services. But, because a large part of the population is without other means of transport, they are largely captive, as shown above from the survey. However, quality of service, while the most noticeable factor of bus transport and the easiest to identify as a problem, is not a primary issue. Instead, it is a causal issue, or result, of a number of other major issues, which are described below.

Lack of Management System for Private Bus Operators

Currently, most private buses are owned by individual operators. This presents a difficult management scenario for WPRPTA as it is nearly impossible to manage each operator's service quality and provision of services. In 1996, regulation was passed to require bus operators to merge to form entities of at least 50 buses by 2003, which would provide some semblance of management oversight, both from the entity and the regulator. However, the regulation was quite broad and provided no specifications for the entities (i.e. LLC, loose associations, management style, facilities, etc.), so the result was the agglomeration of buses on each route into route associations. Some were more tightly constructed than others, with some service guidelines (school children services and rotating timetables), while others were entities in name only. Little changed in the provision of services and the regulation deadline was eventually revoked by NTC and has not been reset, thereby leaving no management system for private bus operators.

Lack of Intra-Modal Route Coordination

Public and private buses are rarely coordinated, even though they share the same routes. WPRPTA has requested NTC's assistance in developing coordinated timetables, although it is a slow and complicated process. Timetables exist only at the origin. Rotated timetables randomly assign each bus a number and that number is provided a slot each day that rotates from peak time to off peak time to standby so that each operator has equal revenue earning potential.²⁵ Of the 254 jointly operated routes in WP (i.e. those that have SLTB and private sector buses on the route), only nine have coordinated timetables and only seven are utilizing that timetable (timetables created by University of Moratuwa). SLTB indicated that they withdrew from the coordinated timetables on two routes because they were unable to meet the timetable requirements, due to traffic congestion (i.e. cannot reach the terminal by the next departure

²⁴ 200 Japanese and UK buses were for tsunami-affected areas; however, they are ill-fitted for those areas (low floor, double-decker) and have instead been put into operation in Colombo.

²⁵ Standby buses are utilized when a bus is more than 5 minutes late for a scheduled slot.

time), as well as general inefficiencies in operations. By creating coordinated timetables on the shared routes, competition would likely decrease along those routes. Additionally, they would ensure that the number of buses on each route would be limited to the number needed to fulfill demand, as well as ensure that private and public buses provide service during off-peak times.

Misdirected Subsidies for Public Bus Services

As indicated above, government funds are being used to purchase new SLTB buses and pay for the organization's deficits, instead of being focused on areas that need subsidies, such as unprofitable routes and services. Deficits for September 2005 for the three regional bus companies (RBC) that serve the CMR were estimated to be Rs. 52.7 million and for all RBCs nationwide, the deficit was Rs. 188.1 million. Much of this comes from the continued payment for excessive staff and as the deficits are directly covered by the government, the budget burden continues to grow. Additionally, by regulating fares for everyone, those who can afford to pay more are being needlessly subsidized, instead of creating a direct subsidy for the poor. In the meantime, the private sector is not receiving subsidies to incentivize their provision of unprofitable services, reducing mobility for passengers and creating a further disconnect between the public and private sectors.

Lack of Enforcement of Road Rules

This issue is a subset of the lack of enforcement of existing regulations, as many of the road rules are outlined and bus drivers are tested prior to obtaining a license. However, on the roadways themselves, the road rules are commonly disregarded, much to detriment of safety. The accident rates for both public and private sector bus drivers have been discussed previously with the private operators demonstrating a much lower safety record than their public sector counterparts. However, it is not simply a driver issue that must be combated, but also a traffic police/enforcement issue. Within WP, there are 1,148 officers engaged as traffic police, which includes administrative staff as well as those on the street. The traffic police are engaged in directing/controlling traffic and investigating accidents, as well as enforcing road rules and there are not enough police to fully implement and enforce the road rules, thereby allowing the drivers to take the likely chance that their poor driving will not result in a fine.

Government-Imposed Financial Burdens for SLTB

The public sector is tasked with Public Sector Obligations (PSO) – continuing to operate on unprofitable routes and at unprofitable times, as well as providing reduced fare services to school children. While SLTB does receive Treasury funds to continue operations, the money is not targeted towards these PSOs, but instead is given as a lump sum, which does not cover the costs of the PSOs. The continuation of requiring the PSOs, while not providing the needed funding has forced SLTB to continue to cover the costs, by reducing service levels elsewhere.

Limited Private Operator Capacity

In general, private operators are individuals with one or two buses who are not typically educated in business or transport. Their focus is on single day profits, as opposed to long-term improvements that could increase profits in the future. This is partly due to the instability of the sector, but it is also due, to a large extent, to the operators' limited knowledge of business processes, strategies to increase/improve service levels, and the costs and benefits of specific improvements. Although some operators interviewed acknowledged that forming more stable and concrete companies would result in sector improvements, it is not entirely clear that they are able to put forth the necessary plans and policies to bring this to fruition. This can be clearly seen in the formulation of route associations, which came as a result of the NTC Act

Amendment requiring companies of 50 or more buses to be created by 2003. The route associations are highly variable in their policies, demonstrating that sector capacity is low and training and incentives would be needed to make substantial changes.

Insufficient Infrastructure Facilities for Buses

The three major Colombo bus stands located in Pettah are used primarily for inter-provincial routes, although some local bus routes also utilize these facilities. They are strictly separate in that one is used only for SLTB buses, while the other two are used only for private sector buses, even for routes that are operated by both operators. The location of the terminals requires that all inter-provincial buses enter the most heavily congested area of the city to drop off passengers and wait for their return trip.

On a positive note, passengers are able to connect easily with other buses traveling within WP, as well as the railway from Fort Station. However, because of the radial network, most passengers must come to Colombo's CBD, regardless of their final destination. Further implications of the terminal inefficiencies are an increase in traffic congestion in Pettah, along with a waste of limited resources in maintaining three bus stands with overlapping responsibilities. Of the 139 inter-provincial routes that originate/terminate in Colombo, 47.5% of them are operated by both SLTB and the private sector, showing that there is significant overlap in the terminals. Furthermore, the land on which the bus stands sit is of high value and could be utilized in a more economically efficient manner.

Insufficient Radial Route Network

All inter-provincial and some intra-provincial bus networks utilize Colombo as the hub of operations and specifically the Pettah/Fort area as the city's hub. With Colombo as the economic center of the region and country, this is not surprising; however, by requiring that the majority of passengers transfer in central Colombo overlooks the growth of the regional centers, as well as the cross-town demand and as a result, mobility between these areas has been impaired. The problems go even further in that, at least until the OCH and the Southern Expressway are completed, transport from the Southern Province to other regions in the country must also transit via Colombo. The congestion that this has caused is untenable.

The network has grown through requests of citizens, bus operators, and politicians and by this method, an overlapping route and sub-route system has been created where numerous routes operate on the main route, while branching off at various places to serve different areas, the latter being defined as a sub-route. For example, 91 routes, 22 inter-provincial routes and 69 intra-provincial routes and sub-routes, ply on Galle Road, for an estimated total number of 1,670 buses operating in one direction per day on Galle Road.²⁶ Along the overlapping sections, there is severe competition between operators (both inter- and intra-provincial public and private buses, since the section is the most profitable) and increased traffic congestion. International best practice shows that the congestion caused by these overlapping routes could be rectified by implementing a trunk-feeder system, although that would require an increased knowledge of demand by the provincial authorities, as well as a rationalization of the route network and change in the formation of the private operator system.

²⁶ From data gathered from SLTB, NTC, and WPRPTA, the consultants calculated 1,047 private intra-provincial buses operated, 482 private and SLTB inter-provincial bus operated, and 141 SLTB intra-provincial buses operated one way along Galle Road. For inter-provincial routes, it was not clear how many licensed buses actually operated, so it was assumed that 70% of SLTB buses licensed actually operated and 80% of private sector buses actually operated. The traffic count conducted by this study at Wellawatte, along Galle Road, counted 2,136 buses travelling southbound on Galle Road and 1,978 travelling northbound on Galle Road.

School Transport Services

Lack of Full Financial Support: No budget has been allocated to support free school transport or the season tickets offered to students and therefore the bus operators (private and SLTB) are not being reimbursed for providing this service.²⁷ No organization has yet to quantify the potential revenue losses, although trips range from 3-57 km, so the losses could be high for some operators. It is clear that neither organization can afford such services. Under Sisu Sariya, SLTB is providing dedicated services to specific schools on a contract basis and is receiving half the average round-trip operating cost from NTC. The two private operators who still provide Sisu Sariya school services charge students 50% of the regular fare and receive a percentage of the average one-way operating cost from NTC. NTC has received a grant for SLR 35 million from GoSL for 2006 to support this program.

Shortage of SLTB Buses: Only 5-10% of students are covered by the above plan as only about 82 buses are available for exclusive school transport. Therefore, other students are forced to use other modes of transport. It is estimated that at least an additional 125 school buses are needed in the Colombo area to transport the students. These additional buses carrying 100 students per bus would reduce demand for 625 small vans.

Lack of Publicity: The government's offer of free school transport was announced a month before implementation. Therefore, many school principals, as well as parents, are unaware of this option. Additionally, because of the close ties between school van drivers and the families of the children driven, the lack of publicity means that there has not been a substantial reduction in school van transport.

7.5 Railway

(1) Brief Historical Review

A review of the railway's history can be found in Appendix 13. The major points are indicated below.

- The Railway Ordinance, which was created in 1864 for the original railway, still governs much of the railway's operations and its outdated methodology is the root of some of the railway's issues;
- The railway began to lose its market share in both freight and passenger transport when all services were opened to private operators in 1978;
- SLR tariffs have always intentionally been kept at uncommercial levels;
- SLR has been used for political patronage and staff size has become excessive; by 2003 staff costs more than doubled to account for 74% of recurring expenses;
- In 1993, Parliament passed an act to create a Railway Authority to prompt management autonomy, but the strength of trade unions delayed implementation until 2003; and
- The conversion to a Railway Authority lasted a little over a year, but the organized reverted back to a government department, due in part to the demands of the trade unions.

²⁷ Hence why the private operators have since refused to provide free transport.

(2) Colombo's Rail Sector

General Operations

In 2004, Sri Lankan Railways (SLR) carried 4.61 billion passenger km, which accounted for only 7% of modal share nationwide and 11% during the peak period.²⁸ Along the four corridors in Colombo, it does provide important services during the peak periods as it acts as a commuter service from the outer suburbs to central Colombo. On the Coastal and Main Lines, the modal share in 1995 was estimated to be 18 and 24%, respectively, and is believed to have increased with the introduction of new rolling stock.²⁹ Peak period trains run approximately every 10, 10, 10, and 30 minutes on the Main, Coastal, Puttalam, and Kelani Valley Lines respectively.³⁰ Tables 7.6 – 7.8 show a summary of ordinary and seasonal ticket trips per month for March 2002, 2003, and 2005 within the boundary of the Outer Circular Highway.³¹ The total ticket trips were 2.32 million, 2.43 million, and 2.26 million, respectively. Rail traffic increased by 4.4% between 2002 and 2003 and decreased by 6.8% between 2003 and 2005.

Within commuter service, the level of service is equivalent to third class. Trains operate over capacity and crowding is standard. Load factors in the mid-1990s were between 1.27 and 1.74, depending on the line. It is likely that these have increased, as ridership has increased due to the lower rail fares vis-à-vis bus fares.³² Although there are intermodal connections, they are not scheduled as such and therefore, do not provide reliable transfers to rail users. Park N' Ride, Kiss N' Ride, and Bike N' Ride facilities are negligible.

Organizations

The organizations below are responsible for the railways and are mainly central government organizations.

Table 7.4 Railway Organizations

Name of Organization	Level of Government	Purpose	Functional Responsibilities
Sri Lanka Railways	National	Regulator, Operator, Implementer,	<ul style="list-style-type: none"> • Manage and operate passenger and freight services • Construct and maintain infrastructure • Advise the National Government on rail transport policy and services
Ministry for New Railway Development	National	Implementer	<ul style="list-style-type: none"> • Identify, design, and construct new railway infrastructure
Trade Unions	National	Representation	<ul style="list-style-type: none"> • Represent members' issues to SLR management

Source: This Study

²⁸ Ministry of Transport Memo on Reformation of Rail Passenger Fares and Increase, 2005.

²⁹ Kumarage, Amal "A Review of Household Income and Public Transport Services and Fares in the Colombo Metropolitan Region, Sri Lanka. December, 2000.

³⁰ Puttalam and Main Lines are the same for the study area. They split at Ragama, with the Main Line heading towards Kandy and Puttalam going north toward Negombo.

³¹ March was chosen as a representative month and SLR did not collect the data for March 2004.

³² SLR indicated that since August 2005's fare increases, ridership has decreased somewhat.

Table 7.5 Ordinary and Season Ticket Trips on SLR, March 2002

From/To	Fort	Maradana	Dematagoda	Kompannaavediya - Bambalapiti	Colombo Area	Kelaniya - Ragama	Main Line	Wellawatte - Moratuwa	Koralawella - Panadura	Coast Line	Baseline Road - Padukka	Kelani Valley Line
Fort	0	14,027	1,680	6,887	22,394	201,155	201,155	123,214	73,878	199,092	81,017	81,017
Maradana	5,744	0	2,329	5,718	13,791	77,309	77,309	50,979	46,447	97,426	20,890	20,890
Dematagoda	10,637	220	0	2,027	12,884	22,618	22,618	5,094	1,644	6,738	188	188
Kompannaavediya - Bambalapiti	9,059	4,908	2,371	4,982	21,320	31,105	31,105	71,431	44,591	116,022	4,371	4,371
Colombo Area	25,440	19,155	6,380	19,614	70,389	332,187	428,770	252,718	166,560	419,278	106,466	106,466
Kelaniya - Ragama	193,507	81,373	16,836	33,862	327,578	81,541	81,541	15,939	2,910	18,849	1,192	1,192
Main Line	193,507	81,373	16,836	33,862	327,578	81,541	81,541	15,939	2,910	18,849	1,192	1,192
Wellawatte - Moratuwa	133,423	48,919	4,596	78,447	265,385	14,763	14,763	63,025	46,754	109,779	460	460
Koralawella - Panadura	73,897	45,913	1,735	45,331	164,876	2,804	2,804	39,307	5,641	44,948	89	89
Coast Line	207,320	92,832	6,331	123,778	430,261	17,567	17,567	102,332	52,395	154,727	549	549
Baseline Road - Padukka	85,258	23,407	180	12,377	121,222	1,529	1,529	701	68	769	239,961	239,961
Kelani Valley Line	85,258	23,407	180	12,377	121,222	1,529	1,529	701	68	769	239,961	239,961

Source: Sri Lanka Railways, 2006.

Table 7.6 Ordinary and Season Ticket Trips on SLR, March 2003

From/To	Fort	Maradana	Dematagoda	Kompannaavediya - Bambalapiti	Colombo Area	Kelaniya - Ragama	Main Line	Wellawatte - Moratuwa	Koralawella - Panadura	Coast Line	Baseline Road - Padukka	Kelani Valley Line
Fort	0	9,076	1,380	12,600	23,236	229,942	229,942	138,593	74,678	213,271	78,119	78,119
Maradana	6,764	0	4,617	6,257	17,638	77,800	77,800	55,769	50,556	106,325	21,655	21,655
Dematagoda	13,312	280	0	1,527	15,119	17,786	17,786	4,682	1,819	6,501	382	382
Kompannaavediya - Bambalapiti	7,716	5,627	3,202	7,935	24,480	25,386	25,386	71,539	51,395	122,934	5,693	5,693
Colombo Area	27,792	14,983	9,399	28,319	80,493	351,114	351,114	270,583	178,448	449,031	105,849	105,849
Kelaniya - Ragama	190,396	73,638	23,489	27,566	315,089	104,720	104,720	19,212	3,641	22,853	3,719	3,719
Main Line	190,396	73,638	23,489	27,566	315,089	104,720	104,720	19,212	3,641	22,853	3,719	3,719
Wellawatte - Moratuwa	132,635	50,814	5,076	78,540	267,065	15,622	15,622	64,514	51,643	116,157	580	580
Koralawella - Panadura	74,002	47,397	1,824	49,675	173,098	3,496	3,496	41,248	5,159	46,407	89	89
Coast Line	206,637	98,411	6,900	128,215	440,163	19,118	19,118	103,762	36,802	162,564	669	669
Baseline Road - Padukka	81,056	22,912	380	9,950	114,298	2,231	2,231	881	122	1,003	252,985	252,985
Kelani Valley Line	81,056	22,912	380	9,950	114,298	2,231	2,231	881	122	1,003	252,985	252,985

Source: Sri Lanka Railways, 2006.

Table 7.7 Ordinary and Season Ticket Trips on SLR, March 2005

From/To	Fort	Maradana	Dematagoda	Kompannaveediya-Bambalapiti	Colombo Area	Kelaniya - Ragama	Main Line	Wellawatte-Moratuna	Koralawella-Panadura	Coast Line	Baseline Road-Padukka	Kelani Valley Line
Fort	0	5,054	9,442	7,433	21,929	225,953	225,953	110,733	66,245	176,978	74,733	74,733
Maradana	6,551	0	4,112	5,114	15,777	71,432	71,432	47,134	45,848	92,982	20,006	20,006
Dematagoda	11,434	374	0	2,644	14,452	24,642	24,642	4,652	1,878	6,530	332	332
Kompannaveediya-Bambalapiti	6,764	4,760	2,451	3,987	17,962	31,708	31,708	70,877	36,322	107,199	5,549	5,549
Colombo Area	24,749	10,188	16,005	19,178	70,120	353,735	353,735	233,396	150,293	383,689	100,620	100,620
Kelaniya - Ragama	225,392	85,265	19,806	35,074	365,557	80,236	80,236	16,834	3,004	19,838	1,281	1,281
Main Line	225,392	85,265	19,806	35,074	365,557	80,236	80,236	16,834	3,004	19,838	1,281	1,281
Wellawatte-Moratuna	120,462	46,508	5,365	77,382	249,717	15,732	15,732	58,056	37,463	95,519	506	506
Koralawella-Panadura	59,110	50,370	1,923	38,111	149,514	2,758	2,758	32,295	4,390	36,685	22	22
Coast Line	179,572	96,878	7,288	115,493	399,231	18,490	18,490	90,351	41,833	132,204	528	528
Baseline Road-Padukka	81,545	23,891	330	9,189	114,955	1,725	1,725	771	33	804	216,935	216,935
Kelani Valley Line	81,545	23,891	330	9,189	114,955	1,725	1,725	771	33	804	216,935	216,935

Source: Sri Lanka Railways, 2006

Network

The rail network is shown in Figure 7.3. The main lines in/out of Colombo and corresponding road corridors include the following:

Table 7.8 Colombo Rail Lines

Rail Lines	Long-Distance Areas Served	Commuter Corridor
Main Line	Central, Northern and parts of Northwestern Province	Kandy Road
Coastal	Southern Province	Galle Road
Puttalam	Most of North Western and part of North Central Provinces	Negombo Road
Kelani Valley (KV)	Most of Sabaagamuwa	High Level Road

Source: This Study, 2006

Like the bus sector, Colombo is SLR's hub for both commuter and inter-provincial passenger services. Fort/Pettah and Maradana are the main stations in Colombo. Pressure on infrastructure is further increased, as it must serve both suburban peak services and long-distance services. For example, there is insufficient space at Fort/Maradana stations to turn trains, so they continue on the Coastal line and turn at Ratmalana. Additionally, although SLR only carries about 1-2% of all freight in the country, much of it is destined for Colombo and therefore, the infrastructure in CMR must also handle freight services. Of the four lines in CMR, the Main Line is triple tracked to Ragama³³ and double tracked to Polgahawela (beyond the study area), the Coastal Line and Puttalam Line are double tracked to Kalutara and Negombo, respectively.³⁴ The KV Line still needs double-tracking to improve capacity along the route. Another rail bridge over the Kelani River is under construction, funded by the Austrian Government. The bridge is needed to handle the additional traffic brought about by triple tracking of the Main Line.

Rolling Stock

There are 250 trains that provide Colombo's commuter services, 35 of which are diesel multiple units, also called power sets, which are used exclusively for commuter services in Colombo. The power sets are preferred by SLR as they are better able to handle the frequent starts and stops efficiently, as opposed to the regular diesel engines. They also can carry about 35% more passengers. SLR estimates that they need an additional 15 power sets to better service demand. However, due to a lack of regular maintenance, the tracks, signals, and communication systems are outdated and ill-equipped to handle significant increases in capacity. Additionally, because of the lack of maintenance, trains are operating at reduced speeds inside CMR, further hampering service and capacity increases.

Fares

Fares are kept noncommercial to ensure services for low income passengers. It is estimated that the current average commuter fare is Rs 0.53/km for third class services, in comparison to the bus, which is Rs. 0.71. The cost per km, excluding staff salaries, is Rs. 1.26, which is creating a loss of Rs. 0.73/km.³⁵ Seasonal tickets are available in increments of weekly, monthly, and quarterly and are Rs. 31/km/month, or Rs 0.52/km/day.³⁶ However, there are substantial discounts offered on seasonal tickets – government employees receive a 60% discount (Rs

³³ Funded by Sri Lanka government funds

³⁴ Government of India is assisting with double tracking of the Coastal Line to Matara.

³⁵ Ministry of Transport Memo on Reformation of Rail Passenger Fares and Increase, 2005.

³⁶ Ministry of Transport Memo on Reformation of Rail Passenger Fares and Increase, 2005.

0.21/km) and regular citizens receive a 50% discount (Rs. 0.26/km). There are also student fares that are heavily discounted and special season tickets for government officials. Because of the high subsidies for season tickets, in 2003, they only comprised 21% of passenger revenues, while accounting for 46% of passenger trips and passenger-km.



Source: Sri Lanka Survey Department

Figure 7.3 Sri Lanka Railway Network

Passenger Survey

A passenger survey was conducted for this study. The detailed results can be found in Appendix 14. Below is a brief summary of the major results:

- 71.5% do not have access to a private vehicle, indicating a captive ridership;
- 70% of users purchased a daily ticket, an interesting result given the highly discounted seasonal tickets. Therefore, perhaps the discounts are not as necessary and they could be progressively eliminated;
- 46.3% of SLR users use a bus everyday, indicating a high need for intermodal coordination at rail stations;
- Time (30.6%), cost (21.9%), and convenience (21.2%) were indicated as the reasons for using public transport, showing that there is a perception that SLR is faster than buses on parallel routes. If speeds could be increased, ridership should grow;
- SLR riders had a higher opinion of SLR than either bus operator, indicating that improvements and intermodal access will not necessarily result in a modal switch to buses;
- Fares, railway staff behavior, passenger information, and existing payment system were the indicators with the highest levels of satisfaction;
- Condition and cleanliness of the rolling stock and the facilities and condition at the stations had the lowest levels of satisfaction, although these aspects can be easily improved without policy changes; and
- Passenger information and reliability were rated as the most important features.

(3) Rail Sector Issues

The railway continues to be a viable mode of transport for commuters in Colombo. It has the ability to reduce congestion on the main corridors, and can be used to stimulate development away from the city center. However, to accomplish this, it will be necessary for SLR to develop solutions to the following issues, which are in order of the priority given by the PTWG at the 3rd Working Group Meeting on 31 January 2006.

Inadequate Railway Investments

Over the past 20-30 years, fares have provided insufficient revenues and the government has provided varying levels of Treasury funds for railway investments, but this traditionally has been inadequate to cover investments for the future. This has led to a severe reduction in regular maintenance and a postponement of infrastructure upgrades on most aspects – track, signaling, communications, rolling stock, stations, etc. Safety has been affected, so to increase safety, speed restrictions have been put in place which has seriously curtailed the overall capacity of the system. Reliability has also been reduced, as without proper maintenance, rolling stock and other infrastructure are more prone to breakdowns.

Uncertain Role in Public Transport

SLR carries both long-distance and commuter passengers, as well as freight containers. The growth on the roadways and limited ability to increase road infrastructure will continue to pressure SLR to provide a more viable and competitive means of transport. Without a clear continuous government transport policy, it is difficult to prioritize needs and identify a direction to move forward to better provide services. The limited capacity at SLR prevents a clear approach to market research to understand passengers' transport needs.

Lack of Progressive Practices in Management and Regulations

SLR management has been tethered by the Railway Ordinance from 1864, an outdated regulation, as well as a limited insight as to how to move forward. The transport needs and likely development patterns of Colombo in the future will require a significant shift in attitudes and management styles within the railway. However, there are no incentives to implement management practices with a more progressive focus and knowledge of these types of practices, such as involving the private sector or changing the focus from long-distance services to commuter and local services, is low at SLR. Additionally, there has not been an effective overhaul of the regulations to encourage progressive practices such as capturing the value of land adjacent to the rail stations, private participation in infrastructure, and understanding demand and marketing to increase ridership.

