

# **SRI LANKA TRANSPORT SECTOR POLICY NOTE**

World Bank, Sri Lanka

**FINAL REPORT**

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## ABBREVIATIONS

AASL	Airport Aviation Services (Sri Lanka) Ltd
AAGR	Average Annual Growth Rate
BAU	Business as Usual
BIA	Bandaranaike International Airport
BRT	Bus Rapid Transit
CMR	Colombo Metropolitan Region
ERP	Electronic Road Pricing
IMCCPT	Inter-Ministerial Committee for Coordination and Planning of Transport
ICD	Inland Container Depot
ICT	Information and Communication Technology
ITS	Intelligent Transport Systems
IWT	Inland Water Transport
LRT	Light Rapid Transport
KMR	Kandy Metropolitan Region
KV	Kelani Valley
MoF	Ministry of Finance
MoT	Ministry of Transport
MLGPC	Ministry of Local Government & Provincial Councils
NTC	National Transport Commission
PRPTA	Provincial Road Passenger Transport Authority
RDA	Road Development Authority
SAARC	South Asian Association for Regional Cooperation
SLTB	Sri Lanka Transport Board
SLR	Sri Lanka Railways
TDM	Transport Demand Management
TSPC	Transport Studies and Planning Centre
UDA	Urban Development Authority
VOR	Vehicle Ownership Rate
WP	Western Province

## **EXECUTIVE SUMMARY**

### **Objective**

The objective of this study is to (a) assess the adequacy of the current transport system in Sri Lanka and (b) to identify the priority interventions required for Sri Lanka to possess a modern and integrated multi modal transport network that would effectively and efficiently support its proposed economic growth of 8% p.a. over the next 20 years.

The absence of a country-wide multi modal freight and passenger transport strategic study is a vacuum this report seeks to fill. This report will identify and assess the primary challenges facing the transport sector, the sector gaps that need to be filled and the most appropriate interventions that are required in order to adequately facilitate the expected economic growth rates within the limitations of the existing land use and environment.

The scope of this study covers road and rail networks (passenger and freight), bus transportation, trucking and logistics as well as inland water transport (IWT) with their linkages to the international airports and sea ports. It is also limited to the availability of secondary data. Forecasting tools have been used to estimate the travel demand for the different modes of transport for the forecast years of 2021 and 2031.

### **Background and Methodology**

Sri Lanka's current transport networks including the road, rail, bus, trucking and IWT networks are based on the economic models of its colonial period. The major export commodities have since then changed from agriculture to industrial products such as garments, while the economic sectors have also changed from agricultural to commercial activities. Internal trade has also increased leading to new trade patterns bypassing Colombo and the Western Province (WP).

These changes began taking place under liberalized trade policies first adopted in 1977. However the basic infrastructure in terms of the road network, railway network, logistics and warehousing systems have remained largely unaltered during this period of nearly 35 years. As a result, these new economic activities have been forced into areas where international transport nodes such as the BIA and Port of Colombo and inland transport infrastructure is available thus confining these activities to within the WP causing problems of land and road space availability.

Sri Lanka has a population of 20.8 million spread across nine provinces. The WP is the most economically advanced with Colombo functioning as the commercial capital. Transport administration in Sri Lanka is a devolved function. The Central Government assumes responsibility for policy and for inter-provincial road transport as well as for national roads, all railways, ports and aviation. Provincial government is responsible for intra-provincial transport.

The structure for managing the sector is quite complex. It involves all three levels of government as regulators and the central government as an operator of public transport as well. While Central Government is responsible for policy, the instrument of policy implementation remains a provincial function. Majority of the transport is supplied by the informal private sector with the operating conditions for the state and private operators uneven in several areas. The structure does not provide for multi modal planning or inter agency planning since integration between agencies remains sporadic and poor. The sector also has data gaps as well as institutional capacity gaps that need to be met with a new institution dedicated for planning, research and development in transport. Much of the state pre-occupation in transport is in the operation of the state bus and railway agencies that provide around 25% of the passenger supply and 2% of the freight supply. As a result, day to day operations issues often override Government attention on wider policy and strategic interventions.

The Public Investment Plan for the period 2010-2015<sup>1</sup> indicates that the transport sector inclusive of aviation and maritime sectors received an investment of Rs 160 bn for 2010 representing around 2.9% of the GDP as Government Capital Investment. The investment in roads was Rs 123 billion in 2010 and railways Rs 20 billion with further Rs 5-6 billion per year as operating deficits. In the bus sector, the capital infusion by the government has remained at Rs 4 billion per annum with operating deficits for the state bus services ranging at an equal amount. No operating subsidies are offered to private bus transport other than contracted services. Private sector investment in road transport vehicles is an estimated Rs 125 billion per year at present.

## **Analysis**

Sri Lanka has currently a fleet of 2.7 million operating *vehicles* returning a vehicle ownership rate (VOR) of 129 vehicles per 1000 people. However two thirds of the fleet is made up of two and three wheelers. As cars are highly taxed in Sri Lanka, three wheelers are surrogates for private cars and taxis. A compromise car ownership may be considered at around 46 cars per 1000 persons when only cars, vans and three wheelers are included in the definition. Sri Lanka at 46 cars per 1000 persons has a VOR still higher than most other countries at similar PPP adjusted per capita.

In order to assess the future impact of the increasing vehicle ownership and use in Sri Lanka, this study investigates a Scenario of '*Business-as-Usual*' (*BAU*). Accordingly the motor vehicle fleet is estimated to increase from 2.7 million units in 2011 to 4.8 million in 2021 and 7.8 million by 2031. Per capita income in Sri Lanka which was USD 2,399 in 2010 is expected to reach USD 10,000 by 2031. The estimated VOR for all vehicles in Sri Lanka for 2031 when the estimated income reaches USD 10,000 is 370 vehicles per 1000 persons with personal mobility estimated to increase from 100 billion passenger kms in 2011 to 226 billion passenger kms by 2031.

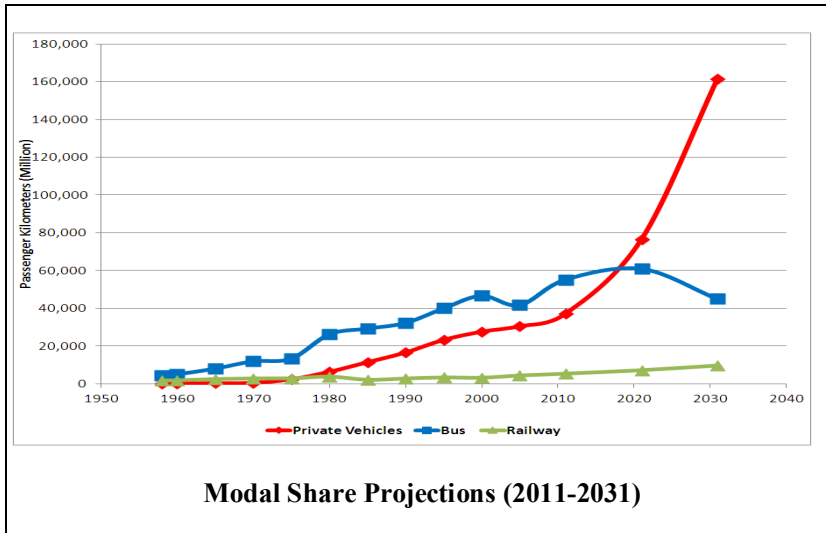
A yet more challenging statistic is the forecast from the DEMIDEPT demand estimation model under the BAU scenario that bus transport shares would reduce from 55 percent to 20 percent by 2031 and a corresponding increase of private travel from 26 percent to 57 percent leading to an increase in traffic levels from 27 to 111 billion vehicle kms by 2031. This is a 300% increase in vehicular traffic levels

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<sup>1</sup>Ministry of Finance, National Budget Division, Sri Lanka, 2010



over 20 years. Railway traffic is expected to increase from 5.4 to 9.7 mn passenger kms even though the modal share which is currently only around 4% will only slightly reduce. This means that the vehicle kms doubles every 8 years which is the period within which road capacity should also be doubled if the current speeds are to be maintained and even fewer years if it is desired that the speeds should improve.



*Goods transport* is also projected to increase from 6,603 tonne kms in 2011 to 19,435 tonne kms by 2031, signifying an average annual growth rate of 6% faster than the long-term growth rate of 3%. This is to account for the higher GDP rate projected and also for longer supply chains as well as movement from agricultural based goods

movements to more industrial and commercially based goods movements. A growth rate of 8% p.a. has been assumed such that the modal share of railway freight increases from 2% in 2011 to 3% in 2031. This of course is the projection under the BAU scenario where the current policy and strategy concerning railway operations is assumed to continue.

Based on the above forecasts for 2021 and 2031, the primary and most serious inadequacies that make the road network ineffective, inefficient and unsustainable are discussed as follows:

- **Inadequate Speed:** The TransPlan estimates the average network speed on the national roads to decrease from 25.75 km/hr in 2011 to 19.13 km/hr by 2031. In Colombo Metro region this will reduce from 21.69 km/hr to 14.41 km/hr and the peak hour speed for commuter traffic to Colombo which is currently around 14 km/hr to drop to 9.10 km/hr.
- **Inadequate Capacity:** Based on historical trends of adding road capacity through new and improved roads, at most only approximately half the required road capacity can be expected to be added within the next 20 years for the BAU scenario. Thus intervention in the road network alone will not be able to bridge the demand for road space that is expected over the next 20 years. It has been shown in the study that the road sector interventions alone can only cope with a maximum of 4-5% per annum growth in GDP.
- **Road Congestion:** The shortfall in road capacity will result in reduced speeds especially in urban centers where the vehicle ownership is expected to grow rapidly. The anticipated increase in service sector activities in these urban centers will require an increase in commuting and business travel to these areas. This will seriously impede their ability to be efficient commercial centers and livable cities able to attract international businesses.

- **Safety:** The number of *road accidents* and fatalities on the road network has steadily increased over the years. Presently there are around 2,300 road traffic fatalities and a further 4,000 or more serious injuries per year. Major causes for these are poor conditions of infrastructure, undisciplined behavior of road users including drivers, riders, passengers and pedestrians, poor training and testing systems and inadequate and inconsistent enforcement. Even though large investment has been made on road infrastructure, very little has been invested in safety to make a significant change in the trend of increasing accidents.

Even though the *railway* carries only 4% of the national modal share, in Colombo Metropolitan Region (CMR) it increases to 10%. However the same cannot be said of Kandy, where it is only 1-2%. In fact, the railway carries considerably less traffic outside of Colombo with traffic levels being below 10,000 passengers per day on most of the network.

*Buses* currently carry 55 percent of the passenger km, while *para-transit*, made up of chartered and non route buses, hired vans, three wheelers and taxis carry another 11 percent. There are an estimated 23,228 buses operating public transport services in Sri Lanka. Fares are regulated and revised annually according to a pricing formula that allows recovery of cost and operating profit. The bus and seat capacity in the sector has grown steadily. However the regulatory agencies have not been able to effect qualitative changes and to improve quality of services in keeping with income levels. The private services though making profits are in the hands of informal operators making it difficult for further development of the quality of private bus services. The SLTB, which is a State organization has a number of operational and management inefficiencies but is still considered by a significant majority of users as being necessary to counter the private bus cartels and the abandonment of services during lean demand periods, non-provision of service in under patronized areas and strikes.

*Para-transit*, which is predominantly made up of over 300,000 three wheelers, also includes a wide cross section of other services ranging from school services to rural vehicles, all of which are also fully deregulated. The high rate of accidents, low productivity and collusive behavior are reasons why some degree of regulatory control may be required for these sectors.

*Logistics Centers* can be loosely classified as locations for goods trip ends. These usually constitute collection centers in production areas, distribution centers and warehouses and transport nodes such as ports. Most of these activities in Sri Lanka are currently located in the WP. The Port of Colombo as well as many of the distribution centers and warehouses for import cargo are located either within the city or its suburbs. The airport and even the distribution centers for domestic trade such as in the case of rice, vegetables, cement etc have significant proportions of their respective movements going through Colombo. This has not been studied adequately. However the cost of transport and handling of goods in Colombo is known to be high due to the concentration of logistics activities to Colombo and its outskirts.

An opinion survey of stakeholders and sector experts has also revealed that the current and planned transport sector infrastructure capacity is not adequate to sustain an 8% growth rate. Stakeholder and experts show agreement for investment to be directed towards multi modal transport including railways and to a lesser agreement on buses. There is also general agreement among the stakeholders

and experts that the current motorization is unsustainable and that solutions to urban traffic congestion should come from improved public transport.

The study identifies the following *four main issues* that are inter-related:

- a) Rapidly increasing motorization
- b) Deterioration in quality of public transport.
- c) Outdated transport networks.
- d) Increasing external costs for transport activity.

Transport management over the next 20 years appears to be based on the fundamental question on how motorization is to be managed. Continuation of the current policy on liberalized motor vehicle imports will require rapid road network improvement. On the other hand, if rapid motorization and the burden of having to engage in unprecedented road building are to be averted, then an alternate policy intervention is required. This would require a twin policy intervention of improving public transport and the simultaneous management of the demand for motor vehicle ownership and or use. This will require a well formulated policy intervention and the setting up the institutional requirements for ensuring that implementation is effective. The *'Business as Usual' scenario* will however result in the increase of negative economic externalities arising from transport system shortfalls that will constrain economic growth and quality of life such that the intended growth rates would not be achieved.

There is currently a clear policy statement taken by the Government in the Land Transport Policy of 2010 that all possible measures would be taken to curb motorization by promoting public transport especially rail based travel. However, policy implementation by the Government over the last two years has been less encouraging as BAU conditions have continued without reflecting a change of policy.

## **Recommendations**

In view of the impending rise in motorization, it would be necessary for Sri Lanka to set achievable and sustainable goals for managing its transport system. As such an *Alternate Scenario* is proposed in this study. This is based on the goal of ensuring a sustainable level of motorization. This is possible only if there is a strategic plan to ensure that not just roads, but all other modes of transport as suitable, are in place to support the new development programs of the government. In this respect this study identifies two primary strategies as set out below:

- Interventions for Managing Motorization in Metropolitan Areas:
- Interventions for Improving Inter-Provincial Connectivity

**Interventions for Managing Motorization in Metropolitan Areas:** It is seen that increasing vehicle ownership and use will result in many urban centres having a rapid increase in motorization. The Colombo Metropolitan Region (CMR) and Kandy Metropolitan Region (KMR) have already reached

the given sustainability levels given that provision of additional road space is limited. As such a multi modal approach has to be followed with specific programs to maximize public transport modal shares on available infrastructure and new modes where appropriate. Simultaneous interventions are required to manage the vehicle use in city centres so that the level of road transport activity does not become unsustainable and speeds drop unacceptably.

Population Density	Population Density (Pop/Ha)	Roads (m/pop)	Share of Public Transport	Car Ownership Saturation (per 1000 p)	Restrictions
Low	< 25	> 4	< 5%	700-900	No restriction on ownership or use
Moderate	25-67.5	1-4	15-35%	400-600	No restriction on ownership but Restrictions on use
High	> 75	< 1	50-80%	200-300	Restrictions on ownership and use

The study shows that the municipal areas of Colombo, Kandy, Sri Jayewardenepura Kotte and Dehiwela-Mount Lavinia and Kandy Municipal area should have **traffic demand management** (TDM) measures such as (a) re-location of land uses that cause traffic congestion (b) demand spreading and (c) Electronic Road Pricing and Parking Charges implemented for managing traffic demand especially during peak periods.

With congestion imposing impediments to road based transport, the **railway** can offer a competitive service with more market oriented approaches as well as a strategy for operational improvements to speed and reliability and improved integration with ports and airports as well as with multi modal logistics centers and multi modal passenger terminals including park and ride facilities. It also requires additional track and rolling stock capacity to deal with demand especially for peak period passenger travel in urban areas. However with all these interventions it is not expected that the railway will carry more than 20% of the corridor traffic in CMR and KMR.

The study shows that 7 of the 10 main corridors in CMR and KMR have peak hour bus passenger flows exceeding 10,000 passengers in one direction. Two of the corridors in CMR namely the Kandy Road and Galle Road have over 25,000 passengers during the peak hour. The number of **buses** on these corridors currently exceeds 200 per hour which makes their operation slow and complex. Thus all these corridors could be considered for conversion to BRT as the quality of current operations will not be adequate to retain modal shares when personal incomes increase. The other recommendations are to (a) modernize the urban bus fleet starting with air-conditioned services; (b) introduce ICT enabled customer services including value added services; (c) develop modern terminals and stops in CMR and other metropolitan areas; (d) implement Route Franchising to enable route based management of services and demand based dispatching starting with air conditioned services; (e) institutional strengthening of Provincial Regulators and align legislation to fall in line with strategy for developing bus transport in urban areas;

In the Sri Lankan context of increasing vehicle ownership and high population density it would be considered a good practice not to build any new **urban roads** unless they provide priority space for public transport or for high occupancy vehicles. The following recommendations have also been

made: (a) upgrade existing links for capacity and speed on roads especially those of a radial nature which can promote traffic diversion away from urban centres; (b) identify and provide missing road links to provide more direct connections between suburban areas with by-pass options to take traffic away from urban and suburban centres; (c) improve capacities of existing urban roads through traffic management measures and introduction of Intelligent Transport Systems (ITS); (d) improve capacity at intersections and bottlenecks through integrated intersection traffic control systems in urban areas; (e) improve road safety by providing better facilities for pedestrians and non-motorized users as well as reducing head-on crashes and (f) develop traffic management capacities.

Moreover, except for corridors where the total flow is less than 50,000 passengers a day, two modes of public transport have been recommended in this study to provide greater choice. While Metros which are fully elevated or underground railway would have greater capacity and speed of travel they cost upwards of USD 40 million per km. This cost is likely to be difficult to justify on ridership alone as none of the urban corridors in Colombo or Kandy would exceed 30,000 passengers during the peak hour. The primary intervention recommended is to introduce **Bus Rapid Transit (BRT)** on priority basis in order to arrest the continuing loss of bus ridership to private vehicles as follows:

- **Colombo:** Kandy Rd; Galle Rd, Parliament Rd; Negombo Rd and Horana Road.
- **Kandy:** Peradeniya Rd and Katugastota Rd (these could be LRT either)

The conversion of the Kelani Valley (KV) line to Light Rail (LRT) is also recommended since the current line cannot deliver the level of service that is expected from a suburban railway service due to single track operation and high curvature. A new institution that has the required capacity for managing rapid transit operations has needs to be set up.

**Interventions for Improving Inter-Provincial Connectivity:** Improving travel speeds and volumes between provincial centres and providing direct connectivity to international air and sea ports is a requirement to meet the current development objectives of the Government. In this respect the national road network should continue to be further developed but complemented by the improvement of the existing rail and bus transport systems to provide adequate choice of travel for both passenger and freight transport where it is economically viable and especially on inter-provincial corridors that can provide competitive services to private vehicle travel.

With the connection of the Southern Highway to the Outer Circular Highway and the proposed extension to the Southern Highway, the Hambantota Port could be connected to the expressway network and other roads for island wide distribution. This could be used to relocate the current warehouses and distribution centres from Colombo City and its suburbs to locations along the OCH and Southern Highway and even in Hambantota. These centres could be developed as **Logistics Centres** for facilitating distribution of import and export goods as well as domestic trade including agricultural produce such as vegetables, fruits and rice. Encouraging the location of logistics centres with railway access could facilitate a higher use of the railway for different types of cargo. The railway however has to make freight transport a priority activity in order to attract such traffic. It requires a policy change in making limited resources available for goods transport. The railway also requires substantial investment in rolling stock, warehousing and loading and unloading equipment. A logistics and freight transport study is recommended to carry this proposal forwards.

**Domestic air transport** even though beginning to become popular again, has been largely undeveloped especially due to the many restrictions being imposed on domestic flying during the period of conflict. The study observes that the development of airports that are hitherto unconnected by fast expressways such as in the up country, north and east are the best to be developed in the initial stages.

The study also observes that the current **expressway network** requires a number of extensions to cover parts of the country that are required to be connected to each other for rapid development. The possibility of **high speed railway** connection with India at a future date should also be borne in mind. These should then supplement the expressway network and the existing railway network. Some directions for such a network are: (a) undertake an Expressway Extension Plan as a priority step and (b) fund extensions that have been identified already.

Currently less than 50% of the length of the **national road network** has been rehabilitated in the last 20 years. This still leaves around 6,000 km of road length to be rehabilitated. The study recommends that such rehabilitation take into account: (a) rehabilitation of Trunk Roads for increasing speed, capacity and safety; (b) providing by-passes to urban centres; (c) traffic management on national road network; (d) reservation of Street Lines for future widening; (e) upgrade roads to national road network and to provide missing links; (f) implement Safety Audits on all roads having more than 10,000 vehicles per day.

The **railway** can provide a competing service to road transport in (a) Long-distance passenger transport, where by providing modern, convenient, comfortable, accessible and competitively priced rail services road passengers can be attracted to rail. In this respect high quality intercity rail services could be operated at regular frequency to destinations that are just outside the urban area; (b) Port-related cargo, where all port cargo, especially in and out of the Colombo Port could be carried by rail to Inland Container Depots (ICD) and logistics centres prior to re-distribution by road and rail and (c) Support tourism sector, by providing customized services to the airport as well as to other tourist destinations including resort areas and the up country.

These would require to (a) improve track utilization by improving signaling, crossing facilities and stations capacities and track speed to operate regular (hourly) Intercity Express Trains to Kandy, Kurunegala and Galle; (b) operate Intercity Express Trains to destinations which are over 200 kms from Colombo where railway can effectively compete with road speeds. For example Anuradhapura, Jaffna, Trincomalee, Polonnaruwa and Batticaloa; (c) provide required high quality rolling stock for long distance travel including air conditioned coaches and sleeping berths where required; (d) improve selected stations for tourist/recreational travel and provide rolling stock required for same.

The heavier bus corridors such as the Colombo-Kandy and Colombo-Galle services carry over 10,000 passengers per day. The interventions required to improve **intercity express bus services** are also mostly institutional and policy re-alignment and include: (a) modernize buses on Intercity Routes making most Air Conditioned; (b) commence direct routes using new roads that have been improved in recent years; (c) ICT enabled value added customer services for integrated ticketing, information etc; (d) Institutional Strengthening of National Regulator; (e) create a network of Regional Multi Modal Terminals for improved transfer between bus and rail as well as between buses.

The *multi modal centres* are where convenient transfers between bus and rail should be facilitated at locations such as Jaffna, Vavuniya, Anuradhapura, Dambulla, Avissawella, Badulla, Galle, Hambantota, Amparai and Katunayake (BIA). Of these Hambantota and Dambulla are two locations without railway access to which new rail lines have been proposed. Amparai is the only other location.

## **Conclusions**

The anticipated modal shares with the proposals named as the Intervention Scenario in the study shows that the Alternate Policy can reduce the intensity of motorization considerably by 2031. It also shows that the current passenger volume by buses can be retained with the introduction of BRT and improvements to urban intercity buses even though the modal share would drop. Railway modal share can also be increased to around 10%, while railway goods modal share can be increased to 6%.

This shows that an estimated 11,402 million vehicle kms per annum including around 800,000 (around 10%) of the vehicles could be taken off the road network without reducing the passenger kms through the Intervention Scenario. This translates to 10% of the passengers being retained in public transport with buses operating 532 million kms additionally and trains 18 million kms additionally. The value of Vehicle Operating Cost from these interventions alone is estimated to be over Rs 300 billion per year. Thus the twin strategies seem to have favorable economic rates of return.

The overall sequencing of the proposed interventions are summarized as follows:

**Action 1:** Re-establish the *Transport Studies and Planning Centre* (TSPC).

**Action 2:** Re-establish the *Inter-Ministerial Committee for the Coordination and Planning of Transport (IMCCPT)* for the purpose of coordination of planning activities especially multi modal planning.

**Action 3:** Carry out a *Sri Lanka Transport Sector Study* that would clearly set out the direction for development of the sector along the lines of transport policy and the recommendations made in this report. These studies are required since no integrated studies have been conducted for many years and also since this study has been undertaken with existing data and its recommendations should be tested with the proper and current data. The subcomponents of this study as set out as follows:



***Action 4:*** Implementing recommendation that have been made up to now such as those in the Transport Study for Kandy Metropolitan Region<sup>2</sup> and some of the expressway and road rehabilitation projects including the recommendation for maintenance funding. For CMR, the proposed JICA Transport Masterplan Study which envisages conduct of a household survey could be expanded to cover the demand for existing and proposed new modes of transport for the CMR including road traffic and development of existing modes of public transport.

***Action 5:*** To pick up for implementation, projects that are found to be feasible from the Sri Lanka Transport Sector Study proposed under Action 3.

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<sup>2</sup> Department of Transport & Logistics Management, University of Moratuwa, Kandy Transport Study, 2011

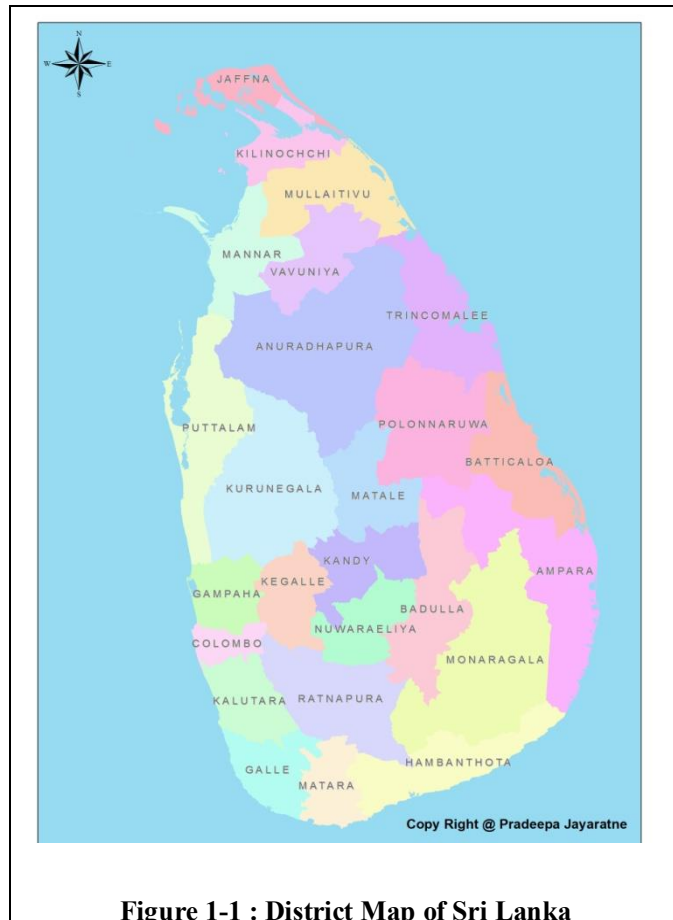


# 1 Introduction

## 1.1 Background and Objective of Program

The objective of this study is to (a) assess the adequacy of the current transport system in Sri Lanka and (b) to identify the most priority interventions required for Sri Lanka to possess a modern and integrated multi modal transport network that would effectively and efficiently support its proposed economic growth of 8% p.a.<sup>34</sup> over the next 20 years.

With cessation of the internal conflict in 2009 and the resurgence of economic growth since then, several transport sector infrastructure developments have got underway such as the expansion of the Port of Colombo, the infrastructure development in Hambantota (Figure 1.1) in the deep south including a new port, airport and road network, the acceleration in highway construction program including several new expressways and the rehabilitation of roads at all levels of the network are



**Figure 1-1 : District Map of Sri Lanka**

expected to provide a catalyst for economic growth. Moreover, the increase in tourist arrivals and the subsequent increase in domestic air operations including the proposed development of domestic airports, shifting of wholesale markets from the Central Business District of Colombo (Pettah) and the study to identify a location for a rail-based ICD are noted as current developments in the transport sector.

However these initiatives have not been the results of an integrated transport network since separate agencies are responsible for different modes of transport. Even though some transport studies have been done from time to time for specific projects, there has been no multi modal transport study since the Colombo Urban Transport Study funded by the World Bank in the late 1990s and a more limited

<sup>3</sup>The Central Bank of Sri Lanka, Annual Report 2011

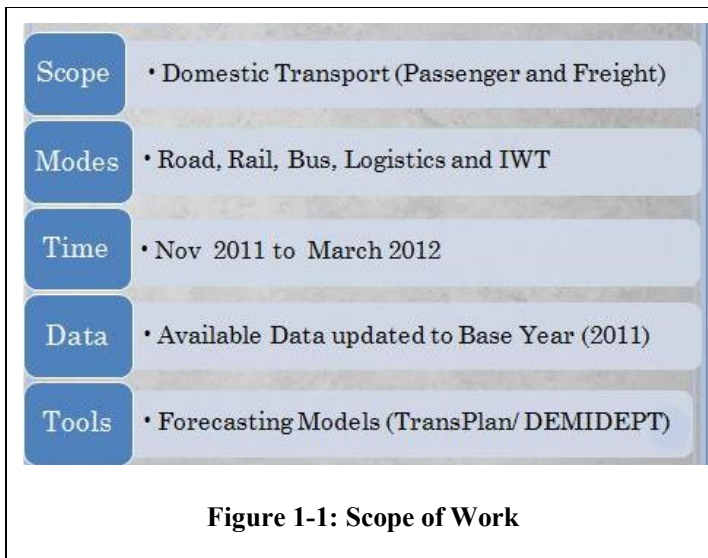
<sup>4</sup> The Central Bank has recently revised the forecast of growth for 2012 to 7.2%.

Colombo Urban Transport Project funded by JICA in 2004. A review of the transport sector was undertaken for the Sri Lanka Infrastructure Assessment Report (SLIA) in 2010. This report which covered all modes of land transport, ports and aviation investigated the historical context of each mode of transport as well as their current performance and plans for the future. The report also analyzed the functions of each sector agency as well as sector structure. It also identified priority projects for implementation.