Misdirected Rail Subsidies

The staff size and the severe discounts on seasonal passes continue to ensure that central government subsidies are necessary to continue the operation of SLR. In the meantime, regular maintenance and infrastructure upgrades continue to be postponed due to lack of funds. By targeting the government resources on maintaining staff size and providing completely noncommercial fares, subsidies are misdirecting and the system is starved of badly needed funds.

Strong Trade Unions Hampering Improvements

There are 94 trade unions at SLR whose purpose is to protect the SLR workers. Mainly they are focused on ensuring proper allowances (extra payment for various work – overtime, stand-by time, etc.), as opposed to focusing on improving service quality. They are strong, with political influence and support, which enables them to influence managerial decisions. The trade unions were an important reason why the Rail Authority has had difficulties in implementation, since the unions are opposed to any movement toward devolving government authority of the railway.

Lack of Realistic Fare Policy

SLR currently has no clear and consistent fare policy to provide for fare increases on a routine basis that reflect actual costs of operations. When increases have occurred, they have typically been on an ad-hoc basis, in response to political influences, which has created irregularities in the fare structure, especially with regards to the seasonal tickets (monthly, quarterly, etc.) vs. single trip tickets. Between 1996 and 2003, operational costs of SLR increased 84%, but no fare increases occurred during that time. In early 2004, SLR increased fares across the board by 50%, which met with no protests from riders. Fares were increased again in August 2005 by another 60% (for third class fares between 0-50 km); however, the increases have not been well-defined or attributed to specific changes in operating costs, and therefore, appear rather arbitrary. The low return at the farebox has not covered required maintenance for some time and has pushed the government subsidy higher, which is proving unsustainable. That said, there are certain inefficiencies present at SLR, such as excessive overstaffing, that should not be passed along to the passengers. The current methodology behind the fares is to keep them lower than bus fares in order to maintain or increase ridership and out of consideration for the transfer penalty that many endure, as transfers between bus and rail are common. As of 2003, it was approximated that 15-20% of passengers shifted from bus to rail, due mainly to the low SLR fares in comparison to that of the buses.³⁷ Additionally, SLR continues to offer seasonal tickets, including monthly and quarterly tickets, as well as special seasonal tickets for government officials, which are highly subsidized, and subsequently, generate losses.

³⁷ Ministry of Transport, Highways, and Civil Aviation. Cabinet Memorandum: *Rationalization of Rail Fares*, 2003.

7.6 Three-Wheelers

(1) Three-Wheelers in Colombo

Three-wheelers entered Sri Lanka in the early 1990s and there are an estimated 230,000 vehicles, mainly individually owned and operated, throughout the country. Figure 7.4 shows the growth in three-wheelers in WP.

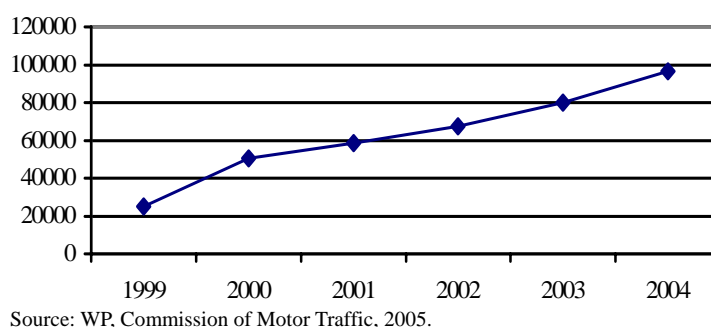


Figure 7.4 Growth of Three-Wheelers in Western Province

Three-wheeler owners initially register their vehicle with the Commission of Motor Traffic (CMT) under MoRT. Drivers also receive their license from CMT, although there are many unlicensed drivers.³⁸ Every year thereafter, three-wheelers must re-register with the provincial CMT. Western Province Commission of Motor Traffic (WPCMT) has not set any limits to the number of three-wheelers that can be registered, and as such, the number of three-wheelers in WP has expanded from 25,043 in 1999 to 96,650 in 2004, a 286% increase (see Figure 7.4). Fares are negotiated for each trip, although there have been some discussions regarding the implementation of meters, but a previous attempt failed.

Three-wheeler growth continues because they serve a need in Colombo as a paratransit service since the bus and rail systems are failing to meet riders' needs. They also are a source of employment for many, a cheap mode of transport, and at this time, impose very little burden on the government (as opposed to buses and trains, which require subsidies and oversight). However, they operate unsafely, swerving into and out of traffic to pick up passengers, making illegal turns, and allowing passengers to disembark from the right side. According to the Traffic Police, in 2004, 50% of the accidents in WP that involved public transport involved a three-wheeler and 51% of traffic violations committed by public transport drivers involved a three-wheeler. They increase congestion in that they are slower than other vehicles, stop anywhere to pick up or drop off passengers, drive around empty looking for customers, often drive in the right lane, and pass traffic congestion on the right. The majority of vehicles operate with 2-stroke engines, which have higher emissions than 4-stroke engines. The most popular Indian 2-stroke vehicle (Bajaj) sells for about Rs. 15,000 less than a Bajaj 4-stroke vehicle. Most three-wheelers have been manufactured in India and assembled in Sri Lanka. Chinese manufacturers are also trying to enter the market with 4-stroke vehicles, which are selling for less than the 2-stroke Bajaj, but three-wheeler operators have indicated that they are not comfortable with the Chinese vehicle because it has not been tested in Sri Lanka.

³⁸ An article in the Daily News 2 February 2006 said that a WP Reserved Police Constable (RPC) was arrested for forging operating permits for three-wheeler drivers who lack licenses.

Infrastructure

Infrastructure for three-wheelers is limited in WP. There are 222 three-wheeler stands in CMC, of which all fit a maximum of 5 vehicles.³⁹ Other gathering areas for three-wheelers include Pettah/Fort/Panchikawatta, various locations along Galle Road, Town Hall, and near the General Hospital and Eye Hospital areas. Typically, three-wheelers park wherever there is space – perpendicular or at a 45 degree angle to the sidewalk on the street, blocking driveway entrances, and on the sidewalk itself.

Organizations

Table 7.9 Three-Wheeler Organizations

Name of Organization	Level of Government	Purpose	Functional Responsibilities
Commission of Motor Traffic	National	Registration	<ul style="list-style-type: none"> Provides initial registration
Western Province Commission of Motor Traffic	Province	Registration	<ul style="list-style-type: none"> Annual registration and licensing
Three-Wheeler Driver Associations	Private	Representation	<ul style="list-style-type: none"> Represent members' issues to the government; Represent members during strike action

Source: This Study

Currently, there is no institution with sole responsibility for regulating three-wheelers, either within the central or provincial government. This has caused a problem in that there is no one overseeing the three-wheelers to make regulations to improve their service and use. Regulations themselves are deficient as there are no restrictions for the number in operation, environmental standards to curb emissions, or oversight to ensure that drivers are properly trained. The government has implemented a government fuel subsidy whereby the government provides Rs. 300/month to any three-wheeler driver who opens an account with a specific bank, although there is no data to know if this is widely used. Additionally, the value added tax (VAT) charges have been removed on leasing installments made during the purchase of a three-wheeler that was purchased before 2004.

The three-wheeler organizations operate quite differently. Samastha Lanka Three Rodha Rata Riyadurange Subasadaka Sangamaya (SLTRRRSS) has organized a number of services for its members, such as (i) a favorable group life insurance scheme; (ii) reduction in down payment for a three-wheeler, as SLTRRRSS guarantees the remainder; (iii) contract with Mobitel for mobile phones, so that drivers can be used as a taxi service in the future; (iv) conducted a 1-day training program on road rules, self-employment skills, marketing, and economic business management with Rotary International; (v) assistance in obtaining stand space from CMC; and (vi) facilities for members to obtain a license. SLTRRRSS also urges all members to obtain comprehensive vehicle insurance and has begun a pilot program with meters from India. Bastian Mawatha Three Rodha Rata Sangamaya (BMTRRS) only provides actions to protect trade union rights and is against most attempts to increase regulation of three-wheelers, including meters, fare regulation, among others.

³⁹ Colombo Municipal Council, 2005.

Regulations

WP tried to implement the Three-Wheeler Service Statute, No. 6 (2002), also known as the Three-Wheeler Act. The purpose of the act was to regularize passenger transport services provided by three-wheelers, including:

- Develop a Three-Wheeler Services Bureau within WPRPTA tasked with (i) surveying three-wheelers for vehicle condition; (ii) registering vehicles and providing and renewing Passenger Transport Service Permits (PTSP); (iii) registering drivers and providing and renewing licenses; (iv) enforcing PTSP conditions; (v) improving service quality by requiring user information, meters, and safety standards; and (vi) providing parking areas for vehicles;
- Appoint an Advisory Council for the Bureau; and
- Research and set a maximum number of three-wheelers authorized to operate within WP and provide only that number of (or less) PTSP.

However, the act was not passed, mainly because the three-wheeler operators strongly opposed the development of an oversight body as they felt that they would then be “controlled” by the government. Demonstrating another example of the strength of the private sector in relation to the government, the WPC gave into the operators’ demands and tabled the bill. Of the two three-wheeler associations interviewed, SLTRRRSS, a three-wheeler driver association, supported this bill; however, by supporting it, the organization lost about 75% of its members because the individual members did not support it. BMTRRS, the second association, strongly opposed the act and the creation of a regulatory body.

Driver Survey

Since there is no institution responsible for the three-wheelers and their operation in the country is recent, there is little data on drivers and vehicles. A survey was undertaken for this study and the major results can be found in Appendix 17. The results of the data are as follows:

- 91.5% of three-wheeler drivers are full-time drivers, indicating that profits from driving are their only earnings and constitute their livelihood;
- 92.5% of three-wheelers have 2-stroke engines, which shows that even if a ban were implemented on imports of 2-stroke engine three-wheelers, the government would likely have to offer significant incentives to the current 2-stroke drivers to show an improvement in air quality;
- 62% make between Rs. 201-500/day, which is slightly more than the poverty line;
- On average, traffic congestion and air pollution were felt to be very bad, although there does not appear to be evidence that three-wheeler drivers understand their role in either of these;
- On average, profitability was felt to be neutral – somewhat good, which indicates that most drivers have not yet experienced a negative outcome from the additional three-wheelers that are entering the market daily and there is sufficient business for the drivers to make a living; and
- On average, the number of regulations for three-wheelers was felt to be neutral – somewhat too many, which indicates potential difficulty in adding new regulations, as they will likely complain.

(2) Three-Wheeler Issues

The issues were prioritized by the PTWG on 31 January 2006. The issues are in order of priority.

Lack of Enforcement of Road Rules

As demonstrated by the number of accidents that involve three-wheelers, drivers are not well-versed in the basic road rules. It is estimated that although licenses are required, 85% of drivers are not properly licensed, as they are unable to pass the CMT written test. However, there is a lack of enforcement by Traffic Police of the road rules, especially with regards to three-wheeler drivers. As with similar cities, resources are lacking in CMR to fully enforce road rules. Additionally, without a regulator, there are no repercussions for drivers who continually violate traffic laws and operate unsafely.

Lack of Institutional Regulator for Three-Wheelers

Central or provincial oversight of three-wheelers is lacking and they are operating in a completely unregulated environment. This has contributed to their uncontrolled growth and unsafe operations. Because they are considered intra-provincial transport, the oversight should come from WP, although attempts to impose operational oversight have previously failed. The central government has passed an environmental regulation to require emissions checks, but its implementation and enforcement is inadequate. The longer this continues, the more difficult it will be to pass regulations as the number of vehicles will grow (43% vehicle growth since 2002).

Too Many Three-Wheelers in Operation

With the decline in bus and rail services, but an increased demand for transport, the number of three-wheelers continues to grow and shows no signs of abating. They continue to serve a purpose for the traveling public who cannot yet afford private vehicles, but need faster and more direct and reliable service than buses and trains provide. They contribute to traffic congestion in that they stop arbitrarily in traffic, cannot keep pace with private vehicles and buses, and park haphazardly, often overlapping with traffic lanes. The lack of oversight of these operators and vehicles allows an unlimited number of vehicles to enter the market.

Insufficient Quantity of Three-Wheeler Stands

CMC has provided 222 three-wheeler stands in the city, although three-wheeler associations have asked for 978 stands. The existing stands are relatively small, having only enough space for 5 vehicles. The lack of space results in three-wheelers congregating in various high-demand areas, such as in Pettah/Fort, along Galle Road, and near Town Hall and parking anywhere, such as sidewalks, car parking lots, and on the street. Without proper parking areas, the alternative is to circulate with an empty vehicle, wasting fuel and contributing to road congestion. This leads to further congestion on the roadways and sidewalks in already highly congested areas.

7.7 Summary of Public Transport Issues

The public transport issues are summarized Table 7.10 below. The bold and italicized issues were identified as high-priority issues by the PTWG. In general, the issues in primarily focus on institutions and regulations and therefore the projects to be identified for the Interim and Final Reports will focus more on policy creation and capacity building. It is necessary to note, however, that political will and leadership will be necessary for the policies to make any inroads at improving the state of public transport in the CMR.

Table 7.10 Summary of Public Transport Issues

	General Public Transport	Buses	Railway	Three-Wheelers
Institutions	<ul style="list-style-type: none"> • <i>Lack of intermodal coordination: organization and facilities</i> • <i>Policization of sector</i> • Lack of institutional capacity • Lack of focus on passenger interests • Focus on employment generation 	<ul style="list-style-type: none"> • <i>Lack of private driver skills</i> • <i>Lack of private management system</i> • <i>Lack of intra-modal coordination</i> • Lack of enforcement of road rules • Misdirected subsidies • Imposed financial burden on SLTB • Limited private operator capacity 	<ul style="list-style-type: none"> • <i>Inadequate investments</i> • <i>Misdirected rail subsidies</i> • <i>Uncertainty as to role/future</i> • <i>Lack of progressive policies</i> • Strong trade unions 	<ul style="list-style-type: none"> • <i>Lack of enforcement of road rules</i> • <i>No responsible institution</i>
Regulators	<ul style="list-style-type: none"> • <i>Lack of implementation & enforcement of existing regulations</i> • Disconnect between central and provincial transport policies 	<ul style="list-style-type: none"> • <i>Oversupply of permits</i> 	<ul style="list-style-type: none"> • Inefficient regulations • Lack of fare policy 	<ul style="list-style-type: none"> • Oversupply of vehicles
Infrastructure	<ul style="list-style-type: none"> • Limited pedestrian access 	<ul style="list-style-type: none"> • <i>Insufficient road capacity and lack of bus priority</i> • Insufficient infrastructure facilities 		<ul style="list-style-type: none"> • Insufficient infrastructure facilities
Service		<ul style="list-style-type: none"> • <i>Lack of timetables</i> • Radial bus network 		

Italicized issues are considered high-priority by the Public Transport Working Group

Chapter 8 Natural and Social Environment

8.1 Introduction

This chapter aims to address sustainability with regards to transport as a basic concept in reducing traffic congestion and environmental impacts while ensuring mobility to support socioeconomic activities in the Colombo Metropolitan Region (CMR). In this chapter, several natural environment and social issues are addressed, which are necessary to resolve to ensure sustainable solutions to social and environmental problems that originate from urban transport.

(1) Overview of Urban Environment in Colombo

Traffic conditions and urban air quality in Colombo are not yet as bad as those encountered in many other Asian cities. However, there has been a significant increase in road traffic congestion in Colombo, particularly over the past five years. Sustained economic growth and lagging investment in public transportation have led to an increase in vehicle ownership and a corresponding growth in fuel consumption.

Without appropriate and timely policy interventions, the present trends would lead to a much higher level of degradation both in the urban environment and quality of life. Thus it is imperative that action be taken before the situation becomes significantly worse. At present, several important initiatives are underway to alleviate road congestion in Colombo through improvement of the network, as addressed in previous chapters in this report. However, there are several longer-term issues due to lack of appropriate policy measures.

(2) Potential Natural and Social Environmental Impacts

Many of the environmental issues related to the transport sector in Sri Lanka are associated with the urban environment; they are as follows:

- Air pollution from vehicle emissions;
- Ineffective land use development which hampers the quality of pedestrian environment;
- Noise pollution from traffic; and
- Poor drainage which inhibits vehicular and pedestrian traffic after heavy rains.

In the meantime, addressing the social dimensions has become a widely acknowledged and practiced imperative of transport development planning. The social issues of urban transport are highly complex. Increasing urbanization generates new demand as many new settlers locate on the periphery, which is not served by traditional transport routes or services. Failure to address their needs is detrimental to their livelihood as their ability to access employment is made more difficult. The main social issues include:

- Poverty;
- Accessibility;
- Gender;
- Sustainability; and
- Involuntary Resettlement.

8.2 Natural Environmental Issues

(1) Air Quality Standards

Overview of Air Pollution in CMR

Automobile exhaust is a major source of air pollution in Sri Lanka, especially after the import liberalization in the late 1970s. Air pollution levels in Sri Lanka are significantly higher than health standards due to: (i) a rapidly increasing vehicle population and fuel consumption, particularly diesel; (ii) a high proportion of old vehicles coupled with poorly maintained vehicles; (iii) adulteration of fuel; and (iv) a high urbanization rate.¹ The government continues to provide a diesel subsidy, which has increased the number of diesel vehicles in the country and added to the pollution problem. Other contributing factors are increased import of fuel inefficient 2-stroke vehicles such as three wheelers, motorcycles and off-road vehicles and unreliable public transportation services which lead the usage of private vehicles and thus total number of vehicles have increased.

Existing evidence shows that the urban environment of Colombo is significantly contaminated with vehicular emissions.² Various studies indicate that inefficient combustion of petroleum in motor vehicles is the primary cause of air pollution in the CMR, as it has nearly 50% and 30% of the nation's vehicle and human population, respectively. The observed levels of lead (Pb), total suspended particulate (TSP), sulfur dioxide (SO₂), and ozone (O₃) are significantly higher than the levels recommended by the World Health Organization (WHO) and the Central Environmental Authority (CEA) of Sri Lanka.³ On a positive note, leaded gasoline has recently been banned, so Pb levels should decrease in the future.

Health Impacts Caused by Air Pollution

Carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NO_x) are generated by mobile sources and adversely affect human health and the environment by contributing to the formation of photochemical smog, acid deposition, and elevated CO levels. NO_x and HCs mix with hydroxyl radicals in the presence of ultraviolet light lead to form O₃ and Peroxy Aeryl Nitrates (principal components of photochemical smog) in the lower atmosphere. CO, like O₃ and NO_x, is also a respiratory irritant regulated as a major pollutant by the United States Environmental Protection Agency (USEPA). HC and smoke particulates include toxic materials that are very damaging to public health and increase mortality. Measurement and control automobile exhaust is therefore important to urban air quality control and the protection of human health and the environment.

Respiratory disease is the second leading cause of hospitalization in Sri Lanka⁴, and asthma is on the rise as a major respiratory disease. This has been largely attributed to the explosive growth of 2-stroke engines, which are prevalent in three-wheelers and motorcycles. These vehicles make up more than 50% of Sri Lanka's overall vehicle population and 85% of its operational road vehicles. The significant increase in diesel fuel consumption is also a contributing factor.

¹ Air MAC (Air Resource Management Centre), 2004. Urban Air Quality Management in Sri Lanka, Ministry of Environment and Natural Resources, Sri Lanka.

² ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint United Nations Development Program (UNDP)/World Bank

³ ESMA (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

⁴ Remote Sensing of Vehicle Emission Survey Report; Ministry of Railways and Transport. January 2005

Three-wheelers and Their Influence on Pollution

Data indicates that 210,000 motorcycles and 120,000 three wheelers have 2-stroke engines.⁵ The reasons why two-stroke engines have significantly higher emissions than four-stroke engines are summarized below:

- Inappropriate type and amount of lubricating oil. In Sri Lanka, 2T oil, the qualified lubricant used in 2-stroke engines, is not readily available at filling stations;
- Dilution of gasoline: the widespread price differential between gasoline and kerosene throughout South Asia results in the dilution of gasoline by kerosene. However, kerosene has as a higher boiling point than gasoline and is therefore more difficult to burn; thus, more deposits build up in the engine and more hydrocarbons are emitted. A limited sample and test of gasoline by the World Bank in Dhaka in 1998 indicated that a significant fraction of gasoline used in three-wheelers was contaminated. However, in Sri Lanka, it appears that adulteration of diesel is more common than that of gasoline, notwithstanding the fact that the price differential between gasoline and kerosene is greater than the price differential between diesel and kerosene; and
- Poor vehicle maintenance.

Two-thirds of the causes of higher emissions from three wheelers are due to fuel quality. Further, it has been shown that 20% of total PM-10 emissions are attributable to three-wheelers.⁶

Growth of Three-Wheelers

Table 8.1 below presents the total registered vehicle population from 1998-2002 and shows the high proportion of the vehicle fleet that is made up of three wheelers and motorcycles. It also shows the high number of dual purpose vehicles, 75% of which are diesel powered.

Table 8.1 Total Vehicle Population in Sri Lanka (1998-2002)

Class of Vehicle	1998	1999	2000	2001	2002
Private cars	208,593	219,125	233,018	241,444	253,447
Three-wheelers	75,666	90,372	101,965	112,239	133,115
Motorcycles	752,009	794,506	834,586	868,705	923,467
Buses	60,061	62,672	64,963	66,273	67,702
Dual purpose vehicles	117,862	127,680	135,632	141,496	150,087
Lorries	151,208	164,398	173,032	179,040	186,992
Land vehicles-Tractors	115,165	123,661	130,946	137,013	144,091
Land vehicles-Trailers	30,728	31,731	32,240	32,806	33,466
Total	1,511,292	1,614,145	1,706,382	1,779,016	1,892,367

Source: ESMAP: 2003

The increasing percentage of three wheelers in the total vehicle population as shown in Table 8.2 indicates a rapid increase in three-wheelers compared to other type of vehicles.

⁵ ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

⁶ ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

Table 8.2 Three-Wheeler Population in Sri Lanka (1998-2002)

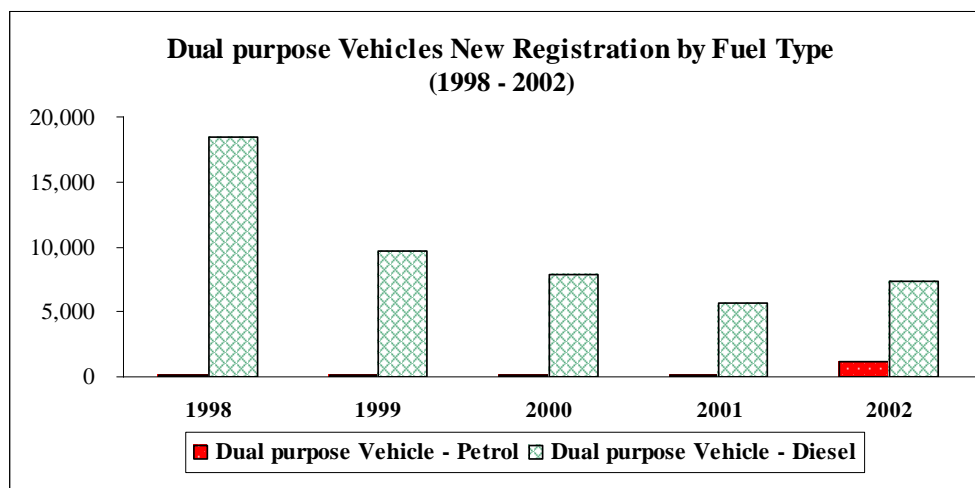
Year	1998	1999	2000	2001	2002
Motor Tricycle (3 Wheelers)	75,666	90,372	101,965	112,239	133,115
Total Vehicle Population	1,511,292	1,614,145	1,706,382	1,779,016	1,892,364
As a % of Total Vehicle Population	5.0	5.6	6.0	6.3	7.0

Source: ESMAP: 2003

Although exact figures are not available, it has been estimated that 60% of the three-wheelers are operated in the CMR.⁷ The Colombo Health Impact Study identifies the drivers of this fleet as being at high risk for pollution-related illnesses. A cursory observation shows that many of the three wheelers are in poor condition, subjecting both drivers and passengers to acrid smoke.⁸

Increase of Dual Purpose Vehicles (Vans)

The increase in dual purpose vehicles (vans) also contribute heavily to air quality degradation as most of them are diesel operated. Between 1998 and 2001, there was a decline in new registrations of dual purpose vehicles, but it appears to be on the rise again. New registration of petrol dual purpose vehicles is a positive change, considering the lower emissions from petrol than diesel.



Source: Commission. of Motor Traffic, 2003

Figure 8.1 Registered Dual Purpose Vehicles (Vans) by Fuel Type

Transport Legislation

Laws have been enacted from time to time to regulate land, sea and air transport, as shown in Table 8.3. The international approach to regulating pollution caused by vehicles is to require them to comply with certain standards. In the case of land transport, emission levels are set for each vehicle type.

⁷ ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

⁸ Chandasiri and Jayasinghe, Colombo Health Impact Study, 1998.

Table 8.3 Important Transport Laws

Law	Year of Enactment
Masters Attendant Ordinance	1865
Boats Ordinance	1900
Vehicles Ordinance	1916
Air Navigation Act	1950
Motor Traffic Act	1951
Merchant Shipping Act	1971
Ceylon Shipping Corporation Act	1971
Motor Traffic (Special Provisions) Act	1979
Airports Authority Act	1979
Sri Lanka Ports Authority Act	1979
Marine Pollution Prevention Act	1981
Chartered Institute of Transport of Sri Lanka (Incorporation) Act	2000

Source: This Study

It appears that towards the end of the 1970s, environmental management has become an important issues in Sri Lanka, and hence the increase in environmental legislation.

Air Quality Standards

The National Environmental Act (NEA) No. 47 (1980) was enacted to adopt a comprehensive approach to protect and manage the environment. It has been amended twice, by the National Environmental (Amendment) Act No. 56 of 1988 and the National Environmental (Amendment) Act No. 53 of 2000. The NEA is biased toward command and control approach to pollution control. The Ambient Air Quality Standards were declared under the NEA in Gazette Extraordinary No. 850/4 (12/1994) as National Environmental (Ambient Air Quality) Regulations (1994). These can be seen below.

Table 8.4 Ambient Air Quality Standards

Pollutant	Averaging Time*	Maximum Permissible Level		Method of Measurement ⁺
		Mg/m ³	ppm	
Carbon Monoxide	8 hr, 1 hr	10, 30	9.0, 26.0	Non-disruptive infrared Spectroscopy
	Any time	58	50.0	
Nitrogen Dioxide	24 hr, 8 hr,	0.10, 0.15	0.05, 0.08	Colourimetric using Saltzman method or equivalent (gas phase chemiluminescence)
	1 hr	0.25	0.13	
Sulfur Dioxide	24 hr, 8 hr,	0.08, 0.12	0.03, 0.05	Pararosaniline method of equivalent (pulsed fluorescent method)
	1 hr	0.20	0.08	
Ozone	1 hr	0.20	0.10	Chemiluminescence method or equivalent (ultra violet photometric method)
Lead	Annual	0.0005	-	High volume sampling, wet washing / atomic absorption or spectroscopy
	24 hr	0.002	-	
Suspended Particulate Matter (SPM)	Annual,	0.10, 0.30,		High volume sampling using and Gravimetric
	24 hr, 8 hr,	0.35, 0.45,		
	3 hr, 1hr	0.45		

Source: National Environmental (Ambient Air Quality) Regulations (1994)

* Minimum number of observations required to determine the average over the specified period:

3 hour average = 3 consecutive hourly average; 8 hour average = 6 hourly averages; 24 hour average = 18 hourly average,

Yearly average = 9 monthly averages with at least 2 monthly averages each quarter.

⁺ By wet chemistry methods or by automated analyzer

(2) Emission Standards

Motor Vehicle Emissions

Air pollution from industrial and vehicular emissions, particularly in Colombo, is now a major concern. The transport sector's motor vehicles account for nearly 66% of the country's fossil fuel consumption and are the main cause of urban air pollution.

Rapid urbanization and growth in transport demand together with inadequate public transport and rapid motorization are common issues in many developing countries. In Sri Lanka, the rapid increase in the vehicle fleet is mainly caused by used vehicle imports. This, coupled with a lack of proper monitoring, emissions control and regulations, and standards has resulted in the deterioration of Colombo's air quality. In addition, improvements to the national and urban road network has not occurred in line with the increase in the number of vehicles, leading to traffic congestion and a waste of fuel, which contributes to poor health and quality of life. The economic costs and environmental impacts from vehicular emissions have drawn greater attention from policy-makers and environmentalists.

Emissions from vehicles consist of many pollutants that result from a number of different processes. The primary source of pollution is vehicular exhaust which is generated during the fuel combustion process. In addition, other gases such as ozone, Peroxy azyl nitrates and sulphate and nitrate particles form in the atmosphere from reactions involving the primary pollutants.

Emission Standards

The estimation of these emissions is important from a number of view points. First, development of local emission inventories is essential to draw up a national action plan and also to carry out research and development activities in mitigating vehicle emissions. Secondly, these inventories are useful in comparing the present status with the ambient air quality standards or even developing new standards.

National Environmental Regulations, which include emissions, fuel quality, and vehicle importation standards were put into effect in July 2003 under the NEA. The vehicle emission standards can be found in Tables 8.5 and 8.6 below. Even with the standards, enforcement continues to be a problem, although a court case was filed in 1997 to improve enforcement of emission standards.

Table 8.5 Petrol Vehicle Exhaust Emission Standards

Type of Vehicles	Emission Standards				Remarks
	As of July1, 2003		As of July1, 2003		
	CO	HC	CO	HC	
Petrol vehicles other than motorcycles and three-wheelers	4.5	1,200	3.0	1,000	Both Idling and 2,500 RPM/no load
Petrol motorcycles	6	9,000	4.0	6,000	Both Idling and 2,500 RPM/no load
Petrol three-wheelers	6	9,000	4.0	6,000	

Source: NEA, 2003

CO: Carbon Monoxide (% v/v: percent by volume)

HC: Hydrocarbon (ppm v/v: parts per million by volume)

RPM: Revolutions per Minute

Table 8.6 Diesel Vehicle Exhaust Emission Standards

Emission standards Smoke Opacity on Snap Acceleration k factor (1 m ⁻¹)			
Type of Vehicle	As of July 1, 2003	As of January 1, 2005	As of January 1, 2007
Diesel Vehicles	8.0	6.0	4.0

Source: NEA, 2003

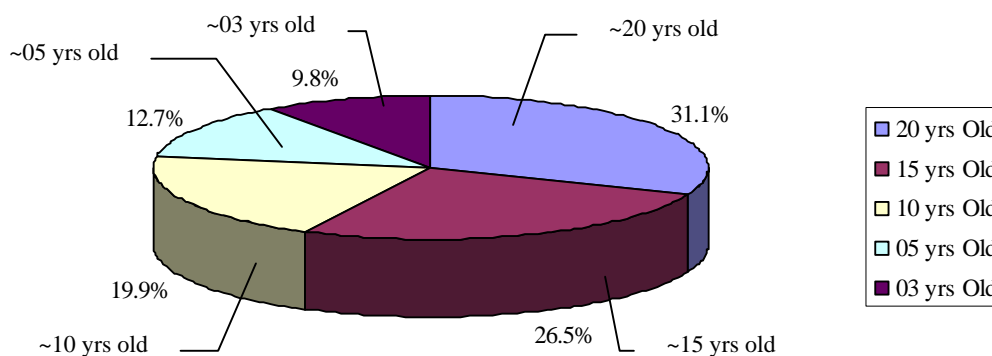
k factor – Absorption Coefficient

Snap Acceleration – has the same meaning as defined in SAE Recommended Practice J 1667

(3) Vehicle Maintenance and Inspection System

Vehicle Age

Vehicle ages have varied based on government import policies. For example, in recent years, a many used vehicles have been imported and presently, only three-wheelers are assumed to be new, while the remainder of vehicles are used, some more than 10 years old. Additionally, based on data from the Department of Motor Traffic, regardless of the age upon import, the below figure shows that more than 57% of vehicles are more than 10 years old. This data does not reflect those vehicles that are unroadworthy. AirMAC has estimated the current active road vehicle population as 1,438, 910.



Source: Department of Motor Traffic, Jan, 2006

Figure 8.2 Age of Vehicles

Vehicle Inspection System

Sri Lanka's current vehicle inspection system focuses on the vehicle's physical fitness, including smoke levels. Present vehicle inspection parameters are listed below.

- Structure;
- Tires;
- Wheels;
- Suspension;
- Engine;
- Fuel System;
- Exhaust system;
- Transmission;
- Service brake;
- Parking brake;
- Steering System;
- Body;
- Windscreen & windows;
- Head lamps;
- Other lamps;
- Direction indicators;
- Horn;
- Reflection;
- Mirrors;
- Speedometer;
- Trailer coupling; and
- Other items such as crash bars etc.

Vehicle inspection is undertaken during initial registration (all vehicles), annually (commercial vehicles such as buses and trucks), and on the roadside by the police (all vehicles) randomly. The initial inspection is carried out by the Ministry of Transport's Commission of Motor Traffic (CMT). Registered private sector garages undertake the annual inspections of commercial vehicles. Within the Motor Traffic Act (MTA), there is regulation to allow assessment of fines to vehicles emitting high smoke levels. However, the regulations do not include any pollution standards. Lastly, the Sri Lankan Police are authorized to fine vehicles that spew visible smoke. There are two categories for initial vehicle registration.

- Brand new vehicles: Vehicles are weighed at the head office of CMT to issue weight/inspection certificates and manufacturer's specifications are used for the gross vehicle weight (GVW); and
- Used Vehicles: Empty weight and the GVW of the foreign registration certificate are accepted to issue the weight certificate.

An inspection certificate is compulsory to register motor vehicles, except in the case of previously approved prototypes. The following details are entered in the Inspection Certificate and the Certificate of Registration:

- Chassis Number and Location;
- Engine Number and Location;
- Wheel base/Overhang;

- Vehicle Weight;
- Vehicle Make and Model;
- Vehicle Class;
- Engine and Capacity;
- Axles;
- Wheels and Tires;
- Fuel Type;
- Body Color;
- Body Type;
- Body Construction and Material Used;
- Length, Width, and Height;
- Type of Cab Construction; and
- Number of passengers/ GVW.

Constraints of Present Vehicle Inspection System

The current vehicle inspection system in Sri Lanka does not include vehicle emissions checks, as it is mainly aimed to ensure road safety as opposed to meeting environmental standards. Additionally, the primary purpose of vehicle inspections is to collect revenue, as opposed to controlling emissions.

Heavy commercial vehicles are required to undergo an annual inspection in order to obtain their annual vehicle license; however, other vehicles, including diesel powered dual purpose vehicles, are not required to submit a fitness test report. Moreover, the quality of the fitness reports issued by the private sector is questionable and therefore, the annual inspection system has not been very successful in controlling emissions.

New Inspection System

In December 2005, CMT took a major step towards improving air quality by contracting with Environmental Systems Products (ESP), a private US company, to design, construct, and operate the country's Vehicle Emissions Testing (VET) Program. ESP will build and operate a network of fifteen vehicle inspection stations and twelve mobile testing units. This program will use Two Speed Idle and Diesel Snap Acceleration tests to inspect motor vehicle emissions. The program will be focused on the Western Province (WP) and CMR, where 70% of the country's vehicles are located. A combination of mobile units and centralized stations will serve the remaining vehicle population. In 2006, motor vehicles of all types, including motorcycles and three-wheelers will have to pass an annual emissions test before their license can be renewed. In partnership with GoSL, ESP will roll out the annual inspection program in May 2006. ESP will operate half of the nationwide program, while Sri Lanka's Laugfs Lanka Gas Ltd will build and operate the remainder of Sri Lanka's VET.

(4) Fuel Quality

Road Transport Vehicle Fuel Types

The Reciprocating Internal Combustion (IC) system, the main engine technology for road-based transport, runs on gasoline, diesel, or natural gas. While gasoline is used primarily for small engines, diesel is the most versatile fuel used in IC engines. The combustion cycle for reciprocating IC engines can be handled by either two or four strokes. Although two-stroke engines have an advantage in its higher power to weight ratio, combustion can be better

controlled in the four-stroke engine, which makes them more efficient and less polluting than two-stroke engines. Recently, advanced technologies such as fuel injection, exhaust gas recirculation, catalytic converters, secondary air injection, pre-chamber or swirl chamber concepts with conventional or alternative fuels have been developed. Alternative fuel technology includes electric, hybrid and fuel cells.

Fuel Supplies

In Sri Lanka, petrol and diesel are distributed by Ceylon Petroleum Corporation (CPC). Sapugaskanda Oil Refinery of the CPC is a topping/reforming⁹ refinery with hydro-treating units for naphtha, kerosene, and diesel. The refinery was commissioned in 1967 and is able to handle only 60% of Sri Lanka's oil requirements. The remainder is imported and includes Iranian Light, Arabian Light, Upper Zakum and MIRI, which are low in sulphur. In addition to gasoline and diesel the refinery also produces 15,000 tons of light petroleum gas (LPG)/year. Sri Lanka regularly imports oil products, mainly distillates, as production from the 50,000-barrel-per-day refinery. Crude oil imports and sales of CPC are presented in Table 8.7.

Table 8.7 Exports and Imports of Petroleum Products

Items	Quantity (MT)
Imports	
Crude Oil	1,191,250
Refined Products	656,967
LPG	69,001
Export Sales (Local)	
Petrol	111,588
Auto Diesel	909,606
Super Diesel	20,759
Marine Diesel ¹⁰	5,490
Kerosene	114,327
Furnace oil	373,724
Avtur	76,881
LPG	72,719

Source: Central Bank Report, 2000

Fuel Reformulation

During the past 30 years, the use of leaded gasoline has been substantially reduced or eliminated in many countries. In fuel reformulation programs, fuel specification changes have been adopted due to their direct benefits on vehicle exhaust and evaporative emissions. These changes have been done in two more steps over a period of time. Recently adopted advanced specification changes are in the process of implementation to ensure that future fuels can facilitate the introduction of very advanced engine emission control technologies.

In the process to reformulate gasoline, the first step was to remove Pb, as it is highly toxic, specifically the carcinogenic nature of benzene, and presents obstacle in the use of catalytic converters. Reducing Reid Vapor Pressure (RVP), which is the tendency of fuel to evaporate and emit HC vapors into the atmosphere, is the most effective way of reducing HC emissions. Therefore, limiting RVP facilitates the control of ozone in the lower atmosphere. Lower aromatics in gasoline would directly reduce emission of total HC from exhausts and reduce the

⁹ The crude oil refining process used at the refinery

¹⁰ Diesel used by marine vessels such as ships and boats

emission of heavy hydrocarbons, including poly-nuclear aromatic compounds. Oxygenates (oxygen components), when blended in gasoline, reduce exhaust emissions of carbon monoxide (CO) and unburnt hydrocarbons. Further, oxygenates assist in controlling benzene emissions. Sulphur in gasoline has a significant impact on emissions of catalytic converter equipped vehicles and very low levels of sulphur (below 30 ppm) are recommended as fuels that do not contribute to the deterioration of catalytic converter technologies and are suitable for low emission vehicles. Further, SO₂ generated from sulphur in gasoline contributes to total PM.¹¹

In diesel reformulation, sulphur reduction is paramount since low sulphur emissions will be low in SO₂ and PM10 and therefore, worldwide, the sulphur content of diesel is lessening. Most European and North American countries are now introducing regulations to limit sulphur to 0.05% by weight and some, like Finland and Sweden, are moving to virtually sulphur-free fuel, 0.001- 0.005%. The cost of reducing sulphur to 0.05% is moderate, less than USD 0.01/liter.¹² Yet a 1989 study concluded that the cost of reducing sulphur to 0.05 percent in Europe would be between 0.9 and 1.4 U.S. cents/liter, equivalent to \$6,000-\$9,000/ton of sulphur removed.

Sulphur as a Major Pollutant

Sri Lanka has long been cited for its relatively high sulphur content of diesel, which is assumed to be at or near the specification value of 1.1% sulphur by weight. As depicted below, Sri Lanka has an unusually high sulphur specification for its diesel fuel.

Table 8.8 International Comparison of Sulphur Specifications in Diesel

Country	1998	1999	2000	2001
Indonesia	0.5	0.5	0.5	-
Malaysia	0.5	0.5	0.3	-
Myanmar	0.5	0.5	0.5	-
Philippines	0.5	0.5	0.5	0.2
Singapore	0.3	0.05	0.05	0.05
Thailand	0.25	0.05	0.05	0.07
Vietnam	0.5	0.5	0.5	-
Sri Lanka	1.1	1.1	1.1	1.1

Source: ESMAP, 2003

All data is % sulphur by weight

Fuel Type and Emissions

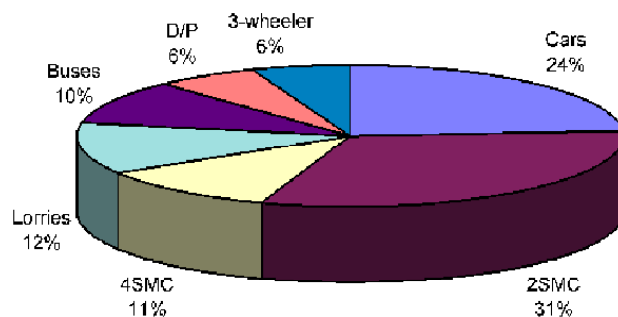
The share of petrol vehicles has remained high compared with diesel vehicles. This is mainly due to the high growth of motorcycle imports during the 1980s and 1990s. For example, the relative share of motorcycles in the total vehicle fleet increased from 41% in 1989 to 52% in 1995. In the category of petrol vehicles, the relative share of motorcycles increased from 18% in 1970 to 23% in 1978 and from 61% to 73% in 1989 to 1996. This deserves special emphasis because of the high emission rates associated with motorcycles. Literature shows that motorcycles contribute 50% more hydrocarbons/km than passenger cars and an almost equal amount of particulate matter as buses and lorries.¹³

¹¹ ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

¹² Faiz, A., C. Weaver and M. Walsh, 1996 *Air Pollution from Motor Vehicles: Standards and Technologies for Controlling Emissions*, World Bank, Washington DC.

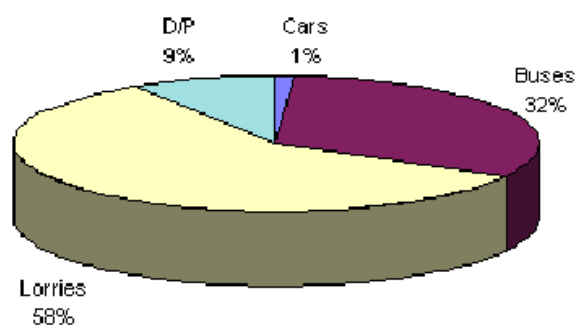
¹³ Chandrasiri S., 1999 *Controlling Automotive Air Pollution: the Case of Colombo City*, Economy and Environment Programme for Southeast Asia, Research Report Series.

Petrol and diesel vehicles account for 78% and 22% of total emissions, respectively. Figures 8.3 and 8.4 show that among petrol-driven vehicles, cars and two-stroke motorcycles account for about 55% of vehicle emissions, whereas buses and lorries account for about 90% of emissions among diesel-driven vehicles.



Source: Chandrasiri, 1999
D/P – Dual Purpose Vehicles; 4SMC – 4-Stroke Motorcycles

Figure 8.3 Percentage of Total Emissions of Petrol Vehicles in Colombo



Source: Chandrasiri, 1999
D/P – Dual Purpose Vehicles; 4SMC – 4-Stroke Motorcycles

Figure 8.4 Percentage of Total Emissions of Diesel Vehicles in Colombo

Fuel Standards

Fuel quality is one of the most important factors affecting vehicle emissions in Colombo. The adulteration of diesel is evident from the characteristic kerosene odor that emanates from the exhaust of some private diesel buses. However, it should be noted that adding kerosene to diesel makes for a “better” diesel, while adding kerosene to gasoline makes for a worse gasoline (i.e., more difficult to combust in an engine designed for gasoline). It is established that some three wheelers use kerosene in place of gasoline due to the lower price of kerosene. Fuel Quality Standards as specified by the National Environmental Regulations are as presented in Tables 8.9 through 8.11.

Table 8.9 Emission Standards for Gasoline

Parameter	Unit	Fuel Standard		Test Method
		Low Octane Gasoline	High Octane gasoline	
		As of July 1, 2003	As of July 1, 2003	
RON		90	95	ASTM D 2699
Benzene (maximum)	% v/v	4	2.5	ASTM D 3606
Lead content (maximum)	g/l	0.013	0.013	ASTM D 3341 and ASTM D 5055
Sulphur (maximum)	Ppm	1000	500	ASTM D 1266
Reid Vapor Pressure (max.)	K Pa	60 (38°C)	70	ASTM D 5191
MON		-	85	ASTM D 2699
Evaporation at 150°C (minimum)	%	70	75	
Total Aromatics	% v/v	45	45	UOP 273
Oxygen content (maximum)	% m/m	2.7	2.7	By calculation

Source: National Environmental Regulations
 RON: Research Octane Number (minimum)
 MON: Motor Octane Number(minimum)
 kPa: kilo Pascal
 % v/v: percent by volume
 g/l: prams per liter
 ppm: parts per million
 % m/m: percent by mass
 ASTM: American Society for Testing Materials

Table 8.10 Emission Standards for Diesel

Parameter	Unit	Fuel Standard			Test Method
		With effect from July 1 st , 2003	With effect from Jan. 1 st , 2004	With effect from Jan. 1 st , 2007	
Cetane Number (minimum)		49	49	49	IP 21 or ASTM D 613
Density at 15°C (maximum)	% v/v	820-860	820-860	860	ASTM D 1298
Distillation (T90-Maximum)	°C	370	370	-	ASTM D 86
Distillation (T95-maximum)	°C	-	-	370	ASTM D 86
Sulphur (S) content (maximum)	ppm	5,000	3,000	500	ASTM D 1266
Cetane index		46	46	46	ASTM D 976

Source: National Environmental Regulations
 % v/v: percent by volume
 g/l: grams per liter
 ppm: parts per million
 T90: Temperature at which 90% of diesel evaporates
 T95: Temperature at which 95% of diesel evaporates
 ASTM: American Society for Testing Materials

Table 8.11 Emission Standards for Super Diesel

Parameter	Unit	Fuel Standard	Test Method
		With effect from Jan. 1 st , 2004	
Cetane Number (minimum)		49	IP 21 or ASTM D 613
Density at 15C (maximum)	g/l	860	ASTM D 1298
Distillation (T95-maximum)	C	370	ASTM D 86
Sulphur (S) content (maximum)	Ppm	500	ASTM D 1266
Cetane Index		46	ASTM D 976

Source: National Environmental Regulations
% v/v: percent by volume
g/l: grams per liter
ppm: parts per million
T95: Temperature at which 95% of diesel evaporates
ASTM: American Society for Testing Materials

(5) Low Emission Vehicles

Liquefied Petroleum Gas (LPG) for Light-Duty Engines

The use of compressed natural gas (CNG) in heavy duty vehicles in place of diesel has many advantages including extremely low emissions of sulphur dioxide and particulate matter. With appropriate engine design this could reduce the emission of NO_x, as well.¹⁴ In Sri Lanka, natural gas is not available and the gas that is being used as fuel for light-duty engines is liquefied petroleum gas (LPG), which is considered to be a more environmentally friendly fuel. It is now estimated that around 12,000 automobiles have converted to LPG. LPG, however, is not well suited for heavy-duty vehicles whereas CNG is a good fuel for heavy-duty engines.¹⁵

International Examples of Low Emission Vehicles

In Nepal, diesel-powered *Tempos*, three-wheelers that carry up to 10 passengers, were banned by the government in 1999 because of their negative impact on air quality. In the mid-1990s, a United States Agency for International Development (USAID)-funded program demonstrated the feasibility of converting *Tempos* to lead-acid battery operation. As of 2000, some 500 of these vehicles were operating in Kathmandu and public acceptance of these vehicles has been high.¹⁶

Electric three-wheelers have also been investigated, but the economics are highly dependent upon the availability of surplus power. In Nepal, the opportunity cost of off-peak hydropower availability for overnight recharging of three-wheeler batteries is effectively free for 6-8 months/year, due to the large number of hydropower projects that do not meet daily peak capacity. On the other hand, Indian studies show that an electric three-wheeler costs \$1,000 more than the standard model, effectively doubling the capital cost and limiting feasibility.

The situation in Sri Lanka is quite different, because unlike in Nepal, Sri Lanka already has a significant number of oil-fired independent power producers (IPPs), whose number is expected to grow over the next few years. Although the power system is also largely hydro-powered, there is very little prospect of spilled energy in the foreseeable future. Even in years with heavy

¹⁴ Air MAC (Air Resource Management Centre), 2004. Urban Air Quality Management in Sri Lanka, Ministry of Environment and Natural Resources, Sri Lanka.

¹⁵ Air MAC (Air Resource Management Centre), 2004. Urban Air Quality Management in Sri Lanka, Ministry of Environment and Natural Resources, Sri Lanka.

¹⁶ ESMAP (Energy Sector Management Assistance Programme), 2003, *Sustainable Transport Options for Sri Lanka*, 2003 Joint UNDP/World Bank

rains, IPP thermal plants would be reduced during off-peak hours to avoid fuel charges, so the availability of surplus off-peak hydropower in Sri Lanka is small. Hence, electric three-wheeler may not become popular as a low emission vehicle option.