The absence of a country-wide multi modal freight and passenger transport strategic study is a vacuum this report seeks to fill. The report will identify and assess the primary challenges imposed on the transport sector, the sector gaps that need to be filled and the most appropriate interventions that are required in order to adequately facilitate the expected economic growth rates within the limitations of existing land use and environment.

## 1.2 Scope of Work

This study investigates the road and rail transport (passenger and freight), bus transport, logistics including trucking as well as inland water transport (IWT) including coastal shipping but excluding international transport except for linkages to airports and sea ports.<sup>5</sup> A summary of the scope is presented in Figure 1.2.



## 1.3 Data and Analysis

This study uses available secondary data pertaining to the performance of the transport sector. This includes road traffic volumes from counts of the Road Development Authority and the University of Moratuwa dating from 2004/2005, vehicle population and ownership data from the Central Bank and from Divisional Secretariat (DS) Divisions and socio-economic and demographic data from the

Department of Census and Statistics for 2010. The transport network operational data which includes railway origin-destination data as well as operational attributes such as travel speeds, number of trains and capacities of different links of the network was collected from the Sri Lanka Railways for 2009. Bus transport data for 2011 was obtained from the National Transport Commission and the respective provincial bus transport regulatory agencies. Data on IWT was non-existent in published or even processed form. Hence in this case, primary data was collected from agencies that are responsible for

<sup>5</sup> While international airports and ports will not be analyzed in-depth, they will be considered as key destinations when assessing the multimodal transport system.

maintaining the waterways mainly the Irrigation Department and the Land Reclamation and Development Corporation. Data on airport and sea port operations for 2010 were obtained from the respective agencies. In addition, a number of research and consulting studies undertaken by the Department of Transport & Logistics, University of Moratuwa have been used.

However, it is important to note that the data from the different agencies was available only in different formats. For example, the road traffic origin-destination data are available in zones representing DS Divisions (DSD) whereas the railway data exists in a matrix of railway operational zones. In the case of bus passenger data, there were no origin-destination flows. In all the above cases, the flows were converted to district wise OD flows using suitable distribution techniques. In the case of freight, the road traffic was available in terms of DSD flows while for railway flows only station to station flows were available. They were also converted to the same format as passenger flows.

### 1.4 Study Methodology

The basic methodology adopted in this study is shown in Figure 1-3 below.

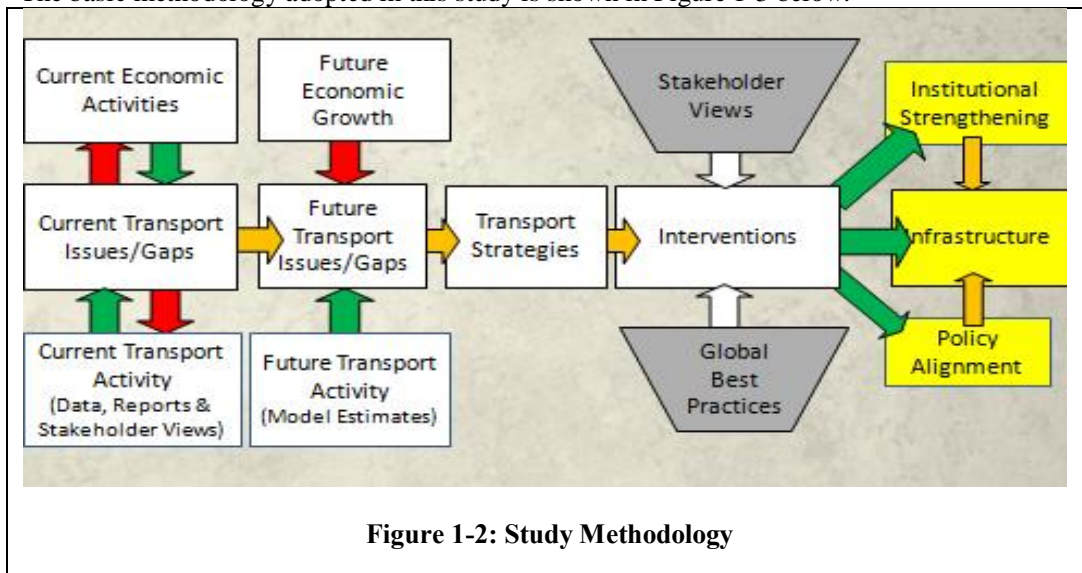


Figure 1-2: Study Methodology

#### 1.4.1 Identification of Current and Future Demand

Current economic activities of the country that derives the demand for transport and the policy framework that determines the transport supply have been summarized in Chapter 2. The chapter also provides insight to the historical development and the current status of the different modes of transport and the current investment in each of them. The study uses the recent most available data for each mode of transport considered herein together with findings of research and study reports of recent times to obtain a best estimate of the respective demand. Growth factors have been used to obtain estimates for the base year 2011. The current transport sector performance including modal shares at national and where possible, at regional, corridor and node level is set out in Chapter 3.

In the case of road traffic growth, including both private passenger and freight vehicles, the TransPlan Model V3<sup>6</sup> which is a Gravity Type model has been used to estimate travel between the 313 DSDs in Sri Lanka by assigning traffic to the national road network made up of 2,460 links and 1,677 nodes. The performance of public transport including the modal share between bus and rail was estimated for the forecast years using the DEMIDEPT demand estimation models developed for Sri Lankan conditions in 1989 and re-calibrated with 2011 data under this study<sup>7</sup>. The forecast transport sector performance including modal shares at national and where possible, at regional, corridor and node level is set out in Chapter 4. There is currently no model to estimate split of freight between road and rail. Nodes have been identified using the origin-destination flows and the maps created by the desire lines that connect such origins and destinations and the existing networks and their features.

Stakeholder views as described in Appendix 1 have been considered in identifying the current issues and gaps where the modes and networks fail to deliver the current economic activity and social aspirations of the country.

#### **1.4.2 Identification of Future Issues and Gaps**

Chapter 5 identifies and summarizes the critical issues that will be faced by the transport sector in responding to the economic development plans of the Government. Particular attention was paid to identify the gaps that would be created between the future estimated demand for transport for two forecast years, the first under a ten year period (2021) and the second under a twenty year period (2031) and the capacity of the supply that will be available or could be provided through existing infrastructure and new transport projects and transport services that are already planned referred to as the Business as Usual (BAU) scenario. The required institutional capacity as well as the policy alignment deemed necessary for these intervention to yield the desired outcomes to fill the sector gaps that have also been identified from the Sri Lanka Infrastructure Assessment report<sup>8</sup>.

The interventions required to deal with the primary issues identified in Chapter 4 have been identified. These are dealt with in Chapters 6 and 7 where the interventions for the two main issues have been dealt with separately.

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<sup>6</sup> Kumarage Amal S, et al, TransPlan Version 3, University of Moratuwa, 2006. The TransPlan Model V3 has been calibrated using island wide origin-destination traffic data from 50 roadside surveys undertaken in 2004/5 by the University of Moratuwa for the Road Development Authority. It estimates the demand for inter-DSD traffic flows which are then assigned to the national road network using a step-wise assignment based on minimum generalized cost including travel time, distance and road toll if any.

<sup>7</sup> Kumarage Amal S and S.C. Wirasinghe, L.L. Ratnayake, DEMIDEPT, Demand Estimation Model for Inter 6 District Public Transport, IDRC Project, University of Calgary/University of Moratuwa, 1989. This model uses a Logit Model based on income, vehicle operating cost, public transport fare, frequency and travel time to determine the vehicle ownership, travel time, fare and frequency data to estimate the modal split between private vehicles and public vehicles as well as between different modes of private vehicles

<sup>8</sup> Amal S. Kumarage, Review of Sri Lanka Transport Sector, World Bank, Colombo, July 2010.

### **1.4.3 Identification of Strategies and Interventions**

Chapter 6 sets out the Alternate Policy and the Alternate Scenario that could be thus created by 2031. There are two strategies that are considered the most appropriate to meet the most significant future issues and gaps noted under the BAU scenario. The detailed interventions under each strategy are discussed in Chapters 7 and 8, which identifies the mode, technology, capacity as well as institutional capacity and reforms requirement that are recommended for these interventions to yield the desired outcomes intended to fill the sector gaps.

## 2 Current Transport Sector Performance

### 2.1 Historical Development

Sri Lanka's early transport networks dating to the 5<sup>th</sup> century BC were confined to the dry zone of the northern, eastern and north central provinces of the country and opened up and closed with the rise and fall of the various kingdoms for many centuries. It was after the arrival of the Dutch in the 17<sup>th</sup> century AD that the first network of inland waterways (IWT) were constructed in the Western Province (WP) connecting the port in Colombo for the export of coconut and spices. It was these waterways that provided the catalyst for the growth of Colombo as a transport hub and led to the WP becoming the most economically dominant province.

The opening of the Suez Canal and the simultaneous introduction of rail transport in the 1860s led to the formation of a multi modal transport node or hub in Colombo. Rubber and tea as export crops were added with the hill country becoming connected to Colombo first by the railway and later by road transport. Colombo became the administrative and commercial capital with the road network and the subsequent long distance bus and trucking routes also being centred on Colombo Fort. Thus Colombo became a uni-polar transport node for the entire

country and had as its central node, the Central Business District in Colombo namely Pettah and Fort, where the Port of Colombo, the IWT network, road and rail networks as well as the truck and bus route networks hubs are located in close proximity to each other. The international airport originally located 10 km south of the city in Ratmalana (Figure 2.1) was in 1964 moved to the Bandaranayake International Airport (BIA) at Katunayake, 32 kms to the north of the city.

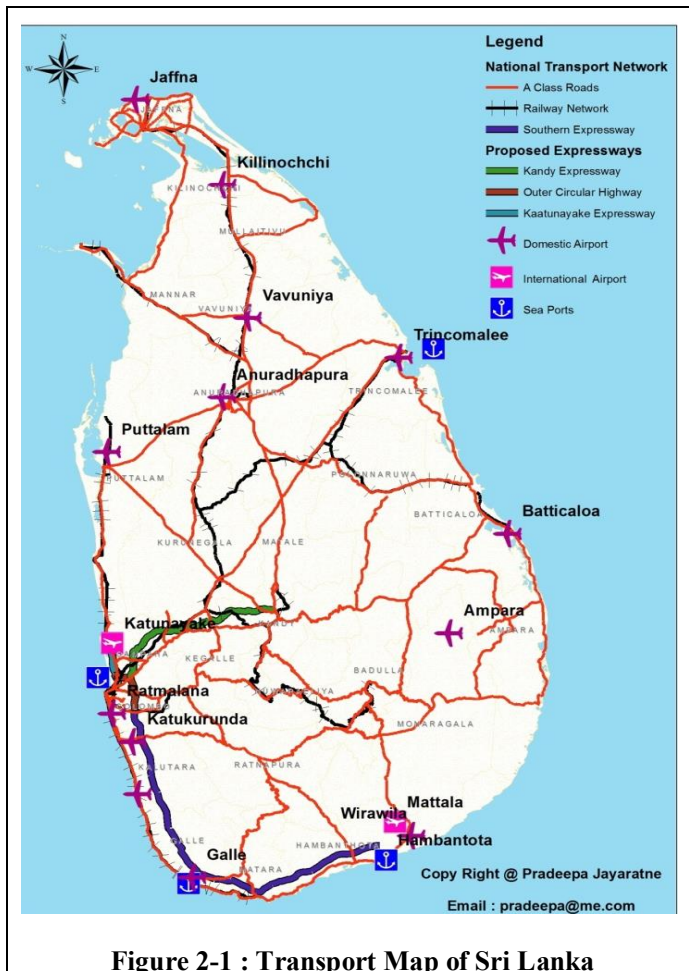


Figure 2-1 : Transport Map of Sri Lanka

### 2.2 Transport Policy Background

The development of the current transport networks in Sri Lanka has evolved under different socioeconomic and political environments. Under the colonial rule it was evident that this was based

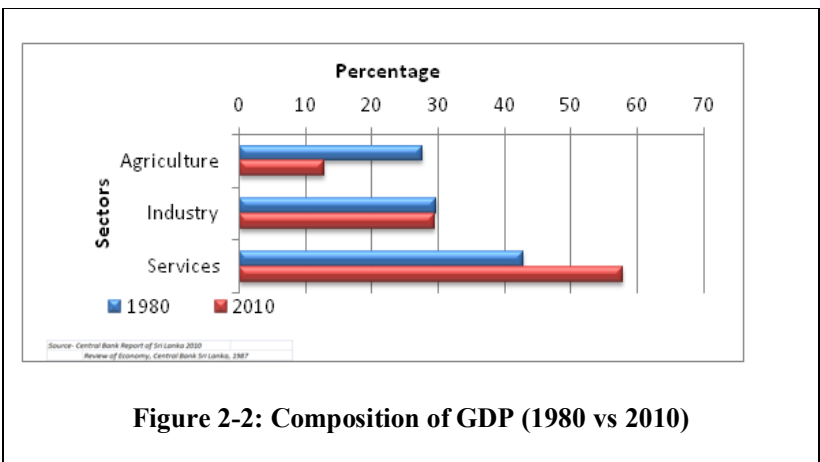
on the economic advantages to be gained from the export of coconut followed by coffee, tea and rubber. With the development of the Port of Colombo the railways followed by trucks and buses developed networks hubbing around the port. Thus all current inland transport networks have a radial pattern with Colombo as the hub. Transport in areas of the country that did not produce export crops was neglected during this era.

In the post-independence era following the year 1948, these areas that were earlier neglected received a high political emphasis as rural roads and rural bus services as social welfare measures became popular requests from elected representatives. The rural road network grew at over 14% per annum from less than 10,000 kms in 1959 to 66,000 kms by 1990 with a majority of villages becoming directly accessible by bus. However during this same period, the trunk roads (or national roads) network that connected the provincial capitals were neglected growing to only 10,400 km from 7,000 km at a mere 1% rate per annum. The need for increased road capacity however did not arise since the economic growth rate during this time when the country followed a closed economic policy was only 3 to 4 percent and the importation of vehicles was heavily taxed and eventually controlled in the 1970s. However this period saw a sharp increase in personal mobility due to a policy of public transport being kept affordable through subsidies from the State.

The liberalization of the economy in 1977 brought a number of changes to the transport sector. In the first instance, motor vehicle importations even though still heavily taxed were allowed and notwithstanding the high taxes, recorded an increase from less than 300,000 units in 1977 to nearly 3 million units in 2011 averaging a long-term growth rate of 8 percent per annum, heralding an era of motorization.

### 2.3 Production and Trade

During this period the economic contribution to the GDP has changed from being dominantly agricultural to the service sector which increased from 43% in 1980 to 59% in 2010 (Figure 2-2). This growth has come from banking, tourism, transport and trade<sup>9</sup>.



In external trade, it is noted that the proportion of exports linked to the three traditional cash crops of tea, rubber and coconut fell from over 90% in the late 1960s to 72% in 1976 and to 20% in 2010. Garments overtook tea as the leading export commodity in 1986 comprising 49% of the

<sup>9</sup> Central Bank of Sri Lanka, Annual Report, 2010



export value. Processed foods make up 6% while, rubber based industrial products as well as export of machinery and equipment make 5% each. Thus the transport sector requirements have changed from providing for agricultural based goods to transport for a more varied economy ranging from agriculture to manufacturing and services.