Hybrid cars have drastically reduced emissions levels in other countries, but the higher price of these is an obstacle that would deter its use in Sri Lanka.

(6) Environmental Monitoring System

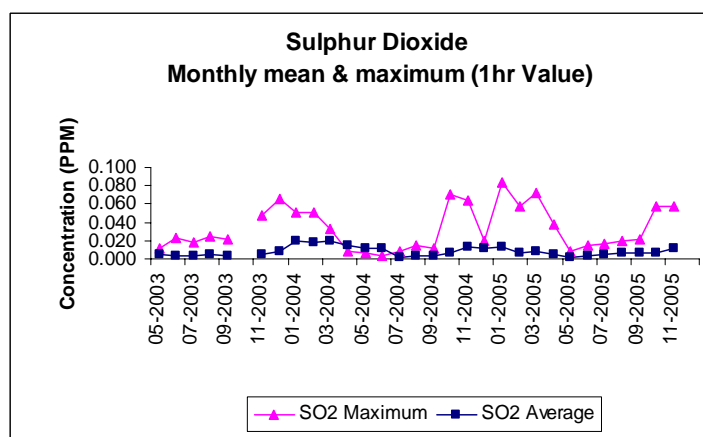
Current Status of Environmental Monitoring System in Sri Lanka

Air quality data is limited in Colombo. Systematic monitoring started in 1989 under the Environmental Division of the National Building Research Organization (NBRO). Initially, locations in Colombo were examined for sulphur rates and dust, which was followed by a second program at seven representative locations in 1992-1993. In late 1996, NBRO started a long-term monitoring program at Fort, in the center of the city, and in Colombo 7 (Baudhaloka Mawatha, a residential area) as a background station in Colombo. However, the monitoring unit at the latter station is currently inoperable due to maintenance problems. A third mobile unit is available to monitor areas when necessary. All three stations were given to CEA by the Ministry of Transport and Environment (MoTE).

Air Quality Monitoring

These sites are monitored for NO_x, CO, SO₂, and ozone (plus corresponding meteorological data) continuously PM10 and every four days. This constitutes the most important source of Colombo air quality data. Other organizations that had been active in air quality monitoring include the Sri Lanka Atomic Energy Authority (which collected PM10 and PM2.5 data in 1995-96 for urban Colombo) and the University of Peradeniya, which collected acid rain samples at 12 locations in 1994-99 and at Nuwara Eliya (in the hill country) since 1996.

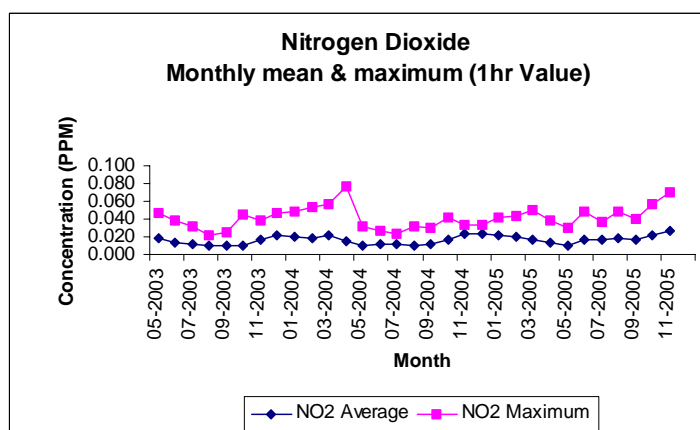
Because of differences in sampling methods and locations, it has been difficult to compare the new data from 1996-2000 with the earlier data. However, the new data collected in late 1996 does allow some preliminary conclusions. Figure 8.5 shows monthly mean and maximum levels from 2003-05 for SO₂. Considering the prominent seasonality of the data it is apparent that the highest concentrations occur during November-January, which reflects the impact of fumigation conditions during the NE monsoon, when the prevailing wind direction is exactly opposite to the sea breezes that have W to SW direction, which are typical for the late afternoon-evening hours.



Source: Central Environmental Authority, Sri Lanka

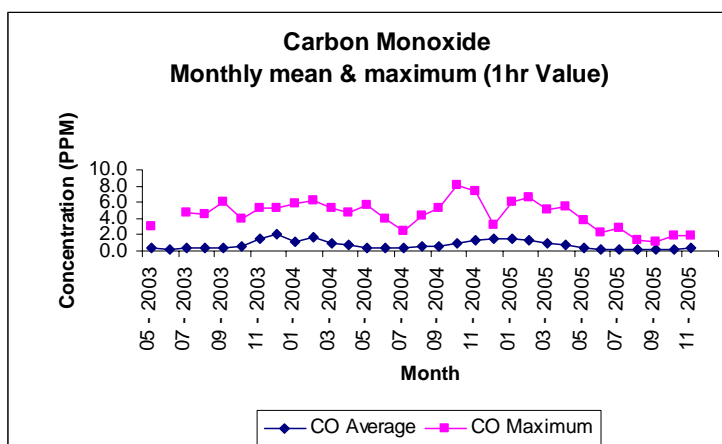
Figure 8.5 Monthly Averages for SO₂

The main conclusion is that some of the pollutants from the transport sector have increased over the duration at the Fort monitoring site. Figures 8.6 -8.8 below show the monthly variation of NO₂, CO and PM₁₀ levels at the Fort monitoring station.



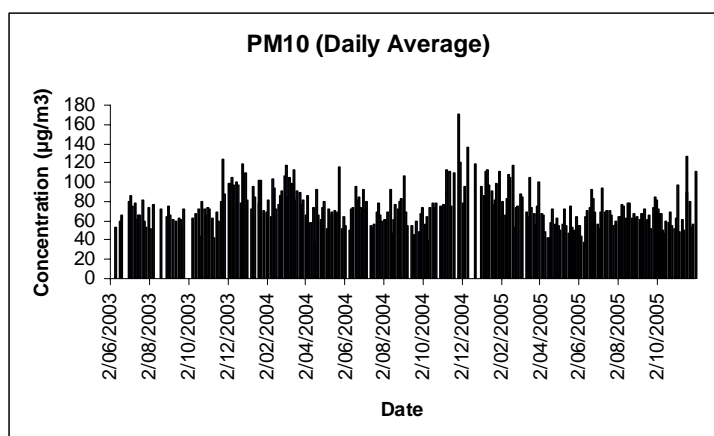
Source: Central Environmental Authority, Sri Lanka

Figure 8.6 Mean Monthly Levels and Maximum NO₂ at Fort



Source: Central Environmental Authority, Sri Lanka

Figure 8.7 Mean Monthly Levels and Maximum CO at Fort



Source: Central Environmental Authority, Sri Lanka

Figure 8.8 Daily Average of PM10 at Fort

8.3 Social Environmental Issues

(1) Poverty

Current Status of Poverty in Sri Lanka

Sri Lanka defines poor as those persons living in a household whose real per capita monthly total consumption expenditure is below Rs. 1,423 (2002).¹⁷ Table 8.12 summarizes all poverty lines, where the national official poverty line is calculated as the arithmetic mean of the lower and upper bounds.

Table 8.12 Summary of Poverty Levels (2002)

Poverty line	Rs./month
1. Food Poverty Line	973
2. Lower Poverty Line	1,267
3. Upper Poverty Line	1,579
4. Official Poverty Line (average of 2 and 3)	1,423

Source: Household Income and Expenditure Survey (HIES), Dept. of Census and Statistics, 2002.

Table 8.13 shows each district's nominal poverty lines, the ratio of poverty headcount, and the percentage of poor households respectively. Note that the poverty line for Colombo is higher than the national poverty line, as well as the level for as all other districts, which reflects higher prices in Colombo district. Using the poverty line, the poverty headcount ratio is computed for 1990-91, 1995-96 and 2002. The headcount ratio is defined as the percentage of the population whose monthly per capita total consumption expenditure falls below the district level poverty line. The proportion of households that are poor – nationally, and for different districts is also shown in the table.

¹⁷ Official Poverty Line: Department of Census and Statistics of Sri Lanka, 2004,

Table 8.13 Nominal Poverty Lines, Ratio of Poverty Headcount and % of Poor Households by District

District	Nominal Poverty Lines (Rs.)			Poverty Headcount Ratio (%)			Percentage of Poor Households (%)		
	1990-1991	1995-1996	2002	1990-1991	1995-1996	2002	1990-1991	1995-1996	2002
(National)	475	833	1,423	26.1	28.8	22.7	21.8	24.3	19.2
Colombo	518	908	1,537	16	12	6	13.1	8.8	5.0
Gampaha	489	875	1,508	15	14	11	11.7	11.3	9.2
Kalutara	494	866	1,523	32	29	20	27.0	24.6	17.7
Kandy	485	850	1,451	36	37	25	30.9	32.7	20.9
Matale	466	816	1,395	29	42	30	24.3	36.8	24.5
Nuwara Eliya	494	841	1,437	20	32	23	15.6	25.9	18.2
Galle	489	833	1,466	30	32	26	25.0	25.5	21.7
Matara	470	816	1,395	29	35	27	23.3	29.5	23.2
Hambantota	470	791	1,338	32	31	32	26.3	26.2	27.8
Kurunegala	456	791	1,352	27	26	25	22.8	22.6	21.2
Puttalam	461	841	1,423	22	31	31	18.6	25.8	24.5
Anuradhapura	456	816	1,380	24	27	20	20.1	21.9	17.2
Polonnaruwa	475	783	1,366	24	20	24	21.2	17.1	20.1
Badulla	485	850	1,409	31	41	37	26.8	35.8	31.5
Monaragala	480	791	1,366	34	56	37	27.4	48.4	32.4
Rathnapura	494	833	1,451	31	46	34	26.4	40.0	30.1
Kegalle	466	858	1,437	31	36	32	27.3	31.7	27.5

Source: HIES 1990/91, 1995/96, and 2002 and Colombo Consumer Price Index (CCPI)

Role of Transport in Poverty Reduction Efforts

Transport projects can make an important contribution towards poverty alleviation. The poor consistently identify the importance of affordable and dependable transport in order to secure and maintain jobs, access medical and educational services, and shop for goods at competitive prices. When considering the role of transport in poverty reduction efforts, it is useful to examine both direct and indirect approaches. Direct or targeted approaches improve basic access for the poor and improve access to education, healthcare, and economic and social resources and opportunities. Indirect approaches improve the overall efficiency of transport systems, with the poor getting indirect benefits from this.

Transport Needs of the Urban Poor

A different set of factors must be considered when designing direct or indirect interventions to address the transport needs of the urban poor. Typically the urban poor are a highly heterogeneous population, thus targeting is problematic. The majority of urban poor tend to live on the periphery of the city center, where travel to and from work often takes several hours. For this group, the main issues are the distances to travel, poor accessibility, and costs involved in traveling such distances. When forced to walk places because they cannot afford the cost of regular transport, the poor spend time and energy that could have been used for more productive activities aimed at raising their living standards.

There is yet another sector of urban poor who live in illegal dwellings built on government reserve areas such as on road and rail reservations, stream reservations, and beaches. Urban city centers also have low cost housing complexes built by the government for low-income people. The rural poor who are increasingly migrating to city centers in search of permanent and temporary employment tend to live in temporary low cost lodgings in cities and are included in

the urban poor category. The latter group of urban poor, though having reasonable accessibility, is not able to afford the most desirable modes of transport.

Constraints for Urban Poor on Transport

(i) Unavailability of a regular bus service: There is regular disruption of public transport services due to various demands of workers thus stranding captive riders, who tend to be from low-income groups. Unavailability of public transport even for one day would drastically affect the income generating capacity of urban poor who are dependent on daily income generated from casual labor. Daily income earners face another dilemma. Often they are required to work outside normal working hours during which times the transport services are very poor. Private sector bus services are almost non-existent during off peak periods and private bus services, as they are profit focused, do not maintain regular services to low density areas or on unprofitable routes, which are generally areas where the poor reside. Even on high demand routes a schedule is not maintained, thus leading to unnecessary delays in travel.

(ii) Inadequate Pedestrian Environment: Another feature that defines transport for the urban poor is the high number of non-motorized road users (pedestrians and cyclists). The poor on the periphery walk long distances on minimally maintained footpaths and negotiate traffic hazards since they must cross or walk across roadways, which usually lack proper sidewalks. Even where sidewalks are available, they are taken over by street vendors. Safety is an issue even for those pedestrians living in city centers. Unsafe habits such as jaywalking are more prevalent among less-educated individuals, who generally belong to the low-income segment of the society.

Consider Poverty Reduction in Urban Transport Planning

Poverty reduction and alleviation among the urban poor hinges on access to employment opportunities, which in turn depends on good and reliable transportation. An improved urban transport system should aim to enhance the ability of the urban poor to find low-cost, time-effective, reliable, and safe transport. In transportation development planning, special attention should be given to the selection of roadways and transport modes that specifically serve low-income users, as well as on ways to improve access of the urban poor to jobs and city services.

Generally urban transportation planning should take the following considerations into account:

- Improve physical access to jobs and amenities and reduce time spent walking;
- Provide well regulated and affordable informal transport services;
- Regulate urban bus services even on the periphery and ensure availability of a reasonable transport service at all times of the day;
- Enable greater use of intermediate means of transport by improving rights-of-way, interchange infrastructure, and attention to safety and eliminating fiscal and financing impediments to vehicle leasing or ownership; and
- Eliminate gender biases by integrating the transport needs of women into transport policy and planning processes.

In summary, acknowledging the differential needs of the urban and rural poor, transport strategies and programs should be designed to provide the poor with better physical access to employment, education, and health services. In an urban setting this often translates into ensuring adequate public transport services, including the informal sector and non-motorized transport. Similarly, transport policies should be focused to give particular assistance to the poorest groups either directly by highlighting the needs of particular social groups, or indirectly

through assistance to those modes of transport on which the poor are known to be particularly dependent, sometimes referred to as targeted interventions.

(2) Accessibility

Accessibility Factors

Access is the ultimate goal of most transportation and as such, there are four general factors that affect physical accessibility:

- **Mobility:** Physical movement that can be provided by walking, cycling, public transit, ridesharing, taxi, automobiles, trucks and other modes;
- **Mobility Substitutes:** Including telecommunications and delivery services, which can provide access to some goods and activities, particularly those involving information;
- **Transportation System Connectivity:** Directness of links and the density of connections in path or road network; and
- **Land use:** Geographic distribution of activities and destinations.

Basic Accessibility

Basic accessibility is the primary concern for most of the urban poor. Providing or maintaining infrastructure that ensure reliable all-weather access to markets, employment, and social facilities would satisfy their basic accessibility needs. To meet this standard requires an understanding of the transport needs of rural and urban communities, distinguishing between the priorities of women and men, the purposes and uses that would be derived from improved access, and the constraints preventing those needs from being fulfilled.

Meeting the escalating needs of increasing urbanization presents unique challenges due to the heterogeneity of urban populations and the spatial dispersion of social and economic activities. The urban poor face additional constraints as they are usually dispersed along urban peripheries where low traffic flows are generated, which do not justify investment in public transport infrastructure and service provision. The quality and efficiency of urban transport has direct economic implications for enterprise productivity and labor market participation. As labor is the principal resource of the poor, it becomes critical to ensure adequate and affordable transport to places of employment.

Upgrading existing transport or road infrastructure can improve public transport and other mobility needs of low-income populations and hence, improve their access to employment centers and other social services. Direct investments are needed in the design and modernization of transport infrastructure aimed at those segments of the urban road network that are largely used by the poor.

Affordability of Transport

In many Asian cities, public transport fares are not affordable or a very large burden for low-income people; however, that is not the case in Sri Lanka due to the low fares of all public transport modes.¹⁸ In addition, government servants and school and university students are offered further concessionary rates in both state owned bus and train services. Private bus services do not offer these discounts and people who have the concessionary tickets are

¹⁸ *Partnerships to Improve Access and Quality of Public Transport*, Sevanatha Urban Resources Center and the Water, Engineering and Development Center, Loughborough University, 2003

disadvantaged when public transport services are not satisfactory. In the positive direction, the National Transport Commission (NTC) has introduced a subsidized school bus service which offer concessionary rates for school children even on privately owned buses, although there is no oversight to insure that private operators are offering the rates and very recently the government has declared that state sector public bus transport is free for school children.

As shown in Table 8.14, an analysis of 30 randomly selected households illustrated that the percentage share of transport expenses as against their monthly income was between 2.7% and 8.9%. The information reveals that affordability of public transport has not been a major problem for low-income communities in Colombo. This is more so because of government regulated fares and subsidies. Low income families who are dependent on daily income from temporary work however may find the transport expenses a significant burden.

Table 8.14 Comparison of Monthly Income and Monthly Transport Expenditures

Income Category(Rs. per month)	Monthly Transport Expenditures	%
Up to 5,000	444	8.9
5,001-8,000	573	8.8
8,001-11,000	686	8.1
Over 11,000	300	2.7

Source: Partnerships to Improve Access and Quality of Public Transport, 2003

The low-income residents surveyed are much more concerned with the quality of bus services and operational issues. Public transport services particularly on the periphery are not reliable or regular.¹⁹ The information gathered by this study corresponds to findings of the other reports, such as the Annual Report of Central Bank, which indicates that public bus fares in Sri Lanka are affordable by even low-income people, since the bus fares are relatively low compared to most other services.

Train services is a somewhat more attractive transport mode for many urban poor and middle-income individuals due to the lower fares, faster travel times, and higher comfort in comparison to buses, although the railway is also highly unreliable. Additionally, access roads are provided to railway stations in most key places for pedestrians, although pedestrian facilities and intermodal coordination via regular bus services are necessary, as is indicated in Chapter 7.

(3) Gender

Gender Issues in Transport

Of the 1.3 billion people living in poverty worldwide, 70% are women, according to the UN 1995 Human Development Report. Transport-related issues such as access to jobs, markets, and social/educational facilities play an important, but underappreciated role in perpetuating women's disadvantaged position in society. While there have been an increasing number of efforts to incorporate gender perspectives, especially into the health, education and agricultural sector, much fewer attempts have been made in the transportation sector. This is particularly unfortunate since transport plays such a vital role in most women's daily routines.

¹⁹ *Partnerships to Improve Access and Quality of Public Transport* Sevanatha Urban Resources Center and the Water, Engineering and Development Center, Loughborough University, 2003

Gender in Sri Lankan Context

Low-income women tend to be dramatically less mobile than men in the same socio-economic groups. They are more dependent on walking, partially due to having less access to bicycles and motorcycles, as well as the cultural taboos of using such modes. Social restrictions hinder women's mobility in many cultures. Efforts to increase the mobility of poor women may face stiff resistance from those who feel threatened or offended by such direct empowerment of women. However, in the Sri Lankan context such cultural barriers are not prevalent at least in Sinhala and Tamil cultures, although this might be an issue of concern in predominantly Muslim areas. In the CMR this will not be a major worry. In most part of the country, particularly in the urban areas, women are not constrained and tend to enjoy equal privileges as men. Female car drivers are increasingly becoming a common feature in urban areas, although bicycle and motorcycle are not used much by females, which is unfavorable to low-income women.

On the other hand, equal treatment has deprived women in Sri Lanka to a certain extent compared to women in some other Asian countries like India where women are allocated separate buses, seats, train compartments, and ticket lines. Here, very few such preferential treatment facilities exist. Some trains have a single ladies compartment which is far from adequate considering the high proportion of female employment. Each bus generally allocates two seats for pregnant women which is also not adequate. Another feature in Sri Lanka is that except in a few main bus stops people do not stay in a line to board a bus and often during peak times the more physically robust manage to get in leaving those who might have come earlier behind. Women are very often intimidated and disadvantaged in this regard.

In all these aspects low income level women suffer more so than their counterparts in middle income level or high income level categories. Most high income level women in Sri Lanka enjoy private transport. There is a recent trend in Sri Lanka for middle income level working women to arrange group transport services in private office vans. This tendency has developed more because of the unreliability and unsatisfactory conditions of public transport than due to affordability or gender issues. Low income level women are left with no other choice than use public transport.

Since more women than men have the family responsibilities of the elderly, disabled, and children, the transport problems of these disadvantaged groups also impact disproportionately on women. Poverty compounds each of these disadvantages. Urban transport planning must quickly become gender sensitive, beginning with the routine collection of gender disaggregated data in surveys. Gender needs to be mainstreamed in the transport planning process; it is not enough to just discuss gender as an afterthought. Efforts to promote meaningful public participation also require special attention to allow the voices of women to be heard and their concerns addressed.

Gender Constraints Related to the Transport Sector in Sri Lanka

Research on the differences between the travel patterns and transport needs of men and women in the urban context is not as well developed as in rural areas. In urban areas, women's essential trips are more dispersed in time and location. Some of the transport constraints urban women face include:

- Greater distance between home and employment opportunities reduces the compatibility between household and non-household activities;

- Irregularity of services on off-peak and non-radial routes. Most urban transport systems are not designed to respond to women's needs to combine multiple trips, many at off-peak hours and off the main transport routes;
- Sexual harassment discourages women from traveling, particularly at night and during peak hours when buses are overloaded; and
- High costs of private transport forces the poor, especially women, to wait for public bus services.

As many of these are household or child-care trips, they are considered nonessential and therefore do not receive the appropriate attention of transport planners. The combination of multi-tasking, poor service, and vehicle access severely limits the time available for other, more productive activities.

Gender and Transport Planning

Transport systems tend to be designed to ensure efficient traffic flows along the main routes during peak traffic flows, and in most cases have not adequately addressed women's needs for trip-chaining, particularly as much of their travel needs are off the main routes and out of peak hours. Women's travel needs are further complicated by the multiple demands on their time which means that the long waits between trips is a great burden for them and their families. This is more so for low income women who cannot afford to engage extra help at home and have to attend to almost all household chores by themselves.

There is a growing awareness and appreciation of the gender differentiated impacts of transport projects and policies and the importance of introducing sustainable improvements of access to economic and social services, especially for women. In order to ensure that the benefits of transport reach women, foresight and attention to component design during project planning are necessary. These design and implementation issues will differ in rural, urban, and resettlement contexts.

(4) Sustainability

Sustainability in Transport Development

There is growing interest in sustainability and its implications for transport planning. Sustainability emphasizes the integrated nature of human activities and therefore the need to coordinate decisions among different sectors, groups and jurisdictions. Sustainability in transport development is defined as transportation that does not endanger the public health or ecosystems and that meets needs for access consistent with use of renewable resources that are below their rates of regeneration, and use of non-renewable resources below the rates of development of renewable substitutes.²⁰ Sustainability as applied to transportation has two dimensions: social and institutional.²¹ The participatory process in transport development initiatives strengthens sustainability and ownership of the initiatives. Building of institutional capacity at local government and community levels will also enhance sustainability and ownership of development initiatives.

Social Sustainability

Social sustainability involves the provision and maintenance of transport access facilities by including community participation in decision-making and project implementation and

²⁰ Organization for Economic Cooperation and Development, 2001

²¹ Managing the Social Dimensions of Transport The Role of Social Assessment, The World Bank 1999

decentralizing responsibility for maintenance to communities. At present this is negligible in Sri Lanka. The success of transport investment relies on how well transport infrastructure and corresponding services meet users' needs. Community participation in planning, implementation, and maintenance of transport infrastructure, therefore, is one of the central strategies of the transport sector. By engaging the community in transport development and linking the project to the infrastructure and service needs of the community will develop a culture of ownership and will ultimately enhance the sustainability of a projects outcome.

Generally in Sri Lanka, the community does not play a significant role in transport planning. The majority of community members are excluded from the decision-making process. Instead expert opinions are sought, which may or may not reflect the community concerns and views. Even the local government bodies do not have much of a say in transportation planning in Sri Lanka where the planning and thus decisions are made by the central government. Perhaps what is more of a concern is the lack of concern this generates in the public sphere. Most citizens do not seem concerned over the fact that they do not have a voice in decision-making.

Institutional Sustainability

International best practice indicates that in order to maintain transport infrastructure, resources and responsibilities must be decentralized to local governments and users and communities should have direct participation in maintenance schemes.²² This requires building technical and financial capacity within district and local level committees to manage and maintain infrastructure works and deliver service operations in a more responsible manner. Building this capacity necessitates the introduction of participatory and institutional mechanisms that enable closer collaboration between local level government and communities. Establishing a road management board within a road agency to oversee the planning and management of the road sector is another viable instrument that enhances sustainability. The board would consist of user groups and stakeholders thereby introducing a strong client perspective to the workings of the road agency.