In 2010, the value of the demand for all goods and services consumed domestically was Rs 6,100 billion with exports valued at Rs 1,215 billion and Rs 1,727<sup>10</sup> billion in import consumption indicating that a substantial amount of wholly domestic trade is also taking place within the country. The changes in the economy and export composition towards a more service oriented economy have had a significant impact on transport requirements that need to be addressed to support sustainable economic growth.

## **2.4 Status of the Current Transport Network**

However, these current economic activities continue to be carried out on the pre liberalization transport network described earlier, which was essentially developed for a Colombo based import-export based transport and distribution network, where agricultural produce was the primary export commodity. The new policies have led to the growth of tourism, establishment of free trade and industrial processing zones, advent to garment manufacture for import, development of banking, import and export services and business processing operations. The basic infrastructure in terms of the road network, railway network, logistics and warehousing systems have remained largely unaltered during this period of nearly 35 years. As a result, these new economic activities in spite of Government incentives to locate in under developed areas; continue to be set up in close proximity to the international transport nodes such as the BIA and Port of Colombo both located in the Western Province (WP). As such there is heavy demand on the transport network in the WP to provide access for all these activities. The resulting congestion on the roads, railways and bus route networks make transport activity within the province ineffective.

This period also saw public transport by both rail and buses deteriorate in quality as keeping fares affordable continued as a key objective and the development of quality was compromised. Hence the growth of personal incomes especially in urban areas saw increasing motorization leading to congestion as road capacity was reached and exceeded in most metropolitan areas. From the 1990s road widening and rehabilitation programs have become priority programs of the Government in order to provide this shortfall in capacity. As shown in Figure 2.1, a set of expressways is under construction to connect Colombo and especially its port and airport to provincial centres.

## **2.5 Post-Conflict Economic Development Programs**

The post conflict development plans of the Government as set out in the Mahinda Chinthanaya<sup>11</sup>, outlines several strategies to develop different parts of the country. Among these the development of

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<sup>10</sup> Central Bank of Sri Lanka, Annual Report 2010, Table 2.4, pg 49

<sup>11</sup> Mahinda Chinthanaya, Policy Program of the Government 2010



Hambantota is the most advanced where an international seaport has been constructed and where the country's second international airport is to be inaugurated in November 2012. The development of several tourism related projects and port related services are also being planned.

Elsewhere, a logistics centre is being planned in Peliyagoda on the northern outskirts of Colombo city. Tourist arrivals have increased and there are several tourism development projects that have been identified such as resorts at Kalpitiya on the northwestern coast and Kalkudah in the east coast. The programs to develop the north and east are in progress even though specific large scale developments other than roads are yet to begin. The construction of the expressways network is proceeding together with accelerated rehabilitation of both national and provincial roads in all parts of the country.

Colombo city and its environs are undergoing a rapid transformation. Lands in the Central Business District occupied by government institutions are being leased to the private sector for hotels and commercial buildings. Most state establishments are being relocated eastwards to the adjacent Kotte-Sri Jayewardenepura Municipal Council area where the Parliament is located and which has been the administrative capital since 1978. The on-going South Port Expansion project in the Port of Colombo is expected to increase capacity from the current 4million TEUs to 12 million by 2020.

## **2.6 Institutional Structures in Transport Sector**

Transport administration in Sri Lanka is a devolved function. The Central Government is assigned responsibility for policy and regulation of inter-provincial road transport as well as for all railways, ports and aviation. There are several institutions set up under different Central Government ministries made responsible for a single mode of transport as shown in Figure 2.3. Each province also has its own ministry of roads and another for transport. More detailed description of these agencies is found in the Sri Lanka Infrastructure Assessment report (2010)<sup>12</sup>.

Other than the state operated bus services that account for less than 20% of passenger trips and the railway that accounts for around 5% of trips, the entire supply of passenger services is by the informal transport sector. There are around 20,000 buses owned by over 15,000 operators. There are also nearly 400,000 three wheeler taxis owned and operated by individuals. Trucking in the country is in the hands of small and medium entrepreneurs, as is the hiring car industry except for a few larger taxi companies in Colombo.

The structure for managing the sector is quite complex. It involves all three levels of government as regulators and the central government as an operator as well. While Central Government is responsible for policy, the instrument of policy implementation is a provincial function. The supply side is dominated by the informal sector with the conditions between the state and private sector operators being uneven in bus transport where the State is also an operator. Integration between agencies remains sporadic and poor. With the closure of the Transport Studies and Planning Centre

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<sup>12</sup>Amal S. Kumarage, Review of Sri Lanka Transport Sector, World Bank, Colombo, July 2010.

set up by the World Bank in the mid 1990s, there has been no agency responsible for collection of data across different modes and agencies or multi modal planning or the research and development of new modes of transport. The Inter-Ministerial Committee for the Coordination of Planning in Transport (IMCCP) also being terminated did not provide any forum for such activities. Much of the

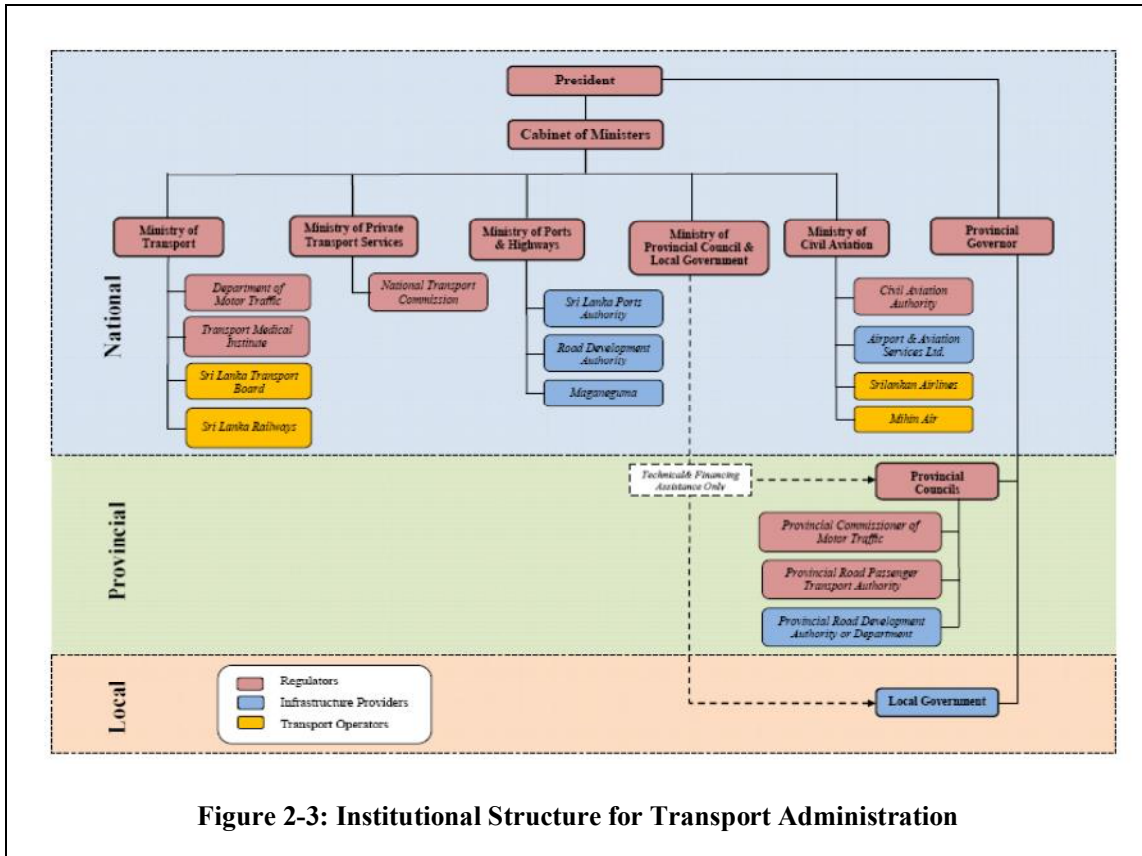


Figure 2-3: Institutional Structure for Transport Administration

state pre-occupation in transport is in the operation of the state bus and railway agencies, as such day to day operations issues often override wider policy and strategic interventions. Moreover, as there are no institutional linkages between the Urban Development Authority responsible for regulation of land use and the different transport agencies, there is no coordination between land use and transport planning.

## 2.8 Investment in Transport

The Public Investment Plan for the period 2010-2015<sup>13</sup> indicates that the transport sector inclusive of aviation and maritime sectors received an investment of Rs 160 billion for 2010 representing around 2.9% of the GDP as Government Capital Investment. The investment in roads has seen an increase from Rs 46 billion in 2006 to Rs 123 billion in 2010 which has been mostly utilized in the rehabilitation of national and provincial roads as well as the expressway construction and rural roads programs. The investment in railways has increased from Rs 13 billion in 2006 to Rs 20 billion for 2010 with further Rs 5-6 billion per year as operating deficits during this period. The increased

<sup>13</sup>Ministry of Finance, National Budget Division, Sri Lanka, 2010

expenditure has been mostly towards rolling stock for urban passenger travel. In the bus sector, the capital infusion by the government has remained at Rs 4 billion per annum with operating deficits for the state bus services ranging at an equal amount. No operating subsidies are offered to private bus transport other than contracted services. Private sector investment in road transport vehicles is an estimated Rs125 billion per year at present. Of this an estimated Rs5 billion is for buses, while goods transport vehicles are estimated at Rs 15 billion. Three wheelers used for para-transit cost Rs 3 billion. There has been no significant investment in the railways by the private sector.

The total investment envisaged in the Public Investment Plan of the government for the six year period is Rs 1.88 trillion with nearly 60% of this expected from foreign sources almost all of which, other than Rs 82 billion for ports is expected as government borrowings. Domestic private investment over 6 years is estimated at around Rs 367 billion (i.e. 19% of total for period) of which Rs 249 billion is for land transport indicating a substantial increase in motor vehicles as no land transport infrastructure projects to be offered to the private sector have been identified as yet. In the analysis of spending by sector it is seen that 51% of the current Government investment is for roads compared with 20% for ports and aviation. The 28% for transport includes mostly the investment in buses and railways for the respective state operators. The plan shows some foreign investment for modernizing mass transit from 2010 onwards the sources of which are yet to be determined.

The government's anticipation of the role of the private sector in developing transport sector infrastructure is not very clear. Even though a general invitation for investment in transport is prevalent in policy documents as well as in considering the Public Investment Plan, there has been no significant investment occurring other than in the South Asia Gateway Terminal in the Port of Colombo a decade ago. However, land transport services are dominated by the informal private sector which again does not have the capacity for planned operations, integration or development of services.

## **2.7 External Costs of the Transport Sector**

Traffic congestion costs in the Western Province alone in 2006 were estimated at Rs 32 billion, while accident costs were estimated at around Rs 20 billion per annum<sup>14</sup>. The cost of avoidable delays, breakdown, waiting time in public transport are estimated to cost another Rs 30 billion to users<sup>15</sup>, while losses in productivity due to issues of poor reliability, flooding, damages of goods in transit and other logistics related costs of the transport network is estimated at another Rs 40 million at least. The combined external losses of road transport alone would thus amount to over Rs 120 billion per annum. This cost translates to 1/6<sup>th</sup> of the total value addition from the land transport sector by both government and private sectors, estimated at Rs 700 billion. This indicates that the current road transport network is inefficient to that proportion.

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<sup>14</sup> Amal S. Kumarage, *Unpublished Report on Transport Statistics, 2008*

<sup>15</sup> Ibid

## 2.8 Reforms in Transport

The transport sector since independence has experienced relatively few successful reform programs. The intense political interest in the sector especially given its employment potential and for visibility of service provision has led to political rational often overtaking economic rational.

The different sub sectors in transport have undergone different degrees of change over the last two decades. The road sector has seen the development of the local road construction industry. The RDA institutional restructuring initiated with assistance from ADB is yet to be fully implemented as is the World Bank assisted road maintenance fund which is intended to ensure that adequate and continuous maintenance funding is provided for existing roads. There are also lacunas between planning and implementation as well as in adoption of design standards and in many internal administrative and operational processes. While new specialist divisions for environment and land have been initiated other areas such as traffic management, road safety and procurement remain under developed. Private sector funding and joint ventures into road construction is yet to begin even though commercial borrowings and in recent years lending from commercial banks has begun.

The railway has continued as a government department even though initiatives were made and even legislation passed for converting it to a more autonomous authority in 2003. While some degree of innovation has been demonstrated in recent times in introducing new services and technologies such as the 1<sup>st</sup> class carriages in 18 long distance trains and IT based passenger information and assistance services, these are yet to be fully institutionalized as regular functions. However, the possible success of these ventures could open the door for acceptance of such joint ventures. The World Bank lead attempt in 2003 to convert the Sri Lanka Railways from a department to an authority did not meet with success. Even though a Railway Management Council was agreed as a compromise, the management of the railway has returned to the status quo since its inception. While institutional structure and employee strength have been key points in previous reform attempts, other areas such as reform on costing of services, commercial orientation including marketing, private sector investment, management and operation of non core activities could be actively pursued in the current context. Improving human resources for modernizing railway operations and instilling commercial orientation are current institutional challenges. Railway also needs to engage in freight transport as an commercial opportunity, which would require a explicit policy intervention.

The development of the bus sector which underwent reform with World Bank assistance in the 1980s has been stunted with several unresolved issues arising from the rapid dismantling of the state monopoly bus operator and the lack of adequate regulatory measures that should have been in place to ensure a suitable environment for operating both state and private operators alongside. The issue of determining suitable ownership and management structures for private operators is an urgent requirement. The recent experiment in setting up 6 route-based management companies by the NTC in 2008/9 is recommended for study as a way forward for all routes. The lack of policy level agreement between different regulatory agencies in the provinces and the central government is also an impediment for improving the quality of bus services. The informal status of the private sector requires structural change with more rigorous regulatory control. Entry to the industry should be controlled and privilege of providing services continuously should be performance based. The

continuing neglect of providing services on low income routes and services such as to rural areas, school services and night services should also be arrested inclusion in the Gami Saeriya, Sisu Saeriya and Nisi Saeriya programs introduced by the NTC in 2005 onwards where negative concessions are offered on competitive bids. Reforms in dispatching and timetabling are also required to ensure that service reliability can be maintained. Demand based route time tables have been implemented successfully on many of the inter-provincial routes. This has prevented popular routes from getting even more over supplied. These should also be introduced to the local routes administered by the provincial authorities.

The trucking and para transit sub sectors continue to date without any regulation causing some degree of problems with over supply in urban areas and in safety and security issues. However in other respects such as pricing there are no major issues. These sectors are dominated by informal service providers and as such converting them to manageable entities by either corporatizing or through more rigorous regulation should be pursued.