(5) Involuntary Resettlement

Overview on Experiences of Involuntary Resettlement in Sri Lanka

Road building projects often involve acquisition of land and significant displacement of households and small enterprises. Treatment and mitigation of social issues of such displacement will involve resettlement. In general, resettlement has not been very successful in Sri Lanka and there are several recent examples where people have shown resistance to projects that cause displacement. Among the significant consequences of poor resettlement are impoverishment of affected persons due to landlessness, homelessness, joblessness, relatively higher mortality and morbidity, food insecurity, lack of access to common property and public services, and disruption of the existing social organization. However, recently the Road Development Authority introduced modified resettlement schemes offering higher and more attractive compensation packages for land acquisition which has resulted in better settlement plans and less resistance towards resettlement.

Legal Framework for Involuntary Resettlement

In Sri Lanka, the Land Acquisition Act (1950) only provides for compensation for land, structures, and crops. It does not require project executing agencies (PEA) to address key resettlement issues such as (i) exploring alternative project options that avoid or minimize

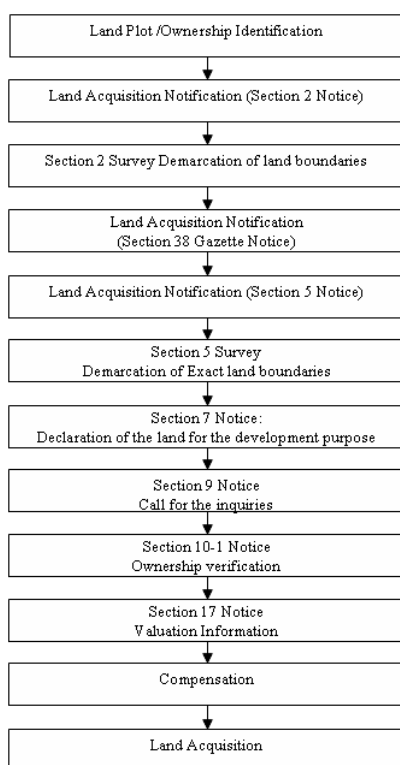
²² Managing the Social Dimensions of Transport The Role of Social Assessment, The World Bank 1999

impacts on people; (ii) compensating those who do not have land titles; (iii) consulting affected persons and hosts on resettlement options; (iv) providing for successful social and economic integration of the affected persons and their hosts; and (v) full social and economic rehabilitation of the affected persons.

However, The National Environmental Act (NEA) No. 47 (1980), amended by Act No. 56 (1988) has some provisions relevant to involuntary settlement. The Minister has, by gazette notification No. 859/14 (23 February 1995), determined the projects and undertakings for which CEA approval is needed in terms of Part IV C of the NEA. The schedule includes item 12, which refers to involuntary resettlement exceeding 100 families, other than resettlement resulting from emergency situations. For such projects it is essential to conduct an Environmental Impact Assessment where it is mandatory to explore and assess alternative project options including alternative routes and compare social and environmental impacts arising from all alternatives with the intention to select the alternative with the least impacts. Social surveys are carried out in this assessment process where comments from the affected parties are sought as to their willingness to resettle and desired resettlement options. It is also a requirement to propose appropriate mitigatory measures which include a resettlement plan. Hence, in this process community involvement is assured to a certain extent in resettlement issues.

Land Acquisition System

The Project Proponents will submit land acquisition applications to the Ministry of Land (MoL) and MoL will follow the land acquisition process as listed in the chart below.



Source: Land Acquisition Act of Sri Lanka and This Study

Figure 8.9 Land Acquisition Process

National Involuntary Resettlement Policy (NIRP)

The Government of Sri Lanka adopted the National Involuntary Resettlement Policy (NIRP) in May 2001 to ensure that persons affected by development projects are treated in a fair and equitable manner and that they are not impoverished in the process, thereby establishing the framework for project planning and implementation.

Note that the NIRP contains several key requirements. One of the important requirements is to prepare a comprehensive Resettlement Action Plan (RAP) where 20 or more families are affected. If less than 20 families are affected, a plan at a lesser level of detail should be prepared. The content and level of detail required for a RAP will vary depending on the complexity of the project and the magnitude of its effects. Where large numbers of people are displaced, a detailed RAP is required. A well-prepared RAP is aimed at using the opportunities created by the project as well as the relocation Program towards re-establishment and development.

8.4 Discussions from Social and Natural Environment Working Group

(1) General

The Social & Natural Environment Working Group (SNEWG) was established to exchange opinions on environmental issues and solutions regarding urban transport in the interest of promoting sustainability through a balance of policies and action projects. SNEWG was chaired by the Additional Director of the Urban Development Authority (UDA) and consisted of relevant stakeholder, including three NGOs.

(2) Discussion Process

With respect to transport in the CMR, 84 broad social and environmental issues were identified through brainstorming of the SNEWG. The issues were then prioritized by the working group based on a ranking system. As a result, 35 issues were selected as high priority issues (see Appendix 18). These high priority issues were categorized into 16 categories depending on their characteristics (see Appendix 19).

In discussions within the Study Team, some SNEWG issue categories were already under discussion in other working groups, such as inadequate public transport and insufficient supply of off-street parking. Therefore, those issues were eliminated from the SNEWG issue list. In addition, SNEWG expanded the issue categories to include (i) poor environmental and landscape planning in road design and (ii) lack of consideration of wetlands and productive agricultural lands. Subsequently, there were ten remaining issue categories and each was discussed in detail, along with their mitigation measures and potential projects were proposed to address these measures (see Table 8.15). Because all of the issues can be consolidated into two major categories, the outcome of the SNEWG was to propose two projects: (i) landscaping and road design and (ii) capacity building in terms of equipment and training of personnel.

Table 8.15 Suggested Mitigation Measures and Proposed Projects for Environmental and Social Issues

No.	Issue Category	Suggested Mitigation Measure	Proposed Project
1	Inadequate vehicle inspection system	<ul style="list-style-type: none"> • Implement mandatory periodic vehicle inspection system • Implement roadside inspection • Inspect at the port of entry 	Capacity building in terms of equipment and training of personnel
2	Lack of pedestrian facilities	<ul style="list-style-type: none"> • Include pedestrian access and comfort (trees, benches etc.) in funding for roads must include • Remove unauthorized activities • Remove or improve placement of hoardings, timber, posts and maps • Improve law enforcement 	Landscape and Road Design
3	Lack of consideration of vulnerable groups	<ul style="list-style-type: none"> • Implement the accessibility law • Install proper lighting and safety measures such as fences 	Landscape and Road Design
4	Adulteration of fuel	<ul style="list-style-type: none"> • Regular control of fuel quality • Establish proper mechanism for monitoring fuel quality 	Capacity building in terms of equipment and training of personnel
5	High pollution from three wheelers	<ul style="list-style-type: none"> • Ban import of 2-stroke engines • Give subsidy to convert existing 2-stroke engines to 4-stroke. • Introduce a higher import tax for 2-stroke engines at port of entry. 	Capacity building in terms of equipment and training of personnel
6	Inadequate regulations	<ul style="list-style-type: none"> • Formulate regulations under the National Environmental Act (NEA) and Motor Traffic Act and enforce it. 	Capacity building in terms of equipment and training of personnel
7	Inadequate operational monitoring	<ul style="list-style-type: none"> • Increase monitoring capacity 	Capacity building in terms of equipment and training of personnel

Table 8.15 Suggested Mitigation Measures and Proposed Projects for Environmental and Social Issues, continued

No.	Issue Category	Suggested Mitigation Measure	Proposed Project
8	Lack of consideration of microclimate	<ul style="list-style-type: none"> • Leave extra space for a greenbelt at the time of planning • Create urban forestry or leave existing forestry/greenery 	Landscape and Road Design
9	Poor environmental and landscape planning in road design	<ul style="list-style-type: none"> • Incorporate environmental and landscape planning into road design 	Landscape and Road Design
10	Lack of consideration of wetlands and productive agricultural lands	<ul style="list-style-type: none"> • Identify and protect significant flood retention areas and productive agricultural areas and ecologically significant habitats in the CMR • Impose regulations to protect the most important of these 	Landscape and Road Design

8.5 Summary of Natural/Social Environmental Issues

Although CMR's urban environment has not yet deteriorated to levels seen in other Asian cities, with the significant increase in road traffic congestion in Colombo, it is essential that action is taken before the situation becomes worse. Main issues on natural/social aspects related to transport sector include;

Inadequate Vehicle Inspection System

The present vehicle inspection system in Sri Lanka does not test the emission levels of vehicles, as is international best practice.

Adulteration of Fuel

Fuel quality is one of the most important factors negatively affecting vehicle emissions in Colombo. The adulteration of diesel is evident from the characteristic kerosene odor that emanates from the exhaust of some private diesel buses. However, it is worth noting that adding kerosene to diesel makes for a "better" diesel, while adding kerosene to gasoline makes for a worse gasoline, which is common with three-wheelers.

Lack of Pedestrian Facilities

As discussed in Chapter 6, vendors and motorists use the sidewalk for their own purposes, which negatively affect the movement of pedestrians.

Lack of Considerations for Vulnerable Groups

There is lack of considerations of vulnerable groups including urban poor, disabled, children, and women with regards to transport planning.

High Pollution Levels from Three-Wheelers

Data shows high growth of three-wheelers, with no signs of abating. As the majority of these three-wheelers use two-stroke engines, this creates high pollution issues since two-stroke engines have significantly higher emissions than four-stroke engines.

Inadequate Regulations

Presently, the noise regulations focused on the use of vehicle horns in the city has been insufficient. This is especially important in and around schools, hospitals, and religious facilities.

Inadequate Operational Monitoring

The current operational monitoring system is not adequate because of a lack of monitoring capacity in term of personnel and equipment.

Lack of Consideration of Microclimate

With the focus on climate change, there should be an increased focus on preventing the creation of microclimates, which results in greater discomfort among citizens.

Poor Environmental and Landscape Planning in Road Design

There is a lack of landscape planning with regards to road design, which can be seen on the main roads in populated areas, the location of residences close to roads, poor design of structures, poor road infrastructure for users, and poor lighting.

Lack of Consideration of Wetlands and Productive Agricultural Lands

Filling of wetlands for road construction has increased flooding in the CMR. Productive agricultural land has been disturbed and inundated due to poorly road planning. These same activities have caused loss of vegetation and habitats and fragmentation of ecosystems.

Chapter 9 Policy Coordination

9.1 Introduction

The purpose of this chapter is to present an overview of the institutional structures and coordination mechanisms of transportation in the Western Province (WP). In addition, the chapter will examine the issues and constraints of implementing effective and efficient transportation policy. Finally, possible solutions are in the process of being outlined through discussions with the Institutional and Policy Coordination Working Group (IPCWG).

9.2 Institutional Structures

(1) Overall Institutional Arrangement

The basic administrative structure of the Government of Sri Lanka (GoSL) consists of three levels: national, provincial, and local. The provincial level was added in 1987 when 13th Amendment was added to the Constitution. Its purpose was to devolve power from the national government and provide the provinces with more autonomy. The basic democratic and bureaucratic institutions comprising these three levels of government are as shown in Table 9.1.

Table 9.1 Overall Sri Lankan Administrative Arrangement

Level of Government	Democratic Institutions	Bureaucratic Institutions
National	<ul style="list-style-type: none"> ● President ● Prime Minister ● Parliament 	<ul style="list-style-type: none"> ● Presidential Secretariat ● Line Ministers (report to Parliament) ● Six Sector Ministries related to transport
Provincial	<ul style="list-style-type: none"> ● Governor (appointed by the President) ● Chief Minister and Four Provincial Ministers ● Provincial Council 	<ul style="list-style-type: none"> ● Five cluster Ministries (report to the Provincial Council), of which one is Transport
Local	<ul style="list-style-type: none"> ● Municipal Councils ● Urban Councils ● Pradeshiya Sabhas 	<ul style="list-style-type: none"> ● Divisional Secretariat (translates national and provincial policy into action) <ul style="list-style-type: none"> - Revenue - Services - Planning - Coordination of Development Functions ● Local Authority Secretariat

Source: Developed based on Asian Cities in the 21st Century, Part B: Urban Governance in Other South Asian Countries, Chapter X, Asian Development Bank (ADB), 1999

(2) National Government Institutional Arrangement

As the field of transportation affects many sectors of a country's socioeconomic structure, many public and private organizations are involved. As Figure 9.1 below indicates, there are more than 6 ministries and 20 agencies/departments at all levels of government that participate in planning and/or managing transportation in WP.

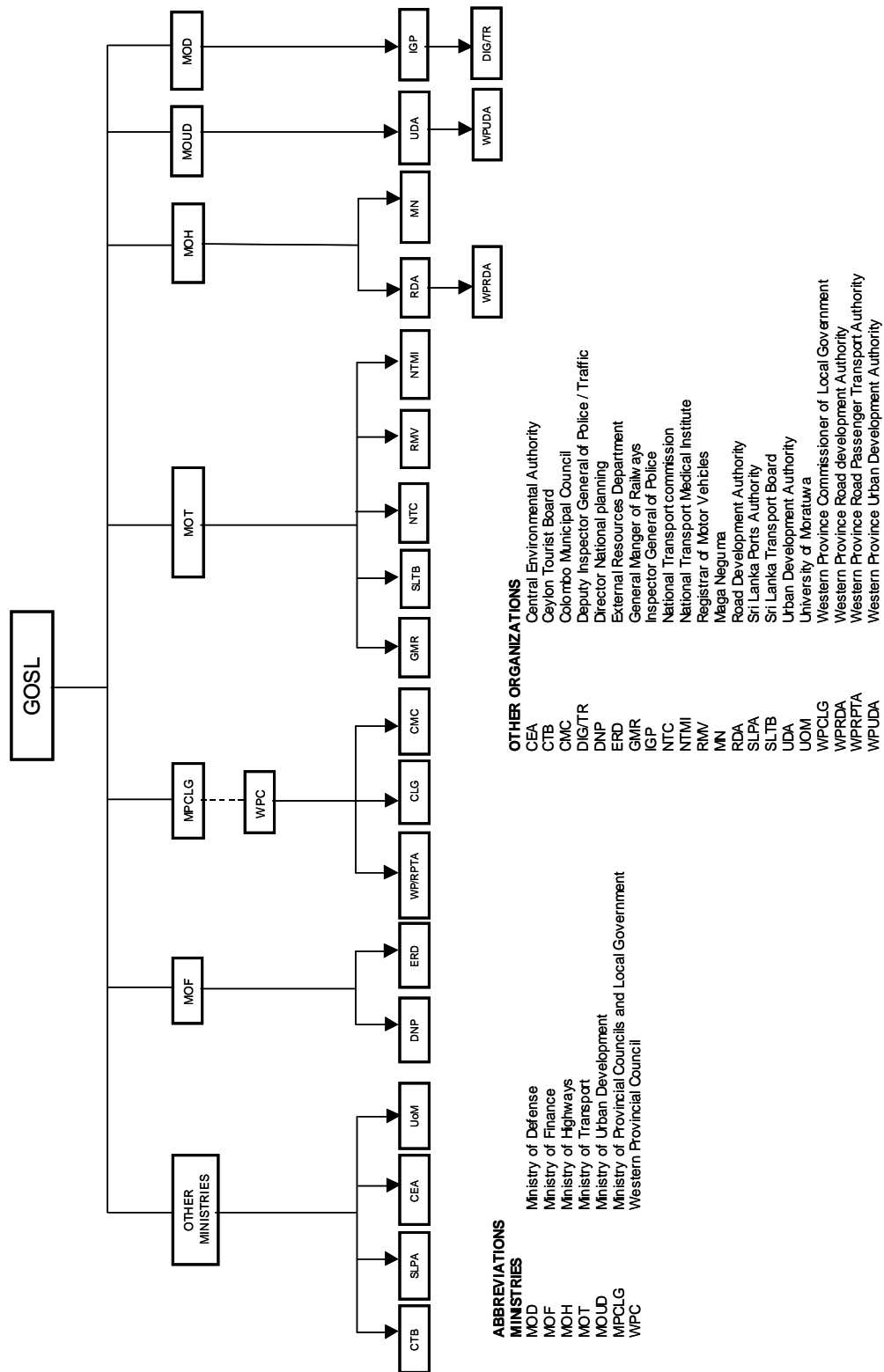


Figure 9.1 Sri Lankan Government Organizations Involved in Transport in Western Province

National level organizations are responsible for creating national policy, negotiating with international financing institutions (IFI), budget, and coordination amongst various organizations. Varying levels of government are responsible for implementation (i.e. Railways and the Sri Lanka Transport Board (SLTB) (national), Western Province Road Passenger Transport Authority (WRPPTA) (provincial) and Colombo Municipal Council (CMC) (local)).

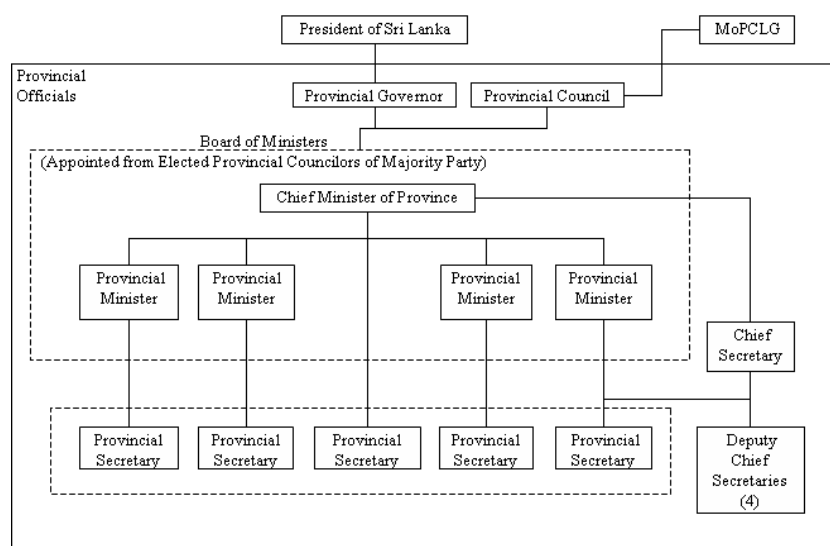
According to the 13th Amendment, the responsibility of framing national transport policies is the national government's, which is listed on List II, also called the Reserved List.¹ All issues should then be addressed within those national policies. However, the same Amendment does not require that the provinces and local governments accept or address issues within the national transport policies, as transport has been devolved to the provinces (List I).

There are several institutions involved in transport issues, including Ministries, Departments, Statutory Authorities, Provincial and Local Governments. Regardless of their level, due to the GoSL budgeting system, all depend on the national Treasury for funding, unless otherwise self sufficient. The individual ministries are involved in the budgetary process for their topics of responsibility, with direction from the Treasury. Therefore, the Treasury has immense power over the implementation of the national policies, strategies and action plans.

The responsibility to have coordinated and integrated policies, strategies, and plans becomes important in this background, as all of the institutions involved are separate legal entities. This can be achieved through proper coordination, which is the responsibility of national level organizations. This is quite important, not only to oversee the preparation and implementation of national policies, but also to facilitate proper implementation by agencies that have cross-cutting objectives and goals.

(3) Provincial Institutional Arrangement

The institutional structure for provincial government in Sri Lanka is as shown in Figure 9.2.



Source: This Study

Figure 9.2 Functional Hierarchy of the Provincial Level of Government

¹ See the Preamble to List II- Reserved List

As the above figure indicates, the Central Government has a strong influence on the affairs of a Provincial Government, with the Provincial Governor appointed by and reporting directly to the President. This means that a Provincial Governor is a representative of the President, not the people of the province, and that all executive action is taken in the name of the President.² This is also true of the Chief Secretary, appointed with advice and agreement of the Chief Minister.

The Provincial Governor, who serves for five years, is vested with executive powers and can dissolve the Provincial Council under the advice of the Chief Minister, except when the ruling party is in the majority. On the other hand, the Governor is constrained by the Board of Ministers in exercising of his functions, except when indicated otherwise by the Constitution.

The Provincial Council, which is elected and serves for a period of five years unless earlier dissolved, is a legislative body that is responsible for supervising and administering local authorities, with the Ministry of Provincial Councils and Local Government (MoPCLG) providing necessary guidance and assistance. It is also an autonomous body and therefore does not come under any ministry, deriving its power from the Constitution and Acts of Parliament. In fact, the Provincial Council can appeal directly to Parliament to legislate on subjects affecting its interests.

The Chief Secretary is the chief executive officer of the Provincial Council. The Chief Secretary, Provincial Secretaries and Deputy Chief Secretaries are in charge of provincial day-to-day affairs and are responsible for matters involving administration, personnel, finance, and planning.

With regards to the Western Provincial Council (WPC), the province of this study, its main organizational responsibilities are given below.

The 13th Amendment has specific transport related provisions, demarcated between the national and provincial governments and local authorities. Accordingly, A and B class roads are the responsibility of the national government, C and D class roads are the responsibility of the provincial government, and E class roads are the responsibility of the local authorities. Because the local authorities come under the WPC, the E class roads are a subset of the WPC responsibilities.

Although national policies are formulated by the national government, there is no legal basis for the provincial government to create provincial policies. Additionally, provinces need not accept national policies, thereby leaving a policy void. This is especially common when the provincial and national governments are of different political parties. The Treasury also plays a role, as they are the central authority for funding and provincial functions.

It is necessary to have appropriate institutional arrangements to manage the national policy, execute strategies and implement action plans. In the provinces these are established under transport statutes, as in the case of the establishment of the Western Province Road Passenger Transport Authority (WPRPTA) in the Provincial Road Passenger Carriage Services Statute No. 1 (1992), which outlines the WPRPTA, as well as the provision of private passenger transport in the province.

² Paraphrased from the Sri Lanka Government's official website (<http://www.priu.gov.lk/ProvCouncils/ProvincialCouncils.htm>)

Through the budgetary process, the national level institutions find resources for their institutions and statutory authorities; however, it is a tedious process for Provincial Councils to find financial similar resources. The provincial budgetary process requires each province's financial needs to be submitted to the national government's Finance Commission appointed under the Constitution (i.e. Article 154R), then to the President, and finally to Parliament where a national budget is agreed upon. Those actions related to outlining the provincial resource needs are another important responsibility of the Provincial Council.

Coordination of the institutions within and beyond WPC in this case is required if an integrated plan of action is to be executed. This can happen at the Motor Vehicle Advisory Committee (MVAC) and at the meetings of the Board of Provincial Ministers or at the administratively established District Coordinating Committee or District Development Committee, whichever is most relevant.

(4) Municipal Council Level Arrangement

In WP, which consists of Colombo, Gampaha, and Kalutara districts, there are 45 local authorities in charge of administering its affairs. As Table 9.2 indicates, Colombo has the largest number of municipal councils, which are established to administer cities and large towns with populations greater than 30,000. The functions of these bodies generally focus on water, sanitation, structural sanitation, thoroughfares, and solid waste management. The district of Gampaha has only one Municipal Council and Kalutara has none, but both districts have Urban Councils and Pradeshiya Sabhas, which are established to provide localized decision-making opportunities to people living in less urbanized and rural areas (i.e., areas with 10,000 – 30,000 people and less than 5,000 people, respectively).

Table 9.2 Number and Type of Local Authorities in Western Province

District	Municipal Council	Urban Council	Pradeshiya Sabhas	Total
Colombo	4	2	6	12
Gampaha	1	6	12	19
Kalutara	-	4	10	14
Total	5	12	28	45

Source: Ministry of Provincial and Local Governments Website
(http://www.minhaprolo.gov.lk/div_pcandlg/Distribution_of_LAs.htm)

An example of the institutional structure for municipal government is given in Figure 9.3 for the Colombo Municipal Council (CMC). As the figure indicates, the Mayor and Municipal Council come directly under the authority of the Provincial Council. Note that the Provincial Council also appoints the Municipal Commissioner, who works closely with the Mayor. The Commissioner reports to the Mayor and is responsible for the overall day-to-day performance of the CMC. The CMC which is comprised of 23 departments that are supervised by three Deputy Commissioners in charge of the Professional Service, Administration, and Engineering Service. The basic duties of the CMC, which are defined in Section 46 of the Municipal Council Ordinance, are as follows:

- Maintaining and clearing of all public streets and open spaces vested in the council or committed to its management;
- Enforcing the proper maintenance, cleaning and repairing of all private streets;
- Supervising and providing growth and development by planning and widening of streets, reservation of open spaces and execution of public improvements;

- Abating all nuisances;
- Establishing and maintaining public utilities for the welfare, comfort and convenience of the public; and
- Promoting public health, welfare and the development of sanitation and amenities.

The law gives the CMC, as well as other local authorities, extensive powers in meeting its obligations, which includes making it mandatory for the police to enforce CMC regulations. Other significant powers held by the CMC include the right to demolish unauthorized buildings and the right to promote economic development via market facilitation and regulation, both of which are directly relevant to urban transportation. However, delays in action in CMC are common, as can be observed by the inability to relocate the wholesale markets currently located in Pettah, which has a direct link to high congestion in the area.

Most of the road transport issues raised are relevant to the municipality and therefore, the responsibilities of the CMC are great. The responsibility of formulating and passing by-laws and regulations in relation to urban transportation is an important responsibility of the local authorities.

As there are several institutions that are related to urban transportation issues, coordination among them is essential from the point of view of the local authorities. This coordination may be at the national government level (e.g. MoRT, Treasury) or provincial government level (e.g. MVAC) or at a sub-municipal government level (e.g. Traffic Sub Committee.) It must be noted that coordination with organizations arises as a consequence of laws, statutes, plans and administrative instruments, which are relevant to urban transportation. WPC oversees the management of CMC and therefore, there is a need to coordinate with WPC. Similarly, for funding purposes of any development or administrative actions, the CMC is represented by WPC and the Finance Commission to the Treasury, which requires additional coordination.

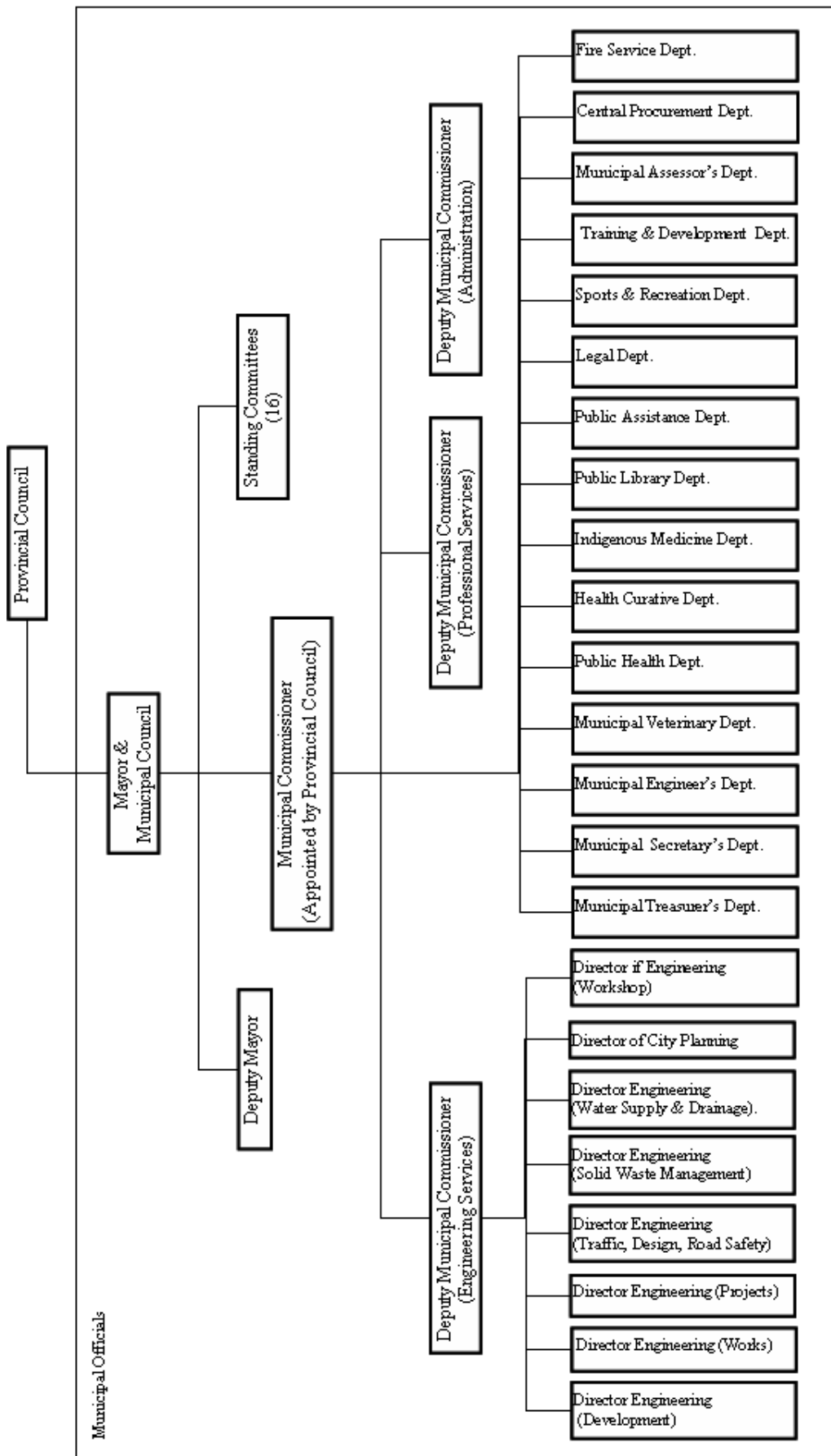
9.3 Overview of Policy Coordination Mechanisms

As mentioned previously, there is no one single body that is responsible for the overall coordination and implementation of transport policy. The responsibilities for various subjects and functions are decided under the 13th Amendment, which has three lists of subjects and functions and the appointed level of responsibility. List I provides the subjects under the purview of the provinces. List II, also called the Reserved List, identifies the subjects under the national government. List III, also called the Recurrent List, is executed under consultations between the provinces and the national government. An example is the supervision of buses, with the WPRPTA charged with overseeing private bus operations in WP and the Sri Lanka Transport Board, under MoRT, charged with operating and managing public buses.

Given the preceding, there is a practical need for coordination. At this time, this is carried out by a number of bodies, with well-known examples described in Table 9.3.

Although the coordination bodies indicated in the table above serve important functions, their scope is relatively narrow and do not include many of the ministries and agencies involved in the preparation and implementation of transportation policy for WP. A coordinating body that is now defunct that did include most of the relevant organizations concerned with transport together with having a sufficiently broad scope is as indicated in Figure 9.4.³

³ Other ministries/departments may have been involved, but the list in Figure 9.4 is based on a review of some of the group's meeting minutes.

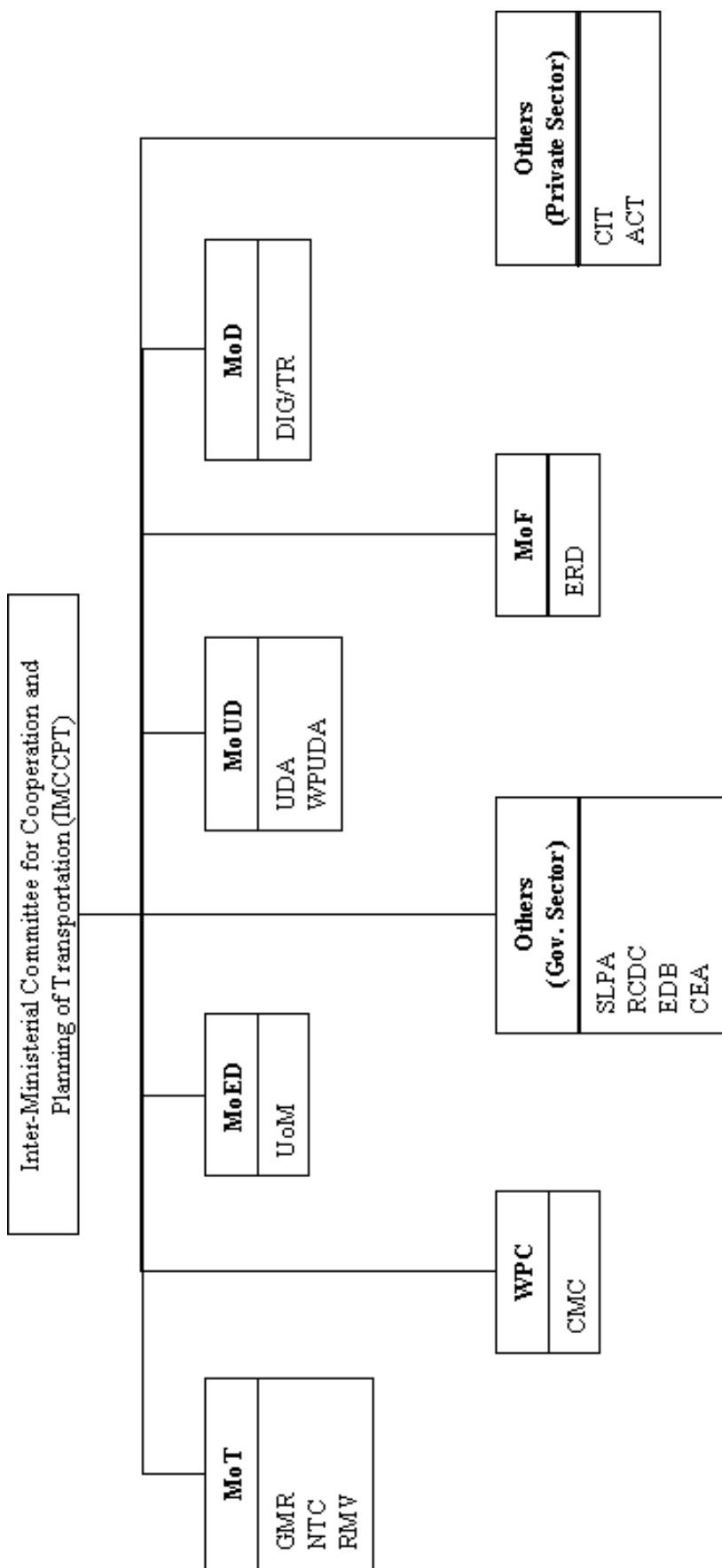


Source: Based on information from official CMC website (<http://www.cmc.lk/orgstru.asp>)

Figure 9.3 Functional Hierarchy of the Colombo Municipal Council

Table 9.3 Examples of Policy Coordination Bodies

Name of Body	Legal Basis	Purpose of Body
Traffic Sub Committee (TSC)	<ul style="list-style-type: none"> No legal basis although a number of ministries and agencies participate. Note that the Police have taken the lead in this body. 	<ul style="list-style-type: none"> To discuss and recommend ways to the relevant agencies on how to improve existing traffic flow conditions.
National Council for Road Safety (NCRS)	<ul style="list-style-type: none"> Established in 1998 as part of an amendment to the Motor Traffic Act, with the Ministry of Railways and Transport (MoRT) as the lead agency. 	<ul style="list-style-type: none"> Maintain an information database and library on road safety. Conduct and assist with research and surveys. Formulate and implement projects on road safety. Coordinate road safety related activities for government and non-government entities. Compensate hit-and-run victims. Solicit financial and other support for road safety activities.
Motor Vehicle Advisory Committee (MVAC)	<ul style="list-style-type: none"> Appointed by the Minister of Transport of the Western Provincial Council. 	<ul style="list-style-type: none"> To advise the Provincial Motor Vehicle Commissioner regarding all matters on motorized road vehicles.
Sri Lanka Transport Board (SLTB) Central Advisory Committee	<ul style="list-style-type: none"> Established in early 2005 under the SLTB Act. Consists of members from a number of ministries and agencies including the MoRT and the National Transport Commission (NTC). 	<ul style="list-style-type: none"> To provide advice to the SLTB's Board of Directors on providing an efficient and regular public bus service.



Source: This Study and Review of IMCCPT Minutes

Figure 9.4 Inter-Ministerial Committee for Coordination and Planning of Transportation

The Inter-Ministerial Committee for Coordination and Planning of Transportation (IMCCPT) was established by a Cabinet decision in January 1984 and was tasked with the following:

- Examine the structure of transport facilities and assess their performance;
- Review existing policies and strategies and identify institutional and structural constraints on transportation and rational transport planning;
- Review the role of railways in goods/passenger transportation and develop a national plan;
- Review and assess existing road network;
- Develop a comprehensive bus transport policy;
- Review existing railway and road user charges;
- Study transport needs within the Colombo suburban area as a special case;
- Recommend where necessary to ensure effective integration and coordination of all transport related activities and policies in liaison with the Committee of Development Secretaries;
- Prepare a comprehensive transport plan for Sri Lanka and monitor performance; and
- Recommend to strengthen and develop institutional machinery to facilitate execution of the aforesaid tasks efficiently and to be responsible for the effective implementation of approved measures and policies.

Another major function of IMCCPT was to work closely with the World Bank to plan and implement its projects. IMCCPT also included a technical arm and was effective in the execution of its duties. However, after the completion of the World Bank's Colombo Urban Transport Study 2 (CUTS2), the organization became defunct sometime around the year 2002.

9.4 Policy Coordination Issues and Constraints

(1) Issues

As Section 9.3 indicates, although there are various coordination bodies, there is no single coordination body with the breadth of scope and the level of participation that IMCCPT enjoyed. As a result, there is currently no single body responsible for the overall coordination of transportation policy and the institutions in charge of their implementation (either at the national or provincial level). This often means there is an overlap in the work of the different coordination bodies that exist now. In addition to this problem, other institutional/policy issues that should be considered regarding coordination are as follows:

- Frequent changes in the functions and content of work of government organizations due to changes in the political landscape;
- Frequent changes in transport policies;
- Large numbers of organizations involved in the field of transportation;⁴
- Sometimes an unclear delineation of responsibility between ministries/government agencies and provincial and local government authorities regarding transport-related services and infrastructure; and

⁴ H.E. Mahinda Rajapaksa, after becoming President in Nov. 2005, created two more non-cabinet ministries (the Ministry of New Railways and Ministry of Road Development) that also have a direct stake in transport.

- Insufficient performance of the Sri Lankan public sector due to poor quality of service, inadequate consideration of consumer concerns, lack of technical and financial capacity, and political interference.⁵

To address all of the problems mentioned above is extremely difficult and will most likely require a long-term effort. Therefore, it should be recognized that there is a need to work within the existing institutional environment to the maximum extent possible in order to effect many if not most short-term changes, while medium- to long-term changes could be achieved in parallel with reforms to institutions and policy.

(2) Constraints

There were three IPCWG Meetings at which institutional and policy coordination issues were discussed at length to identify why the institutional arrangements have not been effective and efficient in implementing transport policies. The outcome of the discussions identified both the issues faced, but also the constraints to moving forward.

- Urban transport is complex and requires serious interventions that are not coordinated at present, which have diluted previous development efforts;
- The wide array of institutions creates an environment of complexities in policy making as well as implementation, which is made more acute by the fact that the coordination needs to be done both horizontally and vertically. For example, Sri Lanka Transport Board (SLTB) and Sri Lanka Railways are not horizontally coordinated and national, provincial, and local institutions must improve vertical coordination;
- Based on Sri Lanka's legal system, the vertical levels function almost independently, at least from a policy and legal perspective;
- Political interference in the sector negatively affects decision-making processes, which leads to confusion on the ground during the implementation of laws, statutes, rules, and regulations;
- Previous efforts (e.g. IMCCPT) have been made to try to overcome these problems, but due to the informal nature of the implementation, their existence has not been embraced; and
- Some policy formulation is made counter to objectives to reduce traffic congestion, which weakens the entire sector. For example, WPC has attempted to reduce congestion by controlling route permits, but this has been diluted by the Ministry of Trade's policy to import more vehicles. Additionally, continuing to import 2-stroke three wheelers runs counter to the Central Environment Authority's objective to reduce environmental pollution.

Even MoRT has identified weaknesses in the enforcement of legal provisions related to institutional interventions to improve the service delivery in urban transportation. This view has also been strongly confirmed by the IPCWG during its meetings. This requires additional study and will be an ongoing topic for the Study Team through continued WG meetings and individual discussions with relevant transport decision-makers.

Future work for this topic will look to find possible solutions for the above mentioned institutional and policy coordination constraints. The IPCWG has been discussing this issue and is considering various changes to the institutional arrangements to enable higher level of

⁵ According to the 2003 Annual Report of the Central Bank of Sri Lanka, the public sector still accounts for a large proportion of total employment, or 15% (1.043 million workers). Its performance therefore has a large impact on the economy of the country.

coordination. The propositions are under discussion and are expected to be submitted in the Interim Report.

Chapter 10 Summary of Issues and Potential Improvement Measures

10.1 Introduction

Previous chapters presented a review of past studies, plans, and identified priority issues by sector. A strategic land use and transport framework for the Colombo Metropolitan Region (CMR) has also been presented. This chapter attempts to integrate high priority issues identified in each sector and put them into context to effectively develop a policy framework for improving traffic condition in the region.

10.2 High Priority Issues

(1) Main Factors Contributing to Traffic Congestion in CMR

Previous chapters identified a number of urban transport systems and development issues. The issues are often closely interrelated, which aggravates the seriousness of traffic congestion in the city and leads to complexity in finding feasible solutions. However, before sectoral issues can be addressed, it is worthwhile to identify the main overarching issues that are contributing to traffic congestion in CMR. They can be identified as follows:

- Rapid urban growth;
- Increasing income and car ownership;
- Low quality of public transport;
- Incomplete road network;
- Inadequate traffic management measures; and
- Weak policy coordination.

Rapid Urban Growth

The urbanized area in Colombo Metropolitan Region is expanding to the suburbs and some of the development is taking place with little regard for previously developed land use plans. This rapid urban growth and suburbanization is not well coordinated with the development of transport systems and is therefore, resulting in longer trips and increased travel demand.

Increasing Income and Car Ownership

As in many other cities in Asia, income and car ownership are rapidly increasing. Although car ownership in the CMR is still in its early stages, the region should expect further growth in private vehicles, thereby putting extra pressure on existing transport systems.

Low Quality of Public Transport

Most of the buses in CMR do use timetables and during peak hours, they are often overcrowded. Safety and security is also a major concern of the majority of users and non-users. On the railway, even though demand is high, the capacity and service levels on the commuter system are low. Intermodal facilities are not widely provided to enhance transfers between modes and the pedestrian environment around railway stations and bus terminals/stands are inadequate. The low level of services provided by public transport systems in CMR, together with increasing incomes, is resulting in a modal shift from buses to cars.

Inadequate Traffic Management Measures

The incomplete road network and relatively short length of urban arterials is an obvious reason for traffic congestion. Additionally, the existing road facilities are not efficiently used for various reasons including inappropriate design of intersections, lack of traffic signals, roadside parking, and lack of segregation of pedestrians. The situation is further worsened by undisciplined driving behavior by drivers - buses, three wheelers and private vehicles. Enforcement is lax and there appears to be an overall lack of concern regarding traffic safety in general. With the inadequate traffic management measures and lack of appropriate bus priority, travel speeds and reliability of buses has also been affected, which has encouraged residents to find other modes, such as vans, three wheelers, and private vehicles.

Weak Policy Coordination

There is a serious problem in CMR with regards to urban transport policy coordination. There is no common framework or strategy among relevant regulatory/implementing institutions to approach traffic congestion problems in the region, which is preventing timely implementation of improvement measures. As urban transport involves a variety of stakeholders, implementation of certain projects faces barriers without improved coordination and political will. Shortage of funding sources and administrative capacity in relevant agencies are also preventing a smooth implementation of projects. As a result, many of the technically sound improvement measures are not implemented at all.

The remaining part of this section summarizes more detailed sectoral issues identified as high priority issues by Working Groups.

(2) Road Network Development High Priority Issues

Unclear Road Hierarchy: In the CMR, there is no clear separation between roads and streets. Tertiary streets act as feeders to Class A and B roads. Significant roadside commercial development exists along Class A and B roads, lessening their capacity.

Insufficient Funds: As shown in the funding section above, annual road budgets are not stable and therefore development and maintenance cannot be properly planned.

Delay of Implementing Land Acquisition System in Urban Areas: Land acquisition is one of the bottlenecks for road development activities, particularly in urban areas, as land values have been increasing rapidly. As some proposed road widening projects will run through high and middle income areas in southern Colombo, it is important to begin to work with current residents to ensure efficient urban transport in the future.

Lack of Coordination with Other Infrastructure: Since there are no utility boxes along major radial roads, utility maintenance crews perform their maintenance work (telephone, water, electricity, drainage) on the roadway, which reduces the roadways' capacity. There is no coordination to oversee utility maintenance to help minimize site work or lower the traffic implications of such work.

Lack of Drainage Management: Lack of drainage capacity always hampers traffic flows during the rainy season. Lack of drainage management measures also stimulates deterioration of pavements and road structures.

Limited Road Development in Suburban Colombo: As shown previously, CMR's overall road development is lower than other Asian capital's metropolitan areas. Particularly, the length and width per population in suburban Colombo District and Gampaha District are extremely low.

Weaknesses in Road Network: There are many weaknesses in the urban and suburban road network including lack of connectivity, network obstructions, insufficient lanes, narrow bridges, and low intersection capacity. This results in reduced capacity and increased congestion throughout the entire network.

Lack of Pedestrian Facilities: Footpaths or sidewalks are lacking in these areas, as well as in those areas where intermodal connections are necessary, such as between rail and bus stations. Therefore, the level of pedestrians' satisfaction with access and facility quality is quite low.

Weak Urban Street Concept: As shown previously, standards need to be created to clarify the concept of urban streets as the Road Development Authority's (RDA) road classification system does not currently cover such a concept. A first step would be to create a new standard that clearly differentiates between urban and rural roads.

(3) Traffic Management and Safety High Priority Issues

High Demand: Due to increases in the number of vehicles on the roadway, particularly private vehicles, congestion is spreading both geographically-wise and time-wise, increasing the delays and deterioration of air quality.

Insufficient and Inadequate Traffic Control Devices: Traffic signs, pavement markings, delineators, medians and sidewalk barriers, and other traffic control devices are inexpensive yet effective tools of traffic management. Application of these devices is neither consistent nor sufficient at the moment.

Mixed Traffic: Traffic is a mixture of vehicles ranging from lorries, buses, passenger cars, and three-wheelers, to motorcycles, tractors, bicycles, and pedestrians. Each vehicle type has different operating characteristics and maneuverability.

Undisciplined Road Users: Both drivers and pedestrians exhibit poor behavior on the roads. Road rules are often ignored and all users compete for their own way, which has resulted in an unsafe and highly congested environment.

Weak Enforcement: Qualified and competent police and adequate facilities are necessary for effective enforcement. Although data shows a large quantity of violations, illegal behavior and traffic violations are still frequently observed.

Limited Traffic Engineering and Management Capacity: Traffic signals perform their intended function only when they are properly designed, installed, operated, and maintained. As traffic demand changes its volume and pattern, periodic reviews and adjustments of timing parameter sets will be crucial to maintaining the high performance of traffic signals. Both of the organizations managing traffic signals do not have sufficient capabilities for undertaking these tasks. Likewise, capacity is still weak in other traffic engineering and management components like intersection design, traffic control devices, and traffic regulation.

Lack of Policy and Master Plan: Although parking policies and strategies were studied and recommendations were made in CUTS1 and CUTS2, there is still no policy or parking

management master plan endorsed by concerned agencies. There is no current or future data on parking demand and existing supply. Without policy and master plan, it is impossible to prepare and implement improvement measures.

Indiscriminate On-street Parking: Due to insufficient off-street parking, on-street parking is rampant. In some areas, regulations banning parking are ignored or sidewalks are used as parking spaces. Parking bays provided on Galle Road, Baseline Road, and other roads attract more vehicles than they can accommodate.

Inefficient Fee Collection System: The manual fee collection method CMC currently adopts is also not efficient, especially with the high level of leakage.

Insufficient Supply of Off-street Parking: Parking management helps to attain a balance between demand and supply. Therefore, there must be some controls over the demand, while an adequate amount of supply must be provided. On-street parking must be allowed only where its effect on road capacity and traffic flow is minimal. Thus, most parking must be provided off-street.

Inconsistent Design Standards: Except for a few recently improved roads, most roads are not constructed under consistent design standards. The carriageway and sidewalk width vary section by section and vertical and horizontal alignments are not kept within accepted limits, resulting in providing poor visibility and lower road capacity.

Poor Pedestrian Environment: Walking is the most basic mode of transport and the pedestrian environment is an important factor for a good mobility and accessibility in a community. But Colombo's pedestrian environment is poor due to narrow sidewalks, uneven pavement, parked vehicles, and many other obstacles. This is further exemplified by the pedestrian fatality rate.

Lack of Safety Awareness: Traffic accidents are a serious social and economic problem; however, people seem not to recognize this as much unsafe behavior occurs, such as speeding, swerving, and jaywalking. Awareness includes knowledge for drivers and pedestrians on basic traffic safety rules.

(4) Public Transport High Priority Issues

General Public Transport High Priority Issues

Lack of Intermodal Coordination: Organizations and Facilities: With decentralization and the bus sector's fragmentation, there has been little coordination between SLR and bus sector. Since railway stations are not always adjacent to the major roadway and with the major development occurring near the roadways, private bus operators have little motivation to serve the stations. Railway station infrastructure has not been upgraded or expanded to facilitate private vehicle or bus to rail connections either.

Political Interference in Public Transport Sector: The use of transport institutions as mechanisms of political patronage has been an issue throughout the public transport sector's history and has been recognized repeatedly as one of the largest issues that is inhibiting improvements in the sector. The largest outcome of this issue is that when politicians interfere, the passengers' interests suffer, as external interests prevail.