In this respect the road sector has been wholly owned and managed by the government. There has been no investment or operational management by the private sector as yet. The maintenance has experienced a cycle of being out sourced and is in some cases back with the road agencies. Road construction has over the last ten years become rapidly vested with domestic contractors indicating a success story. Reforms on road sector maintenance funding, assessment of benefit cost analysis on investment and adherence to plans and policies are currently outstanding issues. In the bus sector, the World Bank initiated privatization of the state bus sector in the early 1990s has resulted in a number of issues that remain unresolved to date. The uneven competition between state and private sector, the poor regulatory capacity, an unrealistic ownership structure for a large industry are the key components that require urgent attention.

## **2.9 Current Sector Policy**

### **National Policy of Land Transport**

The NPLT was formulated by the NTC and the MoT and approved by the Cabinet of Ministers in 2009. It is the only proper policy document since 1992 which set out explicitly, the proposed interventions of Government for ensuring that existing and future mobility needs within the country for passengers and goods transport are satisfied along with safety, cost effectiveness and causing the least impact on the environment and resources. Furthermore, it intends to ensure that all citizens both individual and corporate are provided with adequate levels of access to basic needs such as to places of employment, markets and to public services etc. It also sets out strategies as well as identifies key intervention projects. This is confined to railways, buses and public transport services. It does not include roads, maritime and aviation sectors.

The NPLT assert that the railways will function as a public enterprise empowered to manage the earned revenue within delegated financial authority together with commercial and marketing flexibility and be allowed to create subsidiaries for non-core activities. It also envisages increasing the national modal share of passenger and freight sectors of railway from present 6% to 10% and from 2% to 5% respectively by 2016.

The NPLT recognizes the failure on the part of the initial reforms instituted in the 1980s in the bus sector where private operators were introduced with little or no regulatory framework. As the state operator was not strengthened, the private operators grew in to a very large informal sector very quickly and became a formidable sector with considerable political power. Since then all attempts to improve quality of bus transport have not been sustained in time and across institutions. The private bus industry has been mostly in the hands of single bus operators. The policy aims at consolidating the 15,000 individual owners in to a few corporate management entities made up of existing operators. It also envisages the restructuring of regulatory agencies that would be financially and administratively independent. It also notes that some interventions are required in regulating other passenger services and to facilitate the improvement of efficiency in the freight transport and logistic sectors.

### **National Road Master Plan (2007-2016)**

The only comprehensive strategic plan that is currently available for the road sector is the National Road Master Plan (NRMP) for 2007-2016 which considered a list of investment programs under six complementary components, including (i) construction of expressways and highways, (ii) widening of highways to three different standards, (iii) reduction of traffic congestion, (iv) road maintenance and rehabilitation, (v) bridge rehabilitation and reconstruction, and (vi) land acquisition and resettlement and all measures to protect social and environmental values. It also describes the financing strategy for roads as follows, "the financing strategy for the NRMP rests on four pillars, including a) long-term loans from international financing institutes, b) allocations from the capital budget for investments, c) the RMTF initially for routine maintenance operations and d) private sector financing for commercially attractive highway projects."<sup>16</sup>

### **Development Plan of Sri Lanka Railways (2009)**

The Development Plan<sup>17</sup> of the Sri Lanka Railways (DPSLR) also expects to increase the national modal share of passenger and freight sectors of railway from present 6% to 10% and from 2% to 5% respectively by 2016. The strategies to be adopted to achieve this includes operational improvements, passenger tariff rationalization, and deregulation of freight tariff, enhancement of non-fare revenues, new extensions and new connections -that are viable, replacement, upgrading and modernization of railway assets. It does not envisage the change of the current department structure to a more commercial agency.

### **The Public Investment Plan**

The Public Investment Plan for the period 2010-2015<sup>18</sup> indicates that the transport sector inclusive of aviation and maritime sectors will receive SLR 263 bn in 2011 as Government investment and SLR

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<sup>16</sup> Road Development Authority, National Roads Masterplan 2007-2016, 2007

<sup>17</sup> Railway Development Plan, Sri Lanka Railways, 2009

<sup>18</sup> Ministry of Finance, National Budget Division, 2010

119 bn from private sources, for land transport, ports and airport, making the total investment 3.6% of GDP. The total investment from all sources for the six year period is SLR 1.88 trillion with nearly 60% of this expected from foreign sources – almost all of which, other than Rs 82 billion for ports is expected as government borrowings. Domestic private investment is estimated at around Rs 367 bn (i.e. 19% of total for period) of which Rs 249 bn is for land transport indicating a substantial increase in road vehicles as no land transport infrastructure projects for the private sector have been identified as yet. The distribution of the proposed investments to the transport sector is shown in Figure A4.1. It shows that 93% of foreign borrowings are by government and a further 57% of domestic investments are also made by government.

### 3 Estimation of Transport Demand

As shown in Figure 3-1, the long-term growth in passenger travel in Sri Lanka has kept pace with per capita incomes. This represents an average per capita mobility of over 5,000 passenger km per annum and a vehicle use of 1,300 km per annum. According to international norms, this is double the personal mobility observed for other countries having a per capita income of USD 2300<sup>19</sup>. This high level of mobility has been observed for several decades starting with the rapid expansion of island wide bus services by the nationalized Ceylon Transport Board (CTB) in the 1960s. Overall the growth rate for personal mobility has been 6% per annum and in the case of freight transport around 3.5% per annum.

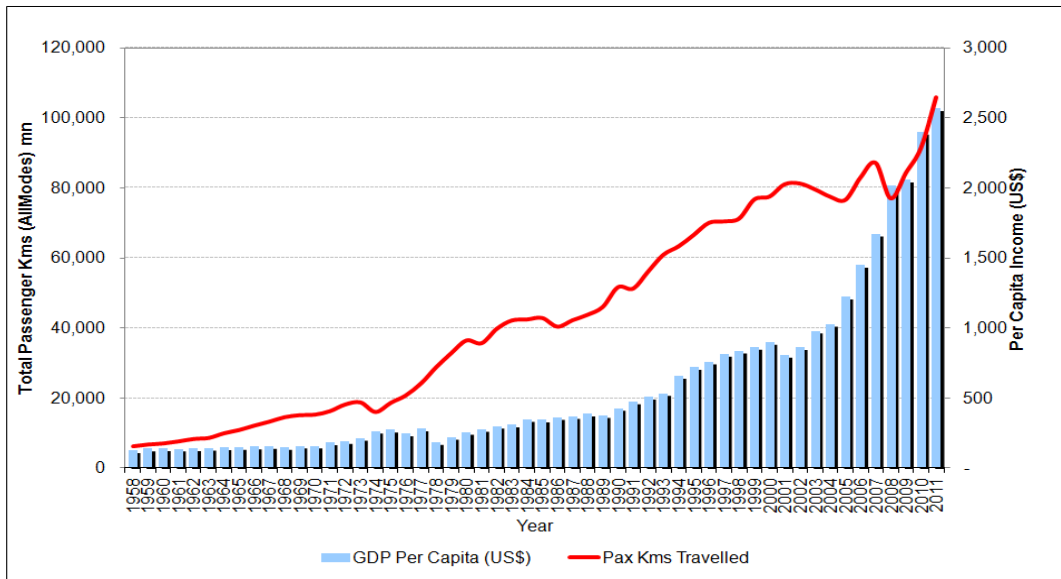


Figure 3-1: Growth of Passenger Traffic 1958-2011

#### 3.1 Current Demand for Passenger Mobility

The Base Year (2011) total transport activity estimated using the TransPlan and DEMIDEPT Demand Estimation models for the different modes is reported in Figure 3.2.

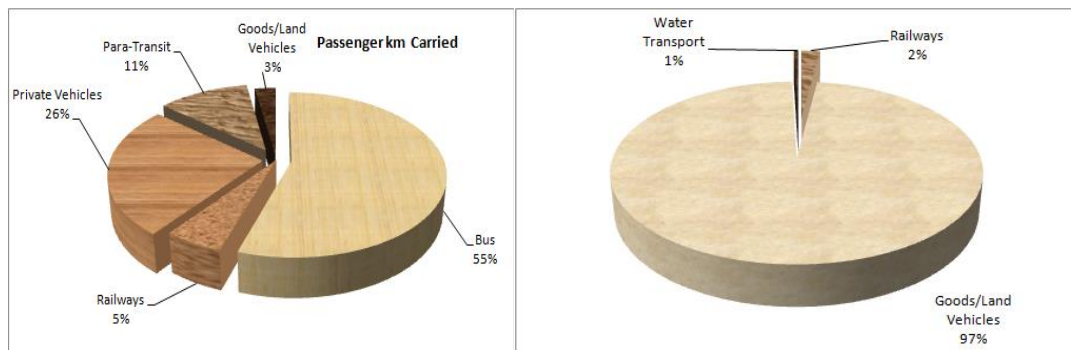
<sup>19</sup>Shaefer, Andreas, *Long-Term Trends in Global Passenger Mobility*, UK, 2008



**Figure 3-2: Transport Activity and Modal shares: Sri Lanka (2011)**

	Vehicle km (mn.)	%	Passenger km (mn.)	%	Ton km (mn.)	%
Buses	1,379	5	55,177	55		0
Railways	9	0	5,365	5	134.8	2
Private Vehicles	16,605	60	25,759	26		0
Para-Transit	4,841	18	11,348	11		0
Goods/Land Vehicles <sup>20</sup>	4,819	17	2,585	3	6436	97
Water Transport	3	0	0	0	32	1
<b>Total</b>	<b>27,657</b>	<b>100</b>	<b>100,236</b>	<b>100</b>	<b>6,603</b>	<b>100</b>

At present there is an estimated annual demand in Sri Lanka for around 100 billion passenger km to be carried by the different modes of motorized transport that provide a supply of an estimated 27.7 billion vehicle km through a fleet of 2.7 million road vehicles and around 150 power sets and railway engines. In this endeavour, road transport accounts for 95 percent of passenger travel volume and 97.5percent of goods transport in the country.



**Figure 3-3: Transport Modal Shares (2011)**

### 3.2 Current Modal Shares

The passenger modal share has been changing rapidly over the years. Since the end of the railway era (after the 2<sup>nd</sup> World War), buses have been the leading provider of passenger transport as shown in Figure 3.4. Private transport share was less than the railways till around 1974 and has since then been increasing rapidly, even though ridership in buses has also been increasing.

<sup>20</sup> Passengers in goods transport vehicles constitute a significant proportion in rural areas.

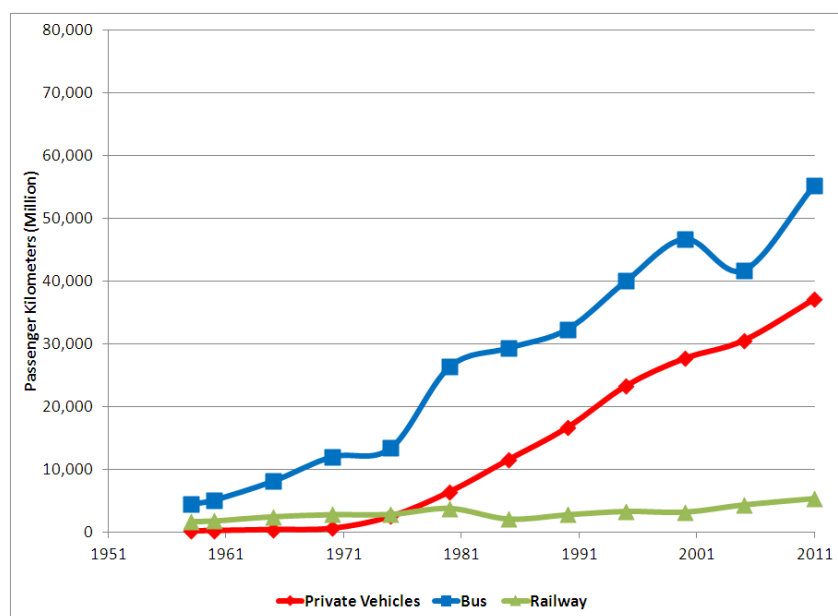


Figure 3-4: Passenger kms by Mode 1958-2007

### 3.3 Motor Vehicles

By end of 2010, there were an estimated 2.7 million vehicles operating in Sri Lanka, even though total vehicles on register show nearly 3.5 million units. Table 3.1 shows the operational fleet by vehicle type and by province. It can be seen that over 2/3<sup>rd</sup> of the motor vehicle fleet is made up of two and three wheelers. Buses used for public transport and for other transport make up around 42,000 (1.5%) of which around 25,000 are used for public transport. Goods vehicles including land vehicles make up around 280,000 (10%) vehicles. Cars and Dual Purpose Vehicles (mostly vans) make up fewer than 500,000 (18%) units. From a geographic distribution it can be observed that around 40% of the vehicles are operating in WP.

Table 3-1: Operational Motor Vehicle Fleet by Province and Category (2010)

MOTOR VEHICLES BY PROVINCES										
Vehicle Category	Western	Southern	Sabara-gamuwa	North-Western	Central	Uva	North Central	Eastern	Northern	All Island
Buses	19,006	4,337	3,004	4,415	5,589	1,550	1,299	1,295	1,019	41,514
Dual Purpose Vehicles	105,831	15,502	9,306	21,418	24,683	5,524	6,974	4,291	1,380	194,909
Private Cars	200,986	17,924	9,738	19,572	28,987	4,842	5,247	3,056	1,630	291,982
Land Vehicles	88,570	19,255	12,804	28,301	22,817	8,231	11,009	8,171	1,929	201,087
Goods Transport Vehicles	15,404	15,836	2,915	12,124	4,607	5,754	7,994	16,019	4,653	85,306
Motor Cycles	464,435	182,996	70,873	218,461	82,297	46,667	115,579	131,577	47,330	1,360,215
Threewheelers	179,124	63,203	53,233	46,728	56,912	24,114	25,637	26,886	4,235	480,072
Others	1,743	341	79	390	425	100	151	965	568	4,762
<b>Total</b>	<b>1,075,099</b>	<b>319,394</b>	<b>161,952</b>	<b>351,409</b>	<b>226,317</b>	<b>96,782</b>	<b>173,890</b>	<b>192,260</b>	<b>62,744</b>	<b>2,659,847</b>

Vehicle ownership is usually measured in terms of number of vehicles per 1000 persons. This can be calculated for the entire fleet or for part of the fleet and for different geographic areas or for the country as a whole. Table 3.2 shows that the total Vehicle Ownership Rate (VOR) for Sri Lanka is currently 129 vehicles per 1000 persons. The rate for all types of private and hiring passenger vehicles excluding buses and goods transport vehicles adds up to a VOR of 113 vehicles per 1000 persons. In terms of entirely private passenger vehicles (motor cycles, cars and dual purpose vehicles ) this works

out to around 89 vehicles per 1000 persons while for four wheel private passenger vehicles (i.e. when motor cycles are excluded) the VOR is only 23 vehicles per 1000 persons.

**Table 3-2: Vehicle Ownership Rate by Province and Category (2010)**

Vehicle Type	VOR per 1000 persons	Province	VOR per 1000 persons
Buses	2	Western	182
Dual Purpose Vehicles	9	Southern	128
Private Cars	14	Sabaragamuwa	83
Land Vehicles	10	North Western	150
Goods Transport Vehicles	4	Central	84
Motor Cycles	66	Uva	73
Threewheelers	23	North Central	140
Others	0	Eastern	123
		Northern	53
<b>Total</b>	<b>129</b>	<b>Sri Lanka</b>	<b>129</b>

The VOR also varies between provinces. While the WP leads this as expected, it is surprising that North Western, North Central provinces are very close behind. The fact that Southern and even the Eastern Province considered a lagging region have relatively high VOR is an interesting phenomenon. This reflects that while four-wheel vehicle ownership follows economic growth rates, the two and three wheeler vehicle ownership follows general mobility patterns and possibly a reflection of deteriorating public transport and lower penetration of public transport in relatively low population density areas. The hypothesis could then be expressed that the motor cycle and three-wheeler have become a replacement for the public transport system which has been unable to provide a service in keeping with the current socio-economic requirements.

As such, motor cycles and three wheelers which are imported at very comparatively low duty rates have become the actual competition to public transport at between 50-60%<sup>21</sup>. At the higher end, cars have been taxed at rates<sup>22</sup> ranging from around 120-189% for petrol vehicles and 180-290% for diesel vehicles with the tax rate increasing with engine capacity. Consequently the VOR of four wheel passenger vehicles currently remains much lower than those of two and three wheeler vehicles. This has led to a high growth rate of two and three wheelers as well as dual purpose vehicles which are taxed at rates a little lower than cars.

### 3.4 Motorization

Figure 3.5 shows the growth of total vehicle ownership over the period 1998 to date. The average annual growth rate of motor vehicle ownership for the last 10 years has been around 10 percent. The growth rate of VOR was observed to be around 6 to 8 percent prior to 2000, indicating that

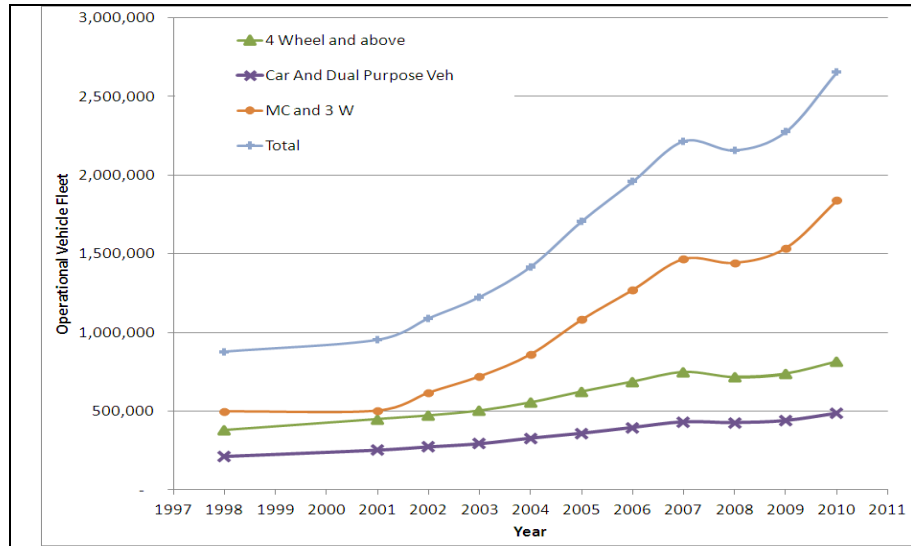
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<sup>21</sup> As of 1<sup>st</sup> April 2012 the tax rate for motor cycles and three wheelers has been increased to 100%

<sup>22</sup> As of 1<sup>st</sup> April 2012, the tax rates for petrol cars have been increased to 200-290%, while for diesel vehicles it increases to 250-350%.

notwithstanding the high tax rates, as income levels increase, the rate of increase in VOR has also increased.

As a whole, the AAGR for all types of vehicles is increasing faster in the other provinces when compared to the WP. Table 3.3 shows that during the last 5 years, private cars have reached the same growth rate as for motor cycles. As such there is confirmation that the AAGR for four



**Figure 3-5: Growth of Operational Vehicle Fleet (1997-2010)**

wheel vehicles is increasing while that for smaller vehicles will remain constant for a while longer before reducing. This means that currently there are as many people moving from motor cycles to four wheeled vehicles as there would be people moving from public transport to two and three wheelers.

Figure 3.6 shows the per capita Vehicle Ownership Rate in 2010 for (a) all vehicles and (b) four wheeled vehicles illustrated for each district. It can be seen that in both distributions while Colombo City accounts for a very high VOR, the rate decreases away from Colombo with the economically backwards districts having the lowest vehicle ownership rates.

**Table 3-3 : Average Annual Growth Rate of Vehicles by Province & Category**

Vehicle Type	AAGR %	Province	AAGR%
Buses	2.7	Western	7.9
Dual Purpose Vehicles	4.7	Southern	12.5
Private Cars	8.2	Sabaragamuwa	15.1
Land Vehicles	3.3	North Western	11.9
Goods Transport Vehicles	8.1	Central	12.5
Motor Cycles	8.5	Uva	14.7
Threewheelers	13.3	North Central	16.4
Others		Eastern	19.3
		Northern	16.4
<b>Total</b>	<b>10.8</b>	<b>Sri Lanka</b>	<b>10.8</b>

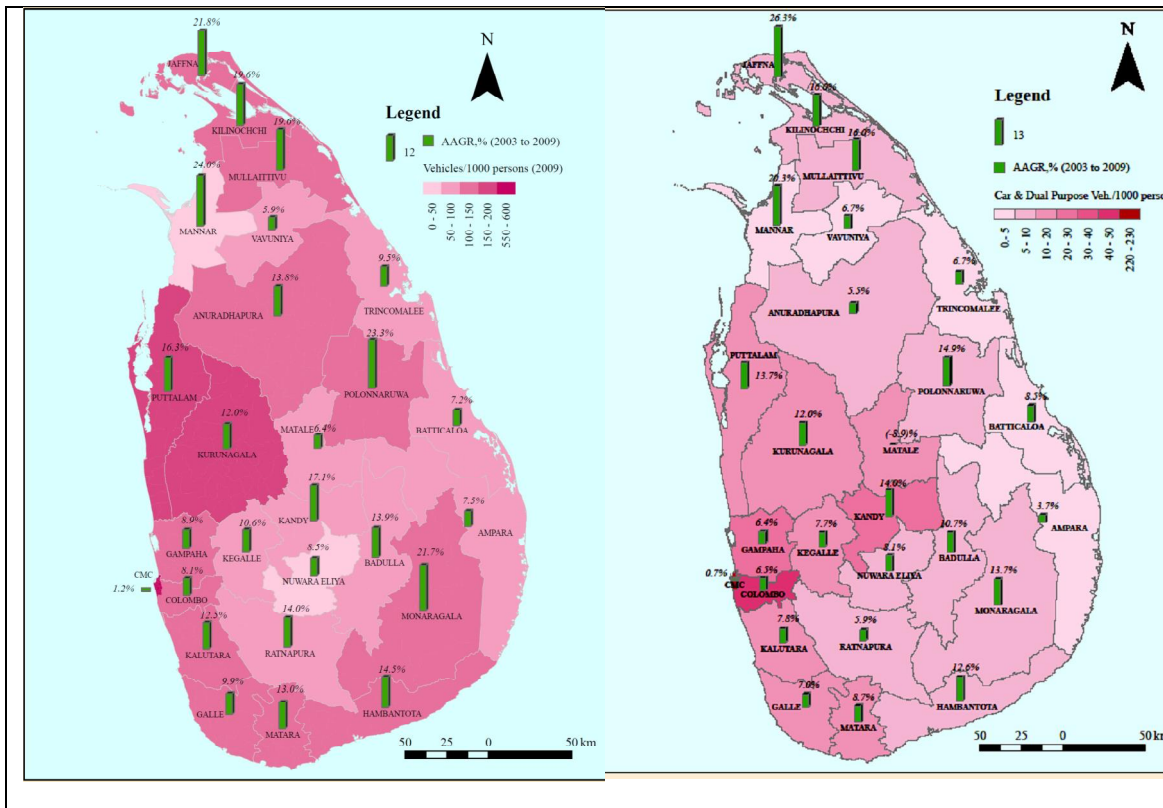


Figure 3-6: Vehicle Ownership Rate and Growth (a) all vehicles (b) all 4 wheeled vehicles -2010

It should be noted that the VOR for all vehicles in Colombo City has reached what may be considered a near saturation of 560 vehicles per 1000 persons as its AAGR has been only 1.2% p.a. Central and Southern Provinces have relatively lower provincial AAGRs indicating that as the VORs increase the growth rates tend to decrease as saturation is complete. As per capita incomes are expected to increase most families would be able to afford a private vehicle. This situation has recently been further facilitated with the Government announcing the reduction of duties by half on passenger cars and utility vehicles. It is possible that Sri Lanka will observe a gradual slowdown in registration of two and three wheelers with more four wheeled vehicles being imported due to income increases, availability of low cost cars and the reduction of import duties. The deterioration of public transport will hasten this process.

### 3.4.1 Comparison with Global Motorization

As of end of 2010 there were an estimated one billion motor vehicles in use in the world<sup>23</sup>. Global vehicle ownership per capita in 2010 was 148 vehicles in operation per 1000 people<sup>24</sup>. The United States has the largest fleet of motor vehicles in the world, with 240 million cars. Vehicle ownership per capita in the U.S. is also the highest in the world with 769 vehicles in operation per 1000

<sup>23</sup>Sperling, Daniel and Deborah Gordon (2009). *Two billion cars: driving toward sustainability*. Oxford University Press, New York. pp. 4 and 13. ISBN 978-0-19-537664-7.

<sup>24</sup>John Sousanis (2011), "World Vehicle Population Tops 1 Billion Units". *Ward Auto World*, Retrieved 2012-02-19.

people. In Asia vehicle ownership needs to be defined as several countries have high percentage of motorcycles and three wheelers. China for example has the second largest fleet of cars in the world, with around 78 million vehicles and a car ownership rate of around 58 per 1000 persons while India has a fleet of around 20 million cars returning a car ownership rate of around 20 per 1000 persons. However India has a much larger motor cycle fleet matching China in terms of all motorized vehicles.

Increase in vehicle ownership and motorization with economic prosperity is an internationally observed phenomenon. The relationship between per capita income and vehicle ownership rates are well documented<sup>25</sup>. Figure 3.7 shows one such work where PPP adjusted per capita incomes and VOR of selected countries USA, Japan, Spain, South Korea, China, Brazil, Mexico and India have been plotted. The figure has also plotted the forecasts that have been made for specific economic growth scenarios currently experienced by the respective countries.

Sri Lanka as in the case of India is in typical situation where the car ownership is relatively less, while vehicle ownership which includes motor cycles is much higher. In 1995 PPP adjusted values; Sri Lanka's per capita income is currently around 3,700 USD. As such, car ownership defined as four wheel passenger cars is 23 per 1000 which is the situation where Brazil was in 1960. However when motor cycles and three wheelers are added it increase to 112 per 1000 persons which is similar to where Brazil was in 2002. As cars are highly taxed in Sri Lanka, three wheelers are surrogates for private cars and taxis. A compromise car ownership may be considered at around 46 cars per 1000 persons when cars, vans and three wheelers are included in the definition.

Sri Lanka's current VOR at 46 cars per 1000 persons is still higher than any of the countries at that income level. As per international trends the car ownership in Sri Lanka could be estimated to reach around 300 per 1000 persons when per capita incomes reach USD 10,000.

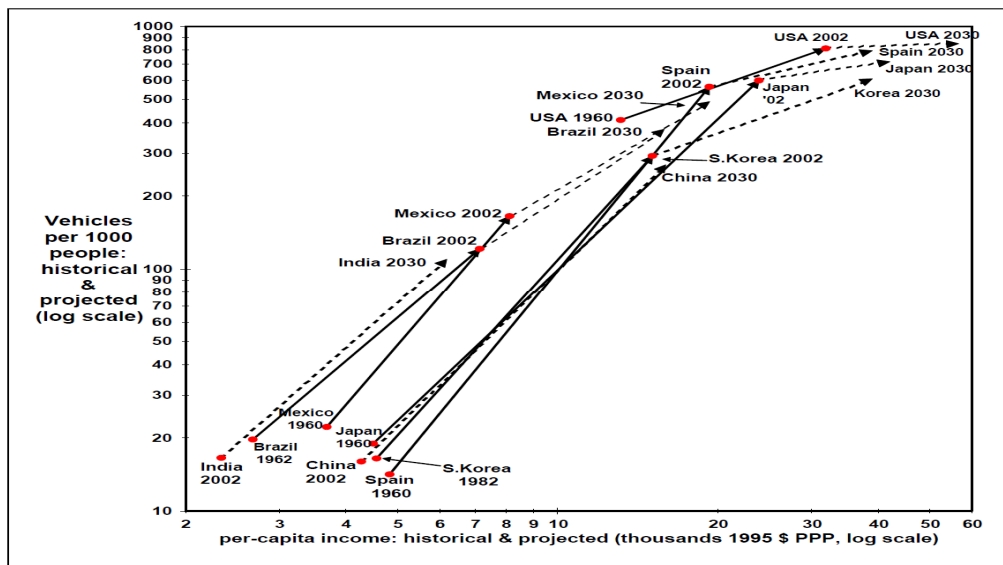


Figure 3-7: Vehicle Growth Rate with Per Capita Income

<sup>25</sup>Dargay, Gately and Sommer, Vehicle Ownership and Income Growth World Wide 2002-2030, January 2007

## 4 Estimation of Future Transport Demand

This chapter will develop a scenario for estimating the transport demand and the issues and gaps that would be created under existing policy and practice. In this respect a -Business as Usualø (BAU) scenario will be developed for the performance of the transport sector for the governmentø economic development plan and the demographic and urban development plans.

### 4.1 Economic Development

According to the Annual report of the Central Bank of Sri Lanka (2010), the GDP is expected to grow by 8.0 per cent in the next few years. All three economic sectors are expected to contribute towards this higher growth. The massive infrastructure development drive, as well as wooing of investor confidence by developing a prevailing conducive macroeconomic environment is expected to contribute positively to the growth in the Industry and Services sectors.

The agricultural sector which accounts for 32 percent of the employed population is expected to expand moderately. The industrial or manufacturing sector on the other hand employs 24 percent and includes construction which is expected to grow faster. Factory based industrial outputs such as food, beverages and tobacco products as well as the textile, wearing apparel and leather products sub-sectors, being the second highest contributors to factory industry, will also grow fast.

As strategic intervention, the Mahinda Chinthanaya 2010<sup>26</sup> sets out to transform Sri Lanka into a dynamic global hub while developing it to become a maritime, aviation, commercial, energy and commercial hub. The container traffic in the Port of Colombo is expected to grow at between 6 to 7 percent per annum for the next 20 years, to reach 15 million TEUs by 2031. Investments in the ports and airports are intended to transform the economy towards the respective maritime and aviation hubs.

The arrivals and departures at the international airport, BIA are expected to increase from the current 6 million passengers to an estimate between 15 million and 21 million by 2025. Currently around 24% or 800,000 arrivals are expected to be tourists who would spend an estimated 6.4 million nights in the country making up around 1% of the internal passenger flows. The government plans to target 2.5 million tourists by 2016 which should translate to around 60% arrivals being tourists by that year.