Lack of Implementation and Enforcement of Existing Regulations: There is a lack of implementation and enforcement of regulations that have already been passed by Parliament or

the Provincial Councils. If existing regulations were implemented consistently, many of the sector issues would be minimized. Without progress to ensure implementation of what has been passed, it is likely to be difficult in getting the private sector and trade unions to agree with proposals, as well as making other policy changes.

Lack of Institutional Capacity of Public Transport Institutions: The fragmented nature of the bus sector along with the multi-faceted responsibilities of the rail sector has resulted in a highly complex public transport industry. Decision-makers often lack adequate experience in transport, which results in an uncertainty in moving forward and has continued to allow external pressures to interfere in the sector. The limited capacity and skills has also resulted in a loss of focus on the passenger in daily operations and decision making.

Lack of Passenger-centric Focus¹: The focus of the needs of the passengers has been lost in the decision-making of transport organizations - bus stands are converted for private vehicle parking, three-wheelers continue unregulated, low quality of service on bus and rail continues - issues that could be improved with political will and a focus on passengers, as opposed to other interests.

Bus High Priority Issues

The high-priority issues, in addition to those raised in the general public transport issues are as follows:

Lack of Private Driver/Conductor Skills and Discipline: In 2004 in WP, of the accidents involving three-wheelers and public and private buses, private buses were involved in 40% of the accidents and received 43% of the citations. Intermittent training occurs, but without vigilant enforcement, the old driving methods continue.

Lack of Private Operator Management System: Currently, most private buses are owned by individual operators and there are no current plans to change this structure. This presents a difficult management scenario for WPRPTA as it is nearly impossible to manage each operator's service quality and provision of services.

Lack of Intramodal Coordination: Public and private buses are rarely coordinated with regards to timetables, even though they share the same routes, which increases competition among the operators. Additionally, the main public and private terminals WP are not integrated, thereby wasting space and resources.

Oversupply of Bus Permits: Private bus operators and government officials alike agree that there are too many buses operating in the CMR, which has led to high competition along the route, low profitability of private sector operators, higher congestion, inability to maintain timetables, and longer travel times for passengers.

Lack of Timetables on Bus Routes: Timetables are rarely implemented on routes with only private sector operations. Timetables on private routes would reduce competition, unsafe driving practices, and passenger travel and waiting time, as well as reduce congestion by limiting the number of buses on the roadway. They would help to increase the efficiency of the buses, as they would reduce the time spent by bus crews waiting for the next trip.

¹ During the brainstorming session that occurred during the 2nd PTWG meeting, this was identified as an issue. However, when prioritization was undertaken during the 3rd PTWG, it did not receive any nominations as a priority.

Lack of Bus Priority: Priority is not given to buses and instead, bus passengers are subjected to the same congestion, thereby increasing the travel time and lowering the quality of service. Bus priority measures (priority signaling, bus lanes, counter-flow lanes) have been recommended previously, but as of yet, have not been implemented.

Rail High Priority Issues

The high-priority issues, in addition to those raised in the general public transport issues are as follows:

Inadequate Railway Investments: Fares have provided insufficient revenues and the government has provided varying levels of Treasury funds for railway investments, so there has been a severe reduction in regular maintenance and a postponement of infrastructure upgrades, which has affected safety, reliability, and general quality of service.

Misdirected Rail Subsidies: By targeting the government resources on maintaining staff size and providing completely noncommercial fares, SLR is misdirecting its subsidies and starving the system of badly needed funds.

Uncertainty of Future Role: SLR carries both long-distance and commuter passengers, as well as freight containers. Without a clear continuous government transport policy, it is difficult to prioritize needs and identify a direction to move forward to better provide services.

Lack of Progressive Policies: Colombo's future transport needs and development patterns will require a significant shift in attitudes and management styles within the railway. However, there are no regulations or incentives to implement more progressive management practices, such as involving the private sector or changing the focus from long-distance services to commuter and local services.

Strong Trade Unions: The trade unions focus on ensuring proper allowances, as opposed to focusing on improving service quality. They are strong, with political influence and support, which enables them to influence managerial decisions.

Three-Wheelers High Priority Issues

The high-priority issues, in addition to those raised in the general public transport issues are as follows:

Lack of Enforcement of Road Rules: There is a lack of enforcement by Traffic Police of the road rules, especially with regards to three-wheeler drivers, which shows in the high number of traffic accidents that involve three-wheelers and their continued disregard for basic road rules.

Lack of Institutional Regulator for Three-Wheelers: Central or provincial oversight of three-wheelers is lacking and they are operating in a completely unregulated environment. This has contributed to their uncontrolled growth and unsafe operations.

Oversupply of Three-Wheeler Permits: The number of three-wheelers continues to grow and shows no signs of abating. They continue to serve a purpose for the traveling public, but they contribute to traffic congestion in that they stop arbitrarily in traffic, cannot keep pace with private vehicles and buses, and park haphazardly, often overlapping with traffic lanes.

Insufficient Three-Wheeler Infrastructure: The existing stands are relatively small, having only enough space for 5 vehicles. The lack of space results in three-wheelers congregating in various high-demand areas, parking anywhere, or circulating with an empty vehicle.

(5) Social and Natural Environment High Priority Issues

Inadequate Vehicle Inspection System: The present vehicle inspection system in Sri Lanka does not test the emission levels of vehicles, as is international best practice.

Adulteration of Fuel: Fuel quality is one of the most important factors negatively affecting vehicle emissions in Colombo. The adulteration of diesel is evident from the characteristic kerosene odor that emanates from the exhaust of some private diesel buses. However, it is worth noting that adding kerosene to diesel makes for a “better” diesel, while adding kerosene to gasoline makes for a worse gasoline, which is common with three-wheelers.

Lack of Pedestrian Facilities: As discussed in Chapter 6, vendors and motorists use the sidewalk for their own purposes, which negatively affect the movement of pedestrians.

Lack of Considerations of Vulnerable Groups: There is lack of considerations of vulnerable groups including urban poor, disabled, children, and women with regards to transport planning.

High Pollution Levels from Three-Wheelers: Data shows high growth of three-wheelers, with no signs of abating. As the majority of these three-wheelers use two-stroke engines, this creates high pollution issues since two-stroke engines have significantly higher emissions than four-stroke engines.

Inadequate Regulations: Presently, the noise regulations focused on the use of vehicle horns in the city has been insufficient. This is especially important in and around schools, hospitals, and religious facilities.

Inadequate Operational Monitoring: The current operational monitoring system is not adequate because of a lack of monitoring capacity in term of personnel and equipment.

Lack of Consideration of Microclimate: With the focus on climate change, there should be an increased focus on preventing the creation of microclimates, which results in greater discomfort among citizens.

Poor Environmental and Landscape Planning in Road Design: There is a lack of landscape planning with regards to road design, which can be seen on the main roads in populated areas, the location of residences close to roads, poor design of structures, poor road infrastructure for users, and poor lighting.

Lack of Consideration of Wetlands and Productive Agricultural Lands: Filling of wetlands for road construction has increased flooding in the CMR. Productive agricultural land has been disturbed and inundated due to poorly road planning. These same activities have caused loss of vegetation and habitats and fragmentation of ecosystems.

(6) Policy Coordination High Priority Issues

Lack of a Comprehensive Transport Policy: The transportation policies are inconsistent, frequently modified and sometimes exhibit conflicting policies, which results in confusion at the implementation level.

Numerous Institutions: The number of institutions involved in urban transport is high and cut horizontally and vertically across the government. Management and oversight changes frequently, and with the limited coordination, the current difficulties in the sector result.

Weak Coordination: There is a lack of strong coordination mechanisms, though the need to coordinate policies to ensure effective and efficient service delivery is great, especially when there are so many institutions involved.

Inadequate Performance of the Public Sector: The inadequacies are reflected in policy making, planning, organizing, directing, staffing, coordinating and budgeting and these weaknesses have created heavy criticisms against sector performance.

Politicization of Transport Sector: Though this is not the only arena that has been affected by politicization, its impact on transportation has affected policy formulation, efficient and effective implementation, and consistency in operations and futuristic development opportunities, which has a long-term detrimental affect on the economic potential for the country.

10.3 Improvement Measures

The Study Team has identified preliminary improvement measures that correspond to the high priority issues outlined above and in previous chapters. These improvement measures include both those that are likely to be implemented before 2015, as well as those that are not likely to be implemented until after 2015. This assessment was made based on the Study Team's international experience, as well as discussions with the Working Groups. Additionally, in reviewing the previous studies, the Study Team was able to gain a better understanding of what types of projects are possible in Colombo. The improvement measures will be addressed by each respective working group and will subsequently be developed into implementable projects, to be outlined in future reports.

(1) Required Policy Framework for Improvement

As can be seen in many developing country cities, transport is undergoing a downward spiral, whereby declining service in public transport results in greater car use and dependence, thereby impacting the urban structure as it is designed for private vehicles, furthering the decline of public transport. This is very evident in Colombo as the public transport system continues its poor levels of service, driving more and more people to purchase private vehicles (automobiles or motorcycles), and allowing the planners and developers to build a city that is accessible only by private vehicle, as it is too low density for foot or public transport viability. Figure 10.1 shows the typical decline of transport.

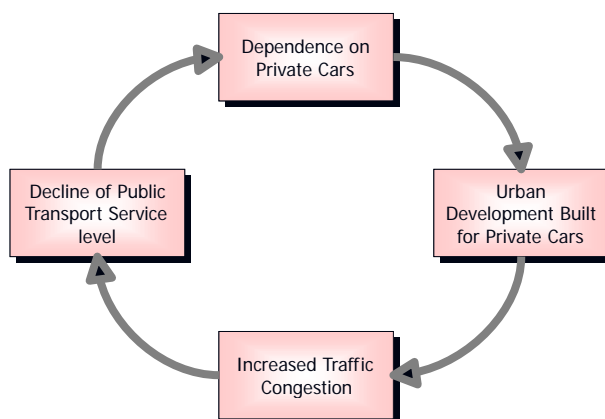


Figure 10.1 Decline of Public Transport and its Impact on Traffic Congestion

The purpose of this project is therefore to stem that decline and reverse the downward spiral. Improvements in public transport service would increase pressure on planners and developers to build a city for people not vehicles, which would then increase the likelihood that citizens would be less dependent on their private vehicles and more dependent on public transport. This can be seen in Figure 10.2.

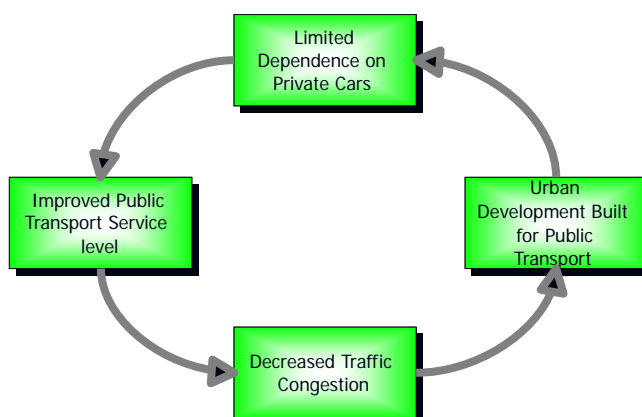


Figure 10.2 Improvement in Public Transport and its Impact on Traffic Congestion

This requires a multi-faceted approach to public transport, traffic management, and road development. Simply constructing more road space will not be sufficient in Colombo, as space is limited, but also because, as international experience shows, cities cannot build their way out of traffic congestion. For example, a multi-faceted approach would include improvements to public transport, road widening and extension, pedestrian improvements, and improving traffic control devices, among others. The issues identified above further support this assertion and the subsequent improvement measures (below) show the wide range of policies that need to be addressed. This further underscores the need for a comprehensive organization, as well as comprehensive transport policies.

It is highly likely that the improvement measures outlined below that correspond to high priority issues will not be easy to implement within the current political/administrative environment. Therefore, it is important to initially set forth a common policy framework or overall strategy among the policy makers and implementing agencies. Some of the improvement measures addressing traffic congestion can be effective for short period, but the overarching goal should

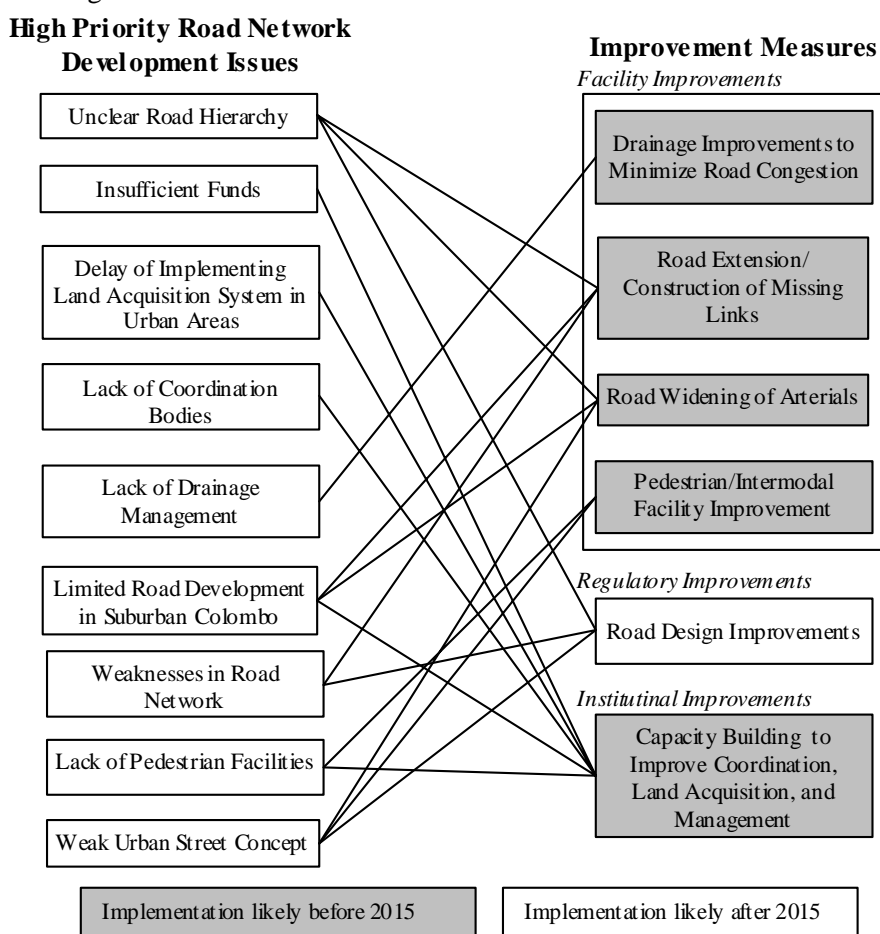
be to achieve a sustainable urban transport system in which implemented measures have a long life span. Although, the main focus of this study so far has been to identify issues and possible improvement measures, they should be placed in a long-term and sustainable perspective. This includes:

- Promote transit-oriented urban development;
- Promote public transport system development and use;
- Improve urban road systems particularly arterials;
- Utilize existing infrastructures and facilities better; and
- Improve policy coordination and administrative capacity.

Some of the aforementioned objectives likely cannot be achieved in the short-term and in fact, these are objectives that are never quite fulfilled, but are always long-term goals that transport organizations are always striving for. However, it is necessary for CMR to start moving towards these goals. In order to do that, the following sections elaborate on sectoral improvement measures and identify measures that can be implemented in relatively short time.