The commercial hub is aligned to recent trends of developments in banking and allied services. The increase in services including education, BPO services and tourism are also flagged as economic drivers. In this respect the Services sector is projected to grow at a rate higher than 8%. This is expected to be led by the demand for service activities such as trade, transport, tourism, financial services, port services and communication, especially resulting from the context of rapid infrastructure development in the aftermath of the ending of the internal conflict in the country.

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<sup>26</sup>Mahinda Chinthanaya, Policy Program of the Government 2010



Growth in wholesale and retail trade sector is also expected to be higher in all three sub-sectors namely import trade, export trade and domestic trade. The import trade sub-sector is led by the import of investment goods, consumer goods and intermediate goods while the export trade is to benefit mainly from the expansion in industrial exports, led by textiles and garments. The domestic trade sub-sector, defined as the trading of goods that are domestically produced and traded is expected to grow by around 8% stimulated by the rapid expansion of trading activities in to the north and east.

Another development strategy of the Government is in developing the lagging regions, particularly the North and East. The development of Hambantota port and airport has also led to several other investments aimed at creating tourism and port related economic activities. However, as for the north and east, there is still no clear direction on the intended economic drivers. The traditional agricultural economies have revived in these areas. Tourism development has been planned and manufacturing is intended to follow. The rapid development of the highways is intended to be a catalyst to stimulate regional growth. New locations have been proposed for the construction of industrial estates in Vavuniya, Batticaloa and Kurunegala districts.

#### 4.1.1 Increase in Income and Personal Mobility

Per capita income in Sri Lanka was USD 2,399 in 2010. With the anticipated 8 percent growth in GDP, per capita income is expected to quadruple in 20 years. This means that in Sri Lanka, per capita income would reach USD 10,000 by 2031. According to international norms, the current level of personal mobility in Sri Lanka ranges from 2 to 3 times the personal mobility observed for other countries having a per capita income of USD 2400<sup>27</sup> in current prices when adjusted for 1996 PPP adjusted dollars as shown in Figure 4.1. This high level of mobility has been observed for several decades starting

with the rapid expansion of island wide bus services in the 1960s where personal mobility rates increased by 7 to 8 percent per annum even though there was no corresponding increase in per capita incomes.

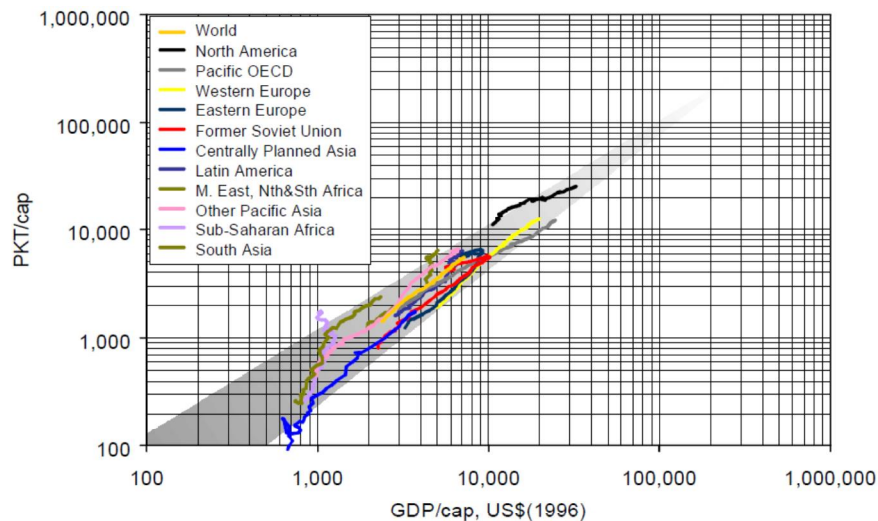


Figure 4-1: Global Mobility Growth with Income

<sup>27</sup>Shaefer, Andreas, *Long-Term Trends in Global Passenger Mobility*, UK, 2008



Based on comparison of historical personal mobility figures in Sri Lanka with international experiences of different countries, the demand for personal mobility in Sri Lanka can be expected to increase to around 16,000 passenger km travelled (PKT) per capita per year by 2031.

## 4.2 Population Growth and Urban Development

Sri Lanka's population is currently estimated at 20.8 million while its urbanization has remained modest, with current urban population estimated at 21.5% or just over 4 million people. The population growth rate is currently 1.1% and in 2030 the population is expected to reach 25 million<sup>28</sup>. Currently the Western Regional Metro also known as the Colombo Metropolitan Region (CMR) which includes the districts of Colombo, Gampaha and Kalutara comprises of over 3 million people, while all other urban areas have population of less than 100,000 with the Kandy Metropolitan Region having a population of around 600,000.

The necessity to create new cities, urban nodes and metropolitan areas has been identified by the Department of National Physical Planning<sup>29</sup> as shown in Table 4.1. This shows that approximately 50% of the population in 2030 will reside within urban areas and around 10 million within the 8 new metro areas that have been identified. The transport network will play a crucial role facilitating the development of metro cities and regions.

However some studies project the population to peak at around 22 or 23 million by 2051, with the 2031 population ranging between 21 and 22 million<sup>30</sup> in which case the need for new urban centres may not be as acute. If this were the case it seems unlikely that the totally new urban areas such as in Hambantota, Dambulla and Polonnaruwa would materialize at least to the same extent.

## 4.3 Estimates of Transport Demand for 2021 and 2031

In order to assess the future impact of the increasing vehicle ownership and use in Sri Lanka, this report investigates a Scenario of 'Business-as-Usual' (BAU) assuming the following characteristics:

- That tax structures on motor vehicle imports would remain constant<sup>31</sup>.

**Table 4-1: Projected Urban Population (2030)**

Urban Area	Target Population
<b>Metro Cities</b>	
Colombo	2,000,000
Gampaha (sub)	750,000
Kalutara (sub)	750,000
Anuradhapura	1,500,000
Dambulla	1,000,000
Polonnaruwa	500,000
Trincomalee	1,000,000
Amparai	500,000
Batticaloa	500,000
Hambantota	1,000,000
Jaffna	1,000,000
<b>District Capitals</b>	1,750,000
<b>Special Purpose Cities</b>	600,000
<b>Total Urban</b>	<b>12,850,000</b>
<b>Total Population</b>	<b>25,000,000</b>

<sup>28</sup> Other estimates give 23 million as the maximum population.

<sup>29</sup> NPPD, Project Proposals 2030, National Physical Planning Department, Sri Lanka, 2011

<sup>30</sup> De Silva, Indralal, A population projection for Sri Lanka, Institute of Health Policy, June 2007

<sup>31</sup> This is based on the tax rates prevailing up to 31<sup>st</sup> March 2012. Rates were increased thereafter.

- There would be no specific restraints of vehicle ownership such as permits and quotas.
- There would be no additional road pricing mechanisms by which vehicle use would be made restrictively expensive.
- The quality of public transport when compared to private vehicles would remain at level substantially lower than private transport as has been the experience in the last 10 years.
- All expressway projects that have been approved up to now would be completed as planned
- Road widening, rehabilitation and maintenance would continue at a rate similar to what has been experienced in the last 10 years.
- New road construction would only be possible at a rate as experienced in the last 10 years.
- Apart from the already approved projects such as Hambantota Development, there would be no specific land use developments that would be localized. The model will assume that all demographic, land use and economic activities will continue as has been happening for the last 10 years.

#### 4.4 Future Modal Shares

The DEMIDEPT Demand Model has been used to estimate the total mobility, total private vehicle fleet, private, vehicle use, public transport share and split between bus and rail for the two forecast years 2021 and 2031. Table 4.2 gives the summary of the model outputs showing the estimated vehicle fleet, VOR, vehicle use, modal splits for 2021 and 2031. Accordingly, the motor vehicle fleet is estimated to increase from 2.7 million units in 2011 to 4.8 million in 2021 and 7.8 million by 2031.

**Table 4-2: Forecast of Vehicles, Kms Operated, Passengers Carried & Modal Share (2011-31)**

Year	10 Year Fleet Growth Rate	Operational Vehicle Fleet	Vehicle Ownership per 1000 persons	Vehicle kms Operated	Passenger Kms Carried	Modal Share			
						Bus	Rail	Private	Other
2011	7.5% p.a.	2.7 mn	130	27 bn	100 bn	55	5	26	14
2021	6.0% p.a.	4.8 mn	250	55 bn	150bn	41	5	38	16
2031	5.0% p.a.	7.8 mn	370	111 bn	226 bn	20	4	57	19

The VOR for all vehicles in Sri Lanka for 2031 when per capita income is expected to reach USD 10,000 is estimated by the DEMIDEPT demand estimation model to reach 370 vehicles per 1000 persons. This is consistent with the international observations discussed earlier, if we consider that the two wheeler fleet will remain the same between 2011 and 2031. Under the BAU scenario the personal mobility is estimated to increase from 100 billion passenger kms in 2011 to 226 billion passenger kms by 2031. Table 4.3 gives the detailed vehicle kms and passenger kms estimated to be carried by each vehicle type for 2011, 2021 and 2031.

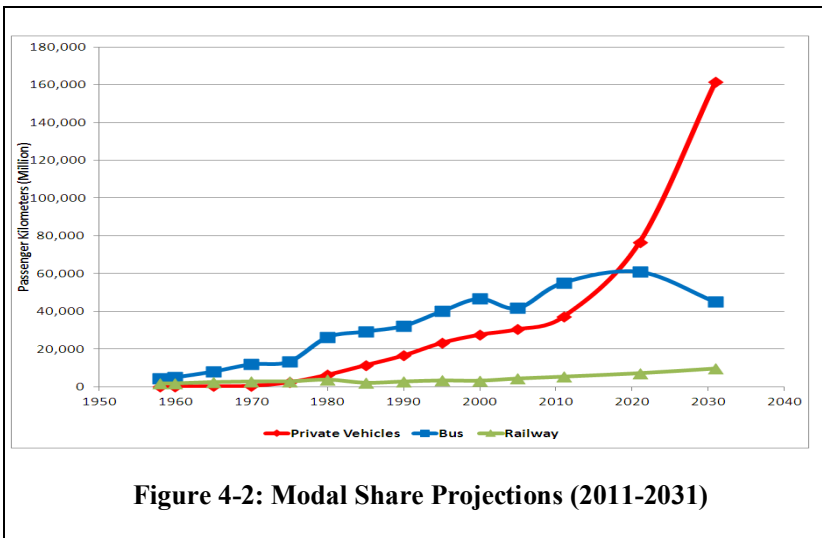
**Table 4-3: Road Traffic Growth 2011-2031**

<i>2011</i>				<i>2.7 mn Vehicles</i>	
<b>Mode</b>	<b>Vehicle km Operated (mn)</b>		<b>Passenger km Carried (mn)</b>		<b>Freight Ton km Carried (mn)</b>
<b>Bus</b>	1,379	5%	55,177	55%	
<b>Railways</b>	9	0%	5,365	5%	134.8
<b>Private Vehicles</b>	16,605	60%	25,759	26%	
<b>Para-Transit</b>	4,841	18%	11,348	11%	
<b>Goods/Land Vehicles<sup>32</sup></b>	4,819	17%	2,585	3%	6436
<b>Water Transport</b>	3	0%		0%	32
<b>Total</b>	27,657	100%	100,236	100%	6603
<i>2021</i>				<i>4.8 mn Vehicles</i>	
<b>Bus</b>	1,524	3%	60,950	41%	
<b>Railways</b>	13	0%	7,211	5%	291
<b>Private Vehicles</b>	36,245	66%	57,065	38%	
<b>Para-Transit</b>	7,328	13%	19,381	13%	
<b>Goods/Land Vehicles</b>	9,474	17%	4,973	3%	11,526
<b>Water Transport</b>	3	0%		0%	32
<b>Total</b>	54,586	100%	149,579	100%	11,849
<i>2031</i>				<i>7.8 mn Vehicles</i>	
<b>Bus</b>	1,124	1%	44,946	20%	
<b>Railways</b>	17	0%	9,690	4%	628
<b>Private Vehicles</b>	80,253	72%	128,136	57%	
<b>Para-Transit</b>	11,136	10%	33,315	15%	
<b>Goods/Land Vehicles</b>	18,628	17%	9,632	4%	18,774
<b>Water Transport</b>	3	0%		0%	32
<b>Total</b>	111,161	100%	225,719	100%	19,435

#### 4.5 Estimation of Public Transport Use

A yet more disturbing statistic is the forecast from the DEMIDPT demand estimation model under the BAU scenario showing that bus transport share of passenger km would reduce from 55 percent to 20 percent by 2031 and that private travel share would increase from 26 percent to 57 percent. This would result in an increase in traffic levels from 27 to 111 billion vehicle kms by 2031. This is a 300% increase in vehicular traffic levels over 20 years for an increase in passenger kms travelled by 125%. Railway traffic is expected to increase from 5.4 to 9.7 mn passenger kms even though the shares itself will slightly reduce. Para-transit on the other hand shows a slight increase in modal share as well. The detailed outputs of the scenarios are given in Figure 4.2. Bus transport is seen to lose significance by dropping to 45 mn passenger kms by 2031, even though it will increase from the current 56 mn passenger km to 61 mn passenger kms by 2021.

<sup>32</sup> This refers to passengers in Goods Vehicles which is a common form of transport in rural roads.



**Figure 4-2: Modal Share Projections (2011-2031)**

These projections show that by 2031, the total public transport share would be only 24%, under the BAU Scenario where it is assumed that public transport quality would remain at a much lower level when compared to cars. Mobility measured in terms of passenger kms is expected to grow by 125% over the next 20

years during which period the vehicle fleet would grow by 190% and vehicle kms by 300%. Per capita mobility would have doubled as a result. This means that the vehicle kms doubles every 8 years. This situation requires the doubling of road capacity every 8 years if the current speeds should be maintained and even fewer years if the speeds should also be improved. This requirement for road space to match the rapid motorization can be considered the largest gap in the transport sector over the next 20 years.

#### 4.6 Estimation of Freight Transport

The freight transport share is estimated through growth rate models of past years to increase from 6,603 tonne kms in 2011 to 19,435 tonne kms by 2031. This corresponds to an average annual growth rate of 6% faster than the long-term historical rate of 3% experienced since 1958 when the average GDP growth rate was 4%. This is to account for the higher GDP rate projected and also for longer supply chains as well as movement from agricultural based freight to more industrial and commercially based freight. There are no models as yet to estimate modal split between road and rail. Given that road congestion would increase in the long-term, it has been assumed that the railway freight share would grow at a faster rate than road transport. A growth rate of 8% p.a. has been assumed such that the modal share of railway freight increases from 2% in 2011 to 3% in 2031. This of course is the projection under the BAU scenario where the current policy and strategy concerning railway operations is assumed to continue.

## 5 Identifying Future Transport Gaps

This section investigates the ability of the existing and currently planned transport networks in Sri Lanka to fill the demand gap estimated to occur over the next 20 years. In this respect, this report will study the following transport networks in Sri Lanka.