(2) Road Network Development

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

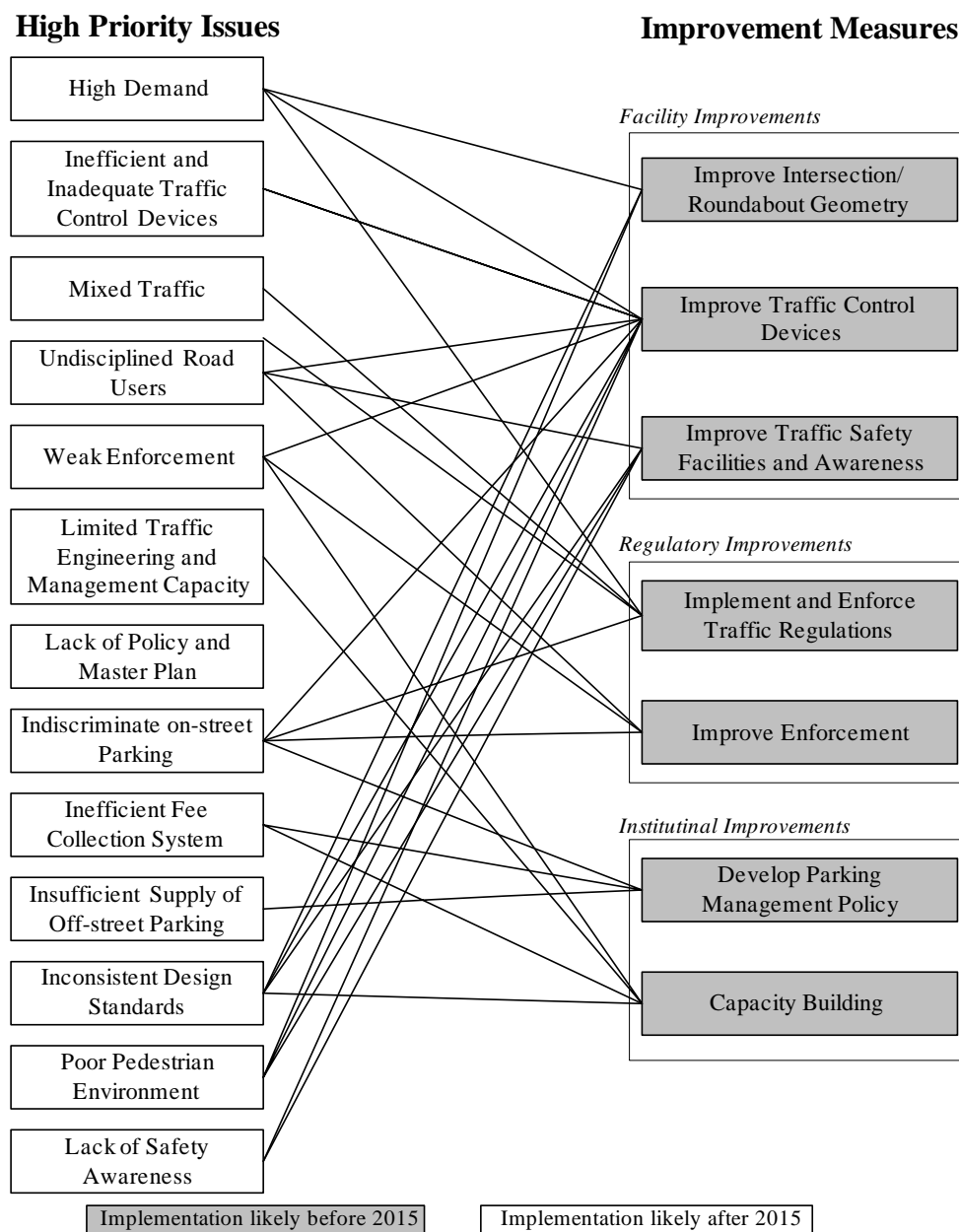


Source: This Study

Figure 10.3 Road Development Issues and Improvement Measures

(3) Traffic Management and Safety

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

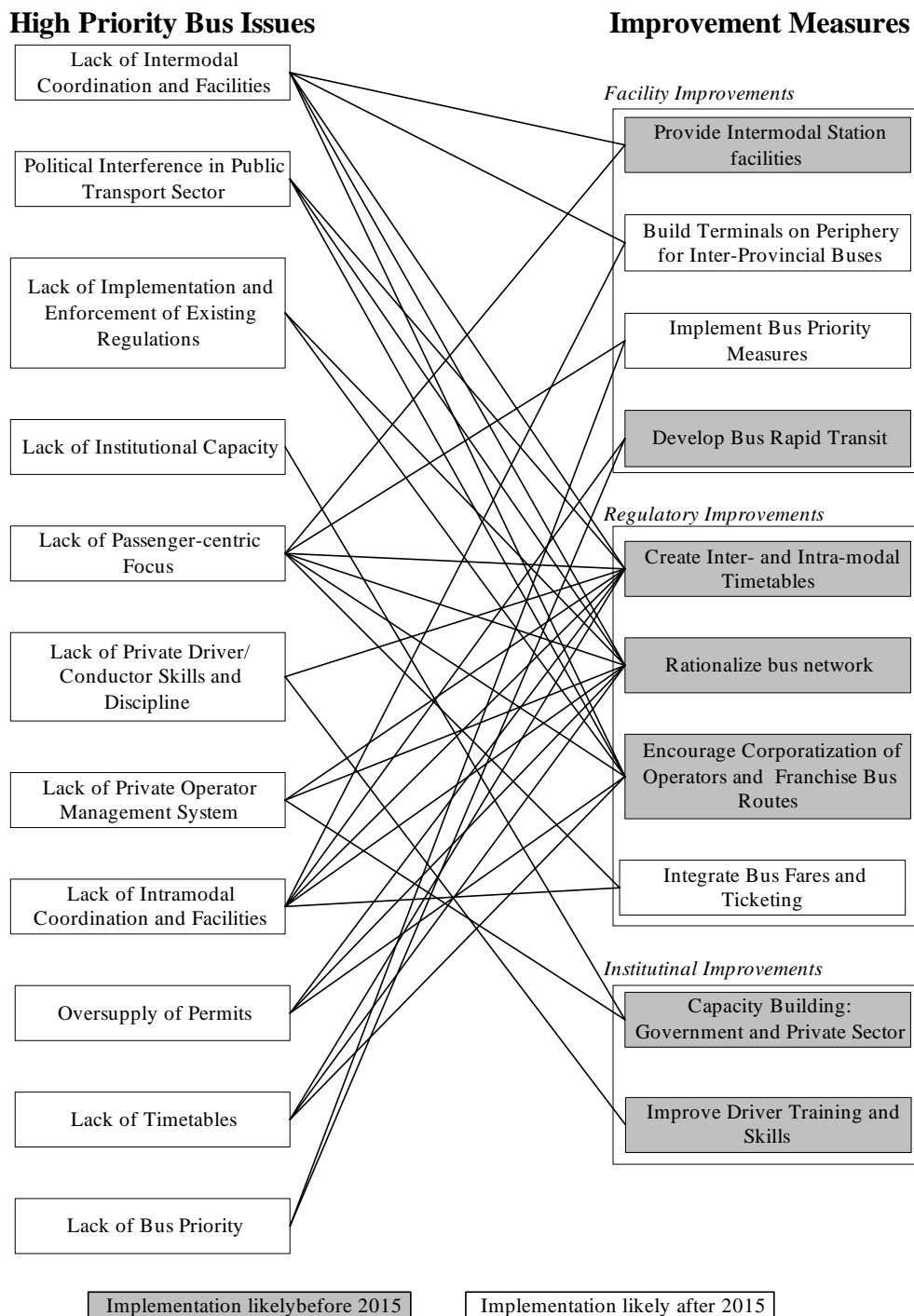


Source: This Study

Figure 10.4 Traffic Management and Safety Issues and Improvement Measures

(4) Bus

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

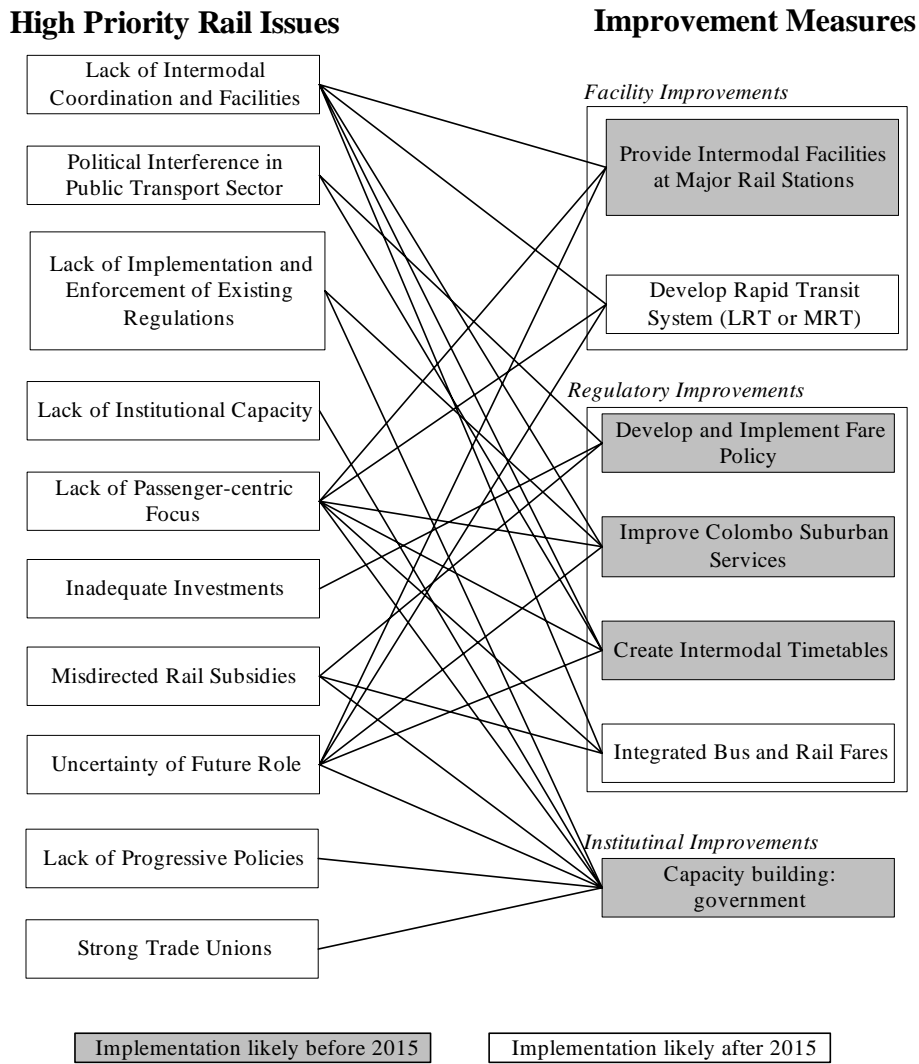


Source: This Study

Figure 10.5 Bus Issues and Improvement Measures

(5) Rail

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

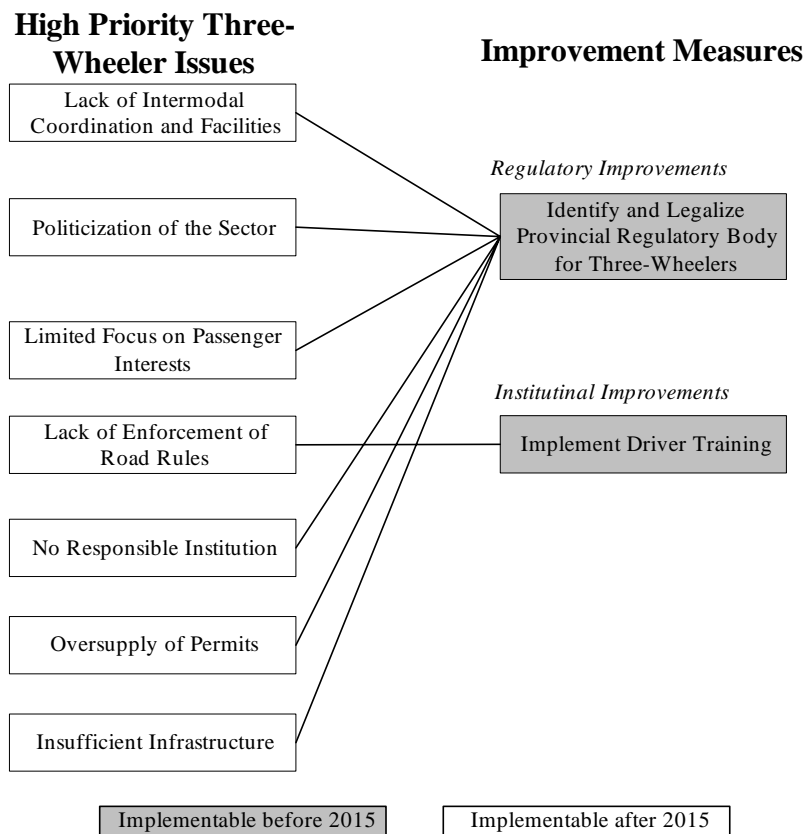


Source: This Study

Figure 10.6 Rail Issues and Improvement Measures

(6) Three-Wheelers

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

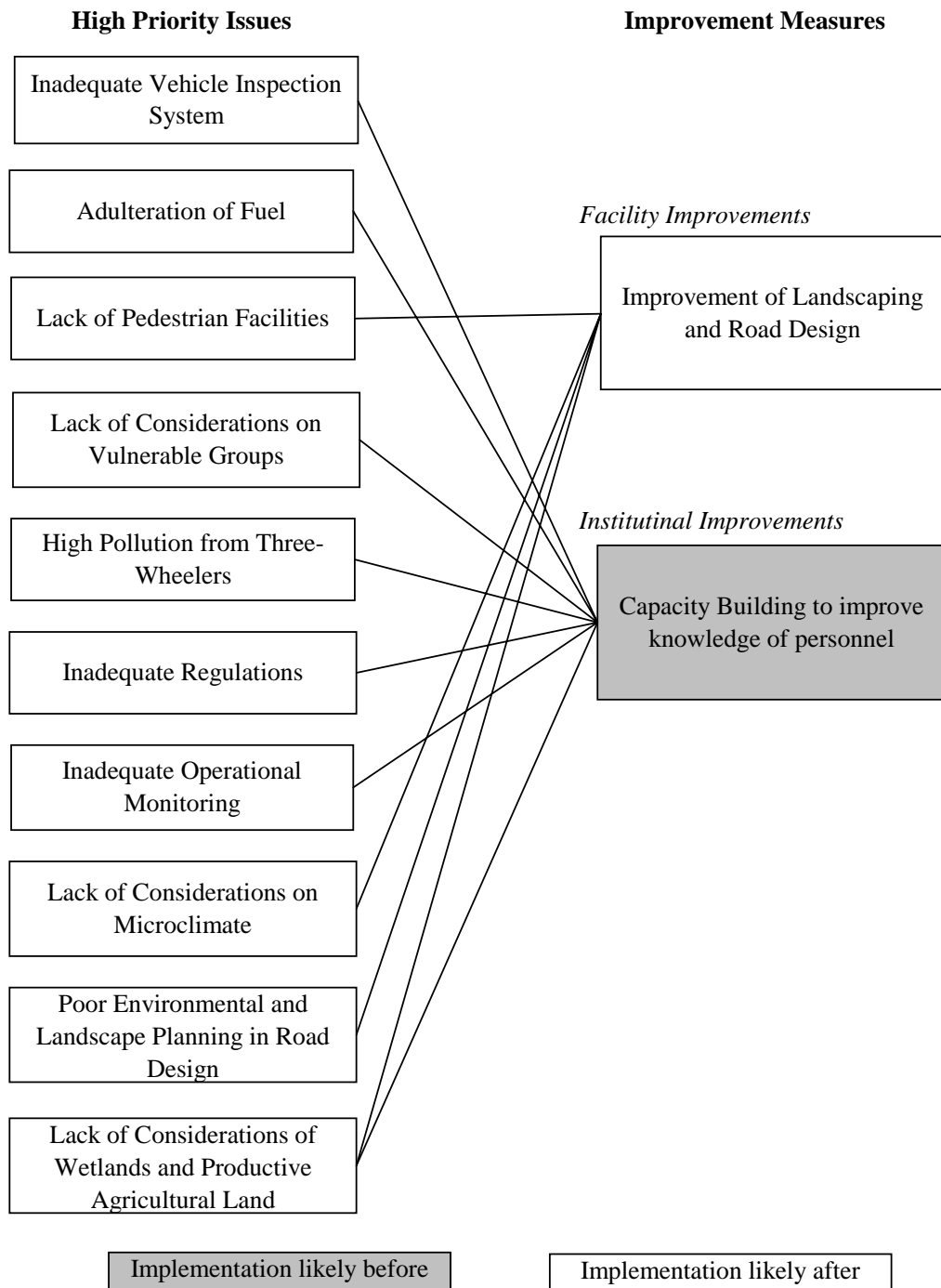


Source: This Study

Figure 10.7 Three-Wheelers Issues and Improvement Measures

(7) Social and Natural Environment

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.

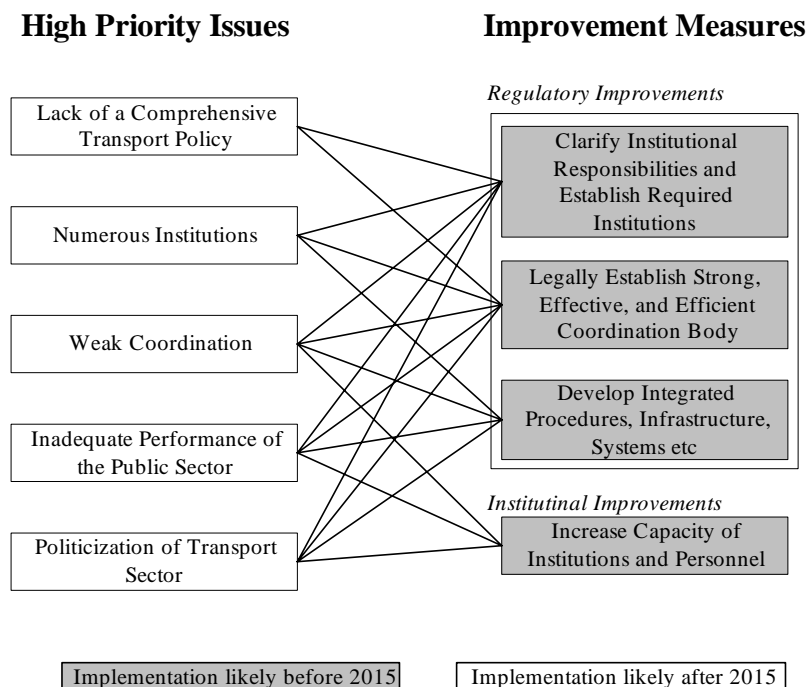


Source: This Study

Figure 10.8 Social and Natural Environment Issues and Improvement Measures

(8) Policy Coordination Improvement Measures

The Improvement Measures and the corresponding issue(s) that would be addressed can be found in the figure below.



Source: This Study

Figure 10.9 Policy Coordination Issues and Improvement Measures

Additional Working Group meetings have been organized to discuss potential policy measures and details of improvement projects. A long list of projects was then prepared based on discussions by Working Group.

10.4 Project Long List

The table below provides a brief list and Appendix 1 provides a detailed summary of the Project Long List that combines projects from the previous studies, as reviewed in Chapter 2, as well as projects identified by the Working Groups. There were 161 previous projects, with an additional 48 projects identified by the Working Groups. The Long List can be described in the following charts by 6 major categories. The majority of projects categorized as Road and public transport (bus, rail, three-wheelers, and intermodal) making up another 25.6% of the projects (see Figure 10.10). The improvement measures listed above are an aggregate of this list, as Appendix 1 has more specific projects. As the Long List is quite lengthy, the Study Team, as outlined in subsequent chapters, will apply criteria to prioritize projects for a short list and furthermore, high-priority projects that can then be implemented by GoSL.

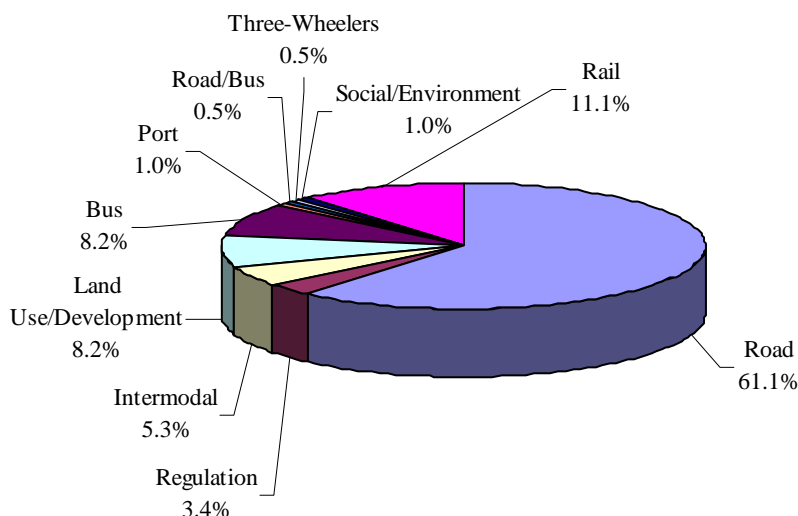


Figure 10.10 Project Category Breakdown for Project Long List

Table 10.1 Summary of Project Long List (Institutional)

Source	Project Name
IPCWG	Establish a Coordinating Body for Urban Transportation Development in CMR
CDP	Creation of a Colombo Development Authority

Table 10.2 Summary of Project Long List (Land Use and Urban Development)

Source	Project Name
CMRSP	Development of Negombo/Katunayake Growth Center
CMRSP	Development of Gampaha/Nittambuwa Growth Center
CMRSP	Development of Biyagama/Sapugaskanda Center
CMRSP	Development of Homagama/Padukka Growth Center
CMRSP	Development of Horana/Bandaragama Growth Center
CMRSP	Development of Matugama Growth Center
CMRSP	Development of Kalutara Urban Center
CMRSP	Development of Moratuwa Urban Center
CMRSP	Development of Avissawella Urban Center
CMRSP	Development of Dehiwela-Mt. Lavinia Agglomeration
CMRSP	Improvement of Schools Outside City
CMRSP	Relocation of Manning Market and Part of Pettah Dry Goods Wholesale Market
CUTS2	Improve and Develop Fort and Pettah Areas
CDP	Introduction of New Building Limits/Lines
CDP	Improvements in Fort
CDP	Create Concentrated Development Areas
WRMP	Land Use Controls

Table 10.3 Summary of Project Long List (Public Transport)

Source	Sub-Category	Project Name
WRMP	Bus	Develop Bus Stand Facilities
WRMP	Bus	Remove Central Bus Stands and Develop Bus Interchanges at Periphery of City
WRMP	Bus	Bus Infrastructure Improvements
PTWG	Bus	Project to Improve School Transport Services

Source	Sub-Category	Project Name
PTWG	Bus	Strengthening of NTC on Transport Planning and Operations/Management
PTWG	Bus	Strengthening of SLTB on Operations/Management
PTWG	Bus	Develop a Training Center at Western Province Road Passenger Transport Authority and Undertake Strengthening of WPRPTA
CMRSP	Rail	Rehabilitation of Rail Track
CMRSP/ CDP	Rail	Development of Rail Signaling System
CMRSP/CDP/ WRMP	Rail	Improvements to Rail Stations
CMRSP/ CDP	Rail	Systematic Replacement of Rail Rolling Stock
CMRSP	Rail	Triple Track on Main Line from Colombo to Ragama
CMRSP	Rail	Double Track Coastal Line from Colombo to Kalutara
CMRSP	Rail	Double Track between Ragama and Negombo
CMRSP/ WRMP	Rail	New Rail Link (Dematagoda-Kotte-Ratmalana)
CMRSP	Rail	Electrification of Railway
CMRSP	Rail	Demand Responsive Suburban Rail Routing and Scheduling
CMRSP/CDP	Rail	Develop People Mover System
CMRSP/CDP	Rail	Extend People Mover System to Suburbs
CMRSP	Rail	Develop Long-Term Strategic Plan for SLR
CUTS2	Rail	Study Rail's Future Supply and Demand to Increase Modal Share
CUTS2	Rail	Increase Progressive Practices Used at SLR
CUTS2	Rail	Develop Strategies for Signaling, Rolling Stock, and Asset Management
CUTS2	Rail	Improve SLR Timetabling and Service Delivery
CUTS2	Rail	Quantify Structural Integrity of Kelani Rail Bridge
CUTS2	Rail	Determine Viable Mass Rapid Transit Options for Colombo
WRMP	Rail	Remove Coastal Line
WRMP	Rail	Develop Circle Line Railway
WRMP	Rail	Develop Southern Line Railway
PTWG	Rail	Strengthening of Sri Lank Railways on Planning and Operations/Management
RDPWG	Road/Bus	Develop BRT between Dematagoda and Battaramulla
PTWG	Three Wheelers	Strengthen WPRPTA to Implement and Strengthen the Three-Wheeler Services Bureau and Outline Three-Wheeler Regulations
CMRSP	Intermodal	Intermodal Access and Park and Ride (Bus/Rail and Rail/Private Vehicle)
CMRSP/CDP	Intermodal	Develop Intermodal Pettah Transport Center
CMRSP	Intermodal	Develop Ragama Intermodal Transport Center
CMRSP	Intermodal	Develop Kottawa Intermodal Transport Center
CMRSP	Intermodal	Develop Ratmalana Intermodal Transport Center
CMRSP	Intermodal	Develop Orugodawatte Intermodal Transport Center
CMRSP	Intermodal	Intermodal Facilities at Each Railway Station
CMRSP	Intermodal	Upgrade Traffic/Land Use Model for CMR to a Full Transport Model
CMRSP	Intermodal	Conduct a Multi-Modal Analysis of Transport Requirements within CMR
CUTS2	Intermodal	Develop, Approve, and Expand Transport Master Plan for CMR
WRMP	Intermodal	Integration of Public Transport Fares and Schedules

Table 10.4 Summary of Project Long List (Road Development)

Source	Project Name
CMRSP	North South Highway (NSH) within CMR
CMRSP	North Eastern Highway (NEH) within CMR
CMRSP	South Eastern Highway (SEH)
CMRSP	Moratuwa-Polgasowita Link
CMRSP	Southward Extension to NSH
CMRSP	Northward Extension to NSH
CMRSP	Trincomalee Extension to NEH
CMRSP	Kandy Extension from NEH
CMRSP	Connection to Asian Highway
CMRSP	Investigate and Develop Parallel Roads
CMRSP	Widen and Re-Define Road Cross-sections
CMRSP	Implement Coordinated System of Construction, Maintenance, and Improvements
CMRSP	Improve Paving Quality
CMRSP	Overpasses at Railway Crossings
CMRSP	Control Access on CMR's A and B Class Roads
CMRSP	Develop CMR's C and D Class Roads
CMRSP	Introduce Street Line Schemes
CMRSP/CDP	Baseline Road Extension
CMRSP/CDP	Develop Marine Drive
CMRSP/CDP	Extension of Duplication Road
CMRSP/CDP	Mattakkuliya Bridge
CMRSP/CDP	Katunayake Expressway
CMRSP	Pedestrianize the Fort Area
CMRSP	Research Requirements for an Inter-Regional Expressway System
CMRSP	Study Conversion of Roads to High Mobility Corridors
CMRSP/CDP	Improve Kollupitiya-Belumahara (State Drive)
CMRSP/CDP	Improve Parliament Drive
CMRSP/CDP	Improve Kollupitiya-Moratuwa (Marine Drive + Railway strip)
CMRSP/CDP	Improve Road from Colombo-Galle
CMRSP/CDP	Improve Road from Colombo-Horana
CMRSP/CDP	Improve Road from Colombo-Ratnapura / WRMP
CMRSP/CDP	Improve Road from Colombo-Kandy
CMRSP/CDP	Improve Road from Colombo-Negombo
CMRSP/CDP	Improve Baseline Road
CMRSP/CDP	Improve Road from Fort-Maradana
CMRSP/CDP	Improve Road from Fort-Borella
CMRSP/CDP	Improve Dharmapala Mawatha
CMRSP/CDP	Improve Road from Dehiwala-Maharagama
CMRSP/CDP	Improve Road from Rajagiriya-Ratmalana
CMRSP/CDP	Improve Road from Pannipitiya-Battaramulla
CMRSP/CDP	Improve Road from Malabe-Athurugiriya
CMRSP/CDP	Improve Road from Koswatte-Kelanimulla (Dalugama (proposed))
CMRSP/CDP	Improve Kirimandala Mawatha
CMRSP	Improve Road from Nugegoda-Delkanda
CMRSP	Improve Port Access Road
CMRSP/CDP	Improve Duplication Road
CMRSP	Improve Road from Bambalapitiya-Ratmalana
CMRSP/CDP	Improve Road from Thimbirigasyaya-Narahenpita
CMRSP/CDP	Improve Road from Nugegoda, Jubili Post-Etul Kotte
CMRSP/CDP	Improve Road from Gas Paha-Mattakkuliya
CMRSP	Improve Road from Delkanda-Rattanapitiya

Source	Project Name
CMRSP	Improve Road from Koswatte-Etul Kotte (proposed)
CMRSP	Improve Road from Udahamulla-Polwatte
CMRSP	Improve Lake Drive State D R Kirimandala Mawatha
CDP	Improve Road from Dehiwala-Hokandara
CDP	Improve Road from Thimbirigasyaya-Nawela
CDP	Improve Road from Maharagama-Nugegoda
CDP	Road Construction along Kelani River
WRMP	Outer Necklace Semi-Expressway
WRMP	Inner Necklace Expressway
WRMP	City Semi Expressway
WRMP	Kandy Expressway
WRMP	Semi Expressways
WRMP	Upgrade A1
WRMP	Upgrade A4
WRMP	Upgrade B84/Colombo Horana Road
WRMP	Upgrade B214/Kelaniya-Mudungoda Road
RDPWG	Fourth Bridge at Kelaniya (Keranisiri Bridge)
RDPWG	B152 Widening
RDPWG	Improve Road from Yakkala-Biyagama-Malabe
RDPWG	Improve Road from Panadura-Bandaragama (A8)
RDPWG	Improve Road from Waskaduwa-Bandaragama (B454-455)
RDPWG	Maradana-Galle Face Link
RDPWG	Independence Square pedestrian footpath development
RDPWG	Beira Lake pedestrian footpath development
RDPWG	Pelawatta-Malabe-Kahantota Road (7 Km)
RDPWG	Pittakotte-Thalawatugoda-Hokandara-Koskadawila Road (8.4.Km)
RDPWG	Thalangama-Aggona-Angoda-Kelaniya-Kiribathgoda Road
RDPWG	Pannipitiya-Moralatiya-Tuumbowila-Wewala-Suwarapola Road (7.4 km)
RDPWG	Piliyandala-Henemulla (5.65 Km) + Bridge 150m span
RDPWG	Biyagama-Malwana-Walgama-Malwana-Walgama-Ulhitwala-Pananwala-Keragala-Henegama-Wanaluwawa Road
RDPWG	Kottawa-Pitipana Road (5.1 Km)
RDPWG	Homagama-Thalagala-Olaboduwa-Palanoruwa-Kahatapitiya-Kedalpitiya sections
RDPWG	Flyover Construction for Railway crossing at Kelaniya on Kandy Road
RDPWG	Flyover Construction for Kohuwala Intersection
RDPWG	Flyover Construction for Kirulapone Intersection
RDPWG	Flyover Construction for Nugegoda Intersection on High Level Road
RDPWG	Flyover Construction for Dehiwala Junction on Galle Road
RDPWG	Flyover Construction for Railway crossing at Duplication Road across the Coastal Railway Line at Slave Island
RDPWG	Flyover Construction for Boralessgamuwa Roundabout
RDPWG	Flyover Construction for Orugodawatta Railway Crossing
RDPWG	Grade separated interchange construction for Rajagiriya Intersection
RDPWG	Construct grade separated interchange at Panchikawatte Roundabout
RDPWG	Construct grade separated interchange at Orugodawatte Intersection
RDPWG	Lipton Circle extending over the roundabout at Alexandra Place on the State Drive to Parliament
RDPWG	Liberty Roundabout at Dharmapala Mawatta and Duplication Road
RDPWG	Capacity Development for Drainage maintenance for Colombo Municipality

Table 10.5 Summary of Project Long List (Traffic Management)

Source	Project Name
CMRSP	Progressively Ban All On-Street Parking
CMRSP	Provide Bus Bays
CMRSP	Signalization of Intersections and Possible Synchronization
CMRSP	Reduce Abutting Access
CMRSP	Prohibit Right Turns
CMRSP	Signalize Pedestrian Crossings
CMRSP/CDP	Transport Demand Management (TDM) Measures (City of Colombo)
CMRSP/CDP	Bicycle Lanes
CMRSP	Research Traffic Restraint/TDM Measures
CUTS2	Create Traffic Management Policy and Body
CUTS2	Strengthen RDA Implementation Capabilities
CUTS2	Strengthen CMC Traffic Management Capabilities
CUTS2	Strengthen Police Traffic Management Capabilities
CUTS2	Develop Parking Policies and Strategies
CUTS2	Undertake Detailed Design of WA Silva Junction Improvements and Extension (Duplication Road)
CUTS2	Implement Galle Road Pilot Scheme
CUTS2	Implement Lipton Circus Pilot Scheme
CUTS2	Prepare Kandy Road and Galle Road Corridor Schemes
WRMP	Traffic Management Proposals
WRMP	Pedestrian Facilities
WRMP	Road Signage
WRMP	Implement Traffic Calming Measures
WRMP	Phase Out Three-Wheelers
TMSWG	Area Traffic Control (ATC) System
TMSWG	Traffic Signal Rehabilitation
TMSWG	CCTV Traffic Monitoring System
TMSWG	Pedestrian Overpass/underpass
TMSWG	Road User Education Program
TMSWG	Traffic Safety Improvement
TMSWG	Traffic Safety Awareness Program

Table 10.6 Summary of Project Long List (Environment)

Source	Project Name
SNEWG	Capacity Building for equipment and training of personnel
SNEWG	Landscaping and Road Design