- a. Road Network
- b. Railway Network
- c. Bus Transport Network
- d. Freight & Logistics Network
- e. Inland Water Transport Network

### 5.1 Road Network

The present road network in Sri Lanka comprises about 12,000 km of the highest category of national highways that are categorized as Class A and B roads administered by the RDA and a total of over 116,000 km of all roads in the entire country, which returns a road density of over 1.7 km per sq km.

Even though Sri Lanka has an impressive length of road network, its performance in terms of speed and safety are considered unsatisfactory. The TransPlan<sup>33</sup> road database on the national road network shows that less than 2% of the network has an IRI (roughness index) of less than 2 m/km. However, according to the roughness data collected in 2006 to 2008 approximately 33% of the Core National Road Network is in good condition in terms of roughness measured as IRI less than 5.5m/km. About 19% has 5.5 to 7.0 m/km roughness<sup>34</sup>. In fact about 9% of the length of the network has an IRI of more than 10 m/km which is considered most unsatisfactory. This is primarily due to ad hoc maintenance methods arising from low allocations for maintenance. With the national network in such poor standard, the provincial and local authority roads for which there are no measured indicators are bound to have even worse conditions. Based on the TransPlan forecasts for 2011 and 2031, the primary and most serious inadequacies that make the road network ineffective, inefficient and unsustainable are discussed as follows:

**Table 5-1: Average Speeds 2011 to 2031**

	Speed Km/Hr			
	2011	2021	2031	2031
	Daily Average			Peak Hour
Sri Lanka	25.75	22.62	19.13	11.42
Colombo District	21.69	17.48	14.41	9.10

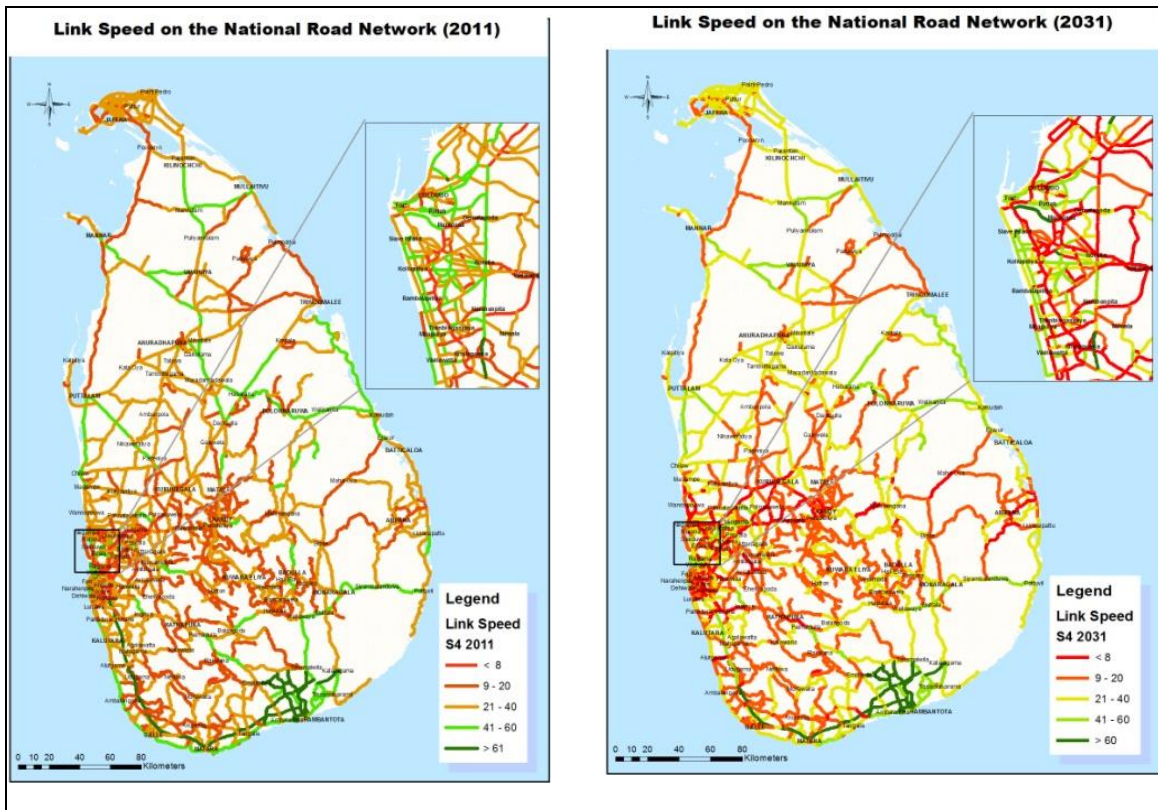
#### *Inadequate Speed*

As shown in Table 5-1, the TransPlan estimate of the average network speed on the national roads will decrease from 25.75 km/hr in 2011 to 19.13 km/hr in 2031. This means that speeds will

<sup>33</sup>University of Moratuwa, 2006

<sup>34</sup>Planning Division, RDA, 2008

drop by 1 km every 3 years. In Colombo Metro region this will reduce from 21.69 km/hr to 14.41 km/hr. The peak hour speed for commuter traffic to Colombo which is currently around 14 km/hr will drop to around 9 km/hr. The average speed on national roads other than the Southern Expressway averages between 25-45 km/hr. The roads in the upcountry and congested roads in the Western Province tend to have lower speeds especially during the daily and weekly peaks. Speeds in the low country and especially in the dry zone that extends from the north to the south through the east have higher speeds when roads are in reasonable good condition. A typical car trip from Colombo to Kandy a distance of 116 km would take between a minimum of 2 ½ hours to 3 ½ hours.



**Figure 5-1: Average Speed on National Roads (2011, 2031)**

The TransPlan output of link speeds for the national road network in 2011 and 2031 is shown in Figure 5.1. It shows that the heavily trafficked roads in the WP have lower than average speeds in 2011 ranging around 20 km/hr. Most of these speeds are however forecasted to fall below 20 km/hr by 2031 with a significant proportion of links reaching the TransPlan Model's minimum sustainable speed of 8 km/hr. It is also observed that although the proposed expressways will improve the speed of travel between cities; the travel speeds within Colombo District, within the WP and within other urban areas, such as Kandy, will not improve.

### 5.1.1 Inadequate Capacity

The increase in demand for road space requires a matching increase in road capacity. There are several methods to increase road capacity. One of these is to improve the quality of the riding surface

and by geometric improvements. For example, if all the 12,000 kms of existing national roads are rehabilitated with asphalt surfaces and maintained in that condition, the speed is estimate to increase from 25.75 km/hr to 28 km/hr for the current level of traffic. The second approach is the widening of roads. If an additional lane on all 12,000 km of the national road network is constructed, it will increase network capacity and hence speeds to 32 km/hr. At current prices, this will cost approximately Rs125mn per km for both the widening and rehabilitation including bridges which will translate to a total capital cost of Rs 1,500 billion over 10 years. However acquiring land/property required for widening especially in urban areas is becoming difficult and expensive. The third option is to construct new roads and thereby increase capacity. There is much opposition to the land acquisition required by new constructions including expressways. Over the last 20 years there have been less than 1,000 kms of new roads constructed that have become national roads. Even though there has been no record of the widening and surface improvements, it is unlikely that such type of investment would have contributed to more than 50% increase in road capacity. The fourth area of capacity improvements are from improved traffic management interventions including the use of Intelligent Transport Solutions (ITS) that can be used to enhance road capacities and their utilization. Sri Lanka is yet to utilize such technology.

It was shown that under the BAU scenario the required growth in road capacity over the next 20 years should be in the range of 300% just in order to keep the base year (2011) network speed. It is clear that the constraints imposed due to financial, land use, environmental, social limitations will not allow such a rapid growth in the road capacity. It is estimated that new roads, general widening, surface and geometric improvements may at most contribute to a 100% increase in road capacity over the next 20 years, which would be approximately double the rate of widening experienced over the last two decades. An intense capacity enhancement program by introducing traffic management and ITS measures may at most provide a further 50% capacity enhancement<sup>35</sup>. Such methods may be more appropriate for urban contexts where road widening is either expensive or not possible. Based on historical trends of adding road capacity through new and improved roads, at most only approximately half the required road capacity can be expected to be added within the next 20 years for the BAU scenario. Thus intervention in the road network alone will not be able to bridge the demand for road space that is expected over the next 20 years. It has been shown in the study that the road sector interventions alone can only cope with a maximum of 4-5% per annum growth in GDP. This too would be only if all four types of road sector capacity increasing interventions outlined above can be implemented.

### **5.1.2 Road Congestion**

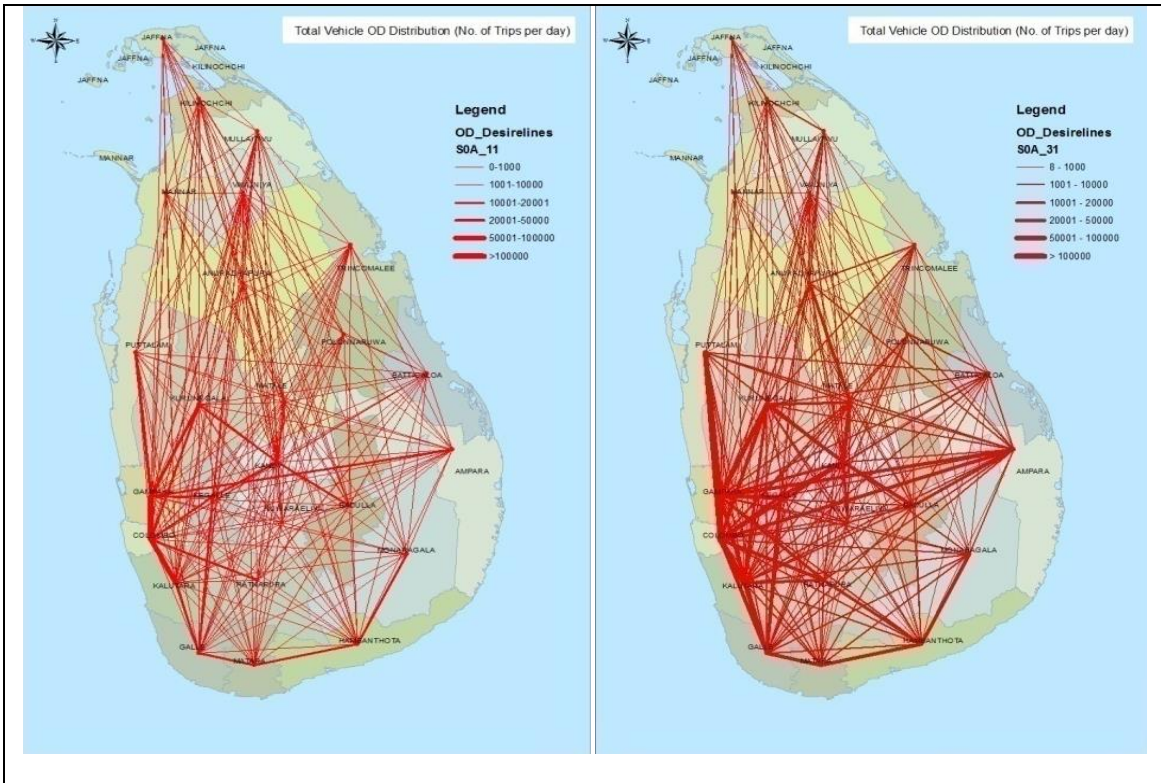
Any shortfall in road capacity will result in reduced speeds especially in urban centers where the, vehicle ownership is expected to grow rapidly. The anticipated increase in service sector economic activities in these urban centers and the growth in domestic trade will require increased commuters

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<sup>35</sup> Research conducted at the University of Moratuwa indicates that current maximum flow rates observed on national roads under capacity conditions are around 2/3rd what has been reported under well designed conditions. For example, maximum flow rate on a multi lane highway is found to be around 1,200 PCU/hr when international capacity would be considered in excess of 1,800 PCH/hr.



and visitors for business or for tourists to travel to these urban areas. Figure 5.2 shows the desire lines of inter-district traffic flows for the Base Year and for the Forecast Year 2031 where it is estimated using the TransPlan model for 8% growth rate in GDP. It is seen from the visual observation that the intensity of traffic flows in several provincial urban centers such as Kurunegala, Anuradhapura, Galle, Matara, Ratnapura, Chilaw and Kegalle will reach conditions currently experienced in the outskirts of Colombo City. The result will be problems of congestion, parking, deteriorating air quality and urban blight. In addition to the increase in traffic levels around provincial urban centres, the traffic levels in the Colombo Metropolitan Region will also increase significantly.



**Figure 5-2: Traffic Flow Desire Lines (2011, 2031)**

This will seriously impede the ability of these cities to be efficient commercial centers and livable cities that would be able to attract international business. For example, under BAU scenario, time for travel measured as the time spent on the national road network would increase from 13 billion person hours in 2011 to 75 billion person hours per year in 2031. . This means that the time spent by each person on the road will increase from an average of 108 minutes to 560 minutes or 8 hours a day which is considered unacceptable and in fact is unlikely to happen as economic withdrawal will occur prior to that. But this withdrawal would also cause significant economic loss. Thus, it is proof that an 8% economic growth rate will not be sustainable for urban growth if only road development is considered as the means of meeting the demand gap.



### **5.1.3 Safety**

While, traffic laws are prevalent to enforce road discipline, there has been a general breakdown of compliance with respect to traffic rules. This has led to poor road discipline, waste of road space as well as accidents and stress for road users. The Traffic Police has not been able to cope with the rapid increase in vehicles and licensed drivers and riders on the roads and standards have deteriorated.

The number of *road accidents* and fatalities has steadily increased over the years. Presently there are around 2,300 road traffic fatalities and a further 4,000 or more serious injuries per year. Major causes for these are poor condition of infrastructure, undisciplined behavior of road users including drivers, riders, passengers and pedestrians, poor training and testing systems and inadequate and inconsistent enforcement. Facilities available for pedestrians and other non-motorized transport modes are minimal thus making them the most vulnerable road users. Some success appears to have been made in regulatory interventions such as implementation of timetables, crew registration and inquiry into complaints in the bus sector where annual fatalities have reduced by over 30% over 3 years. In addition, there is a significant number of rail and water transport related accidents as well.

A major problem in the arrest of traffic accidents has been the lack of political attention given to the problem. Over the years much investment have been made on road infrastructure but very little has been invested in safety to make a significant change. The only such intervention was with respect to the project funded by ADB under the Southern Transport Corridor Project and under NORAD funding. A Parliamentary Select Committee appointed in 2009 has formulated an Action Plan to be implemented through the line ministries. The WHO has declared a Decade of Action on Road Safety which was launched in May 2010. While the plans in both programs are similar and aimed to reduce accidents, the full implementation of these programs is yet to happen.

Safety aspects on driver awareness training, publications and publicity have not been adequately considered over the years. Moreover, attention on checking of motor vehicles road worthiness has also remained at a primitive level. There is also lack of adequate levels of safety features incorporated in road projects especially in rehabilitation projects where facilities for pedestrians and non-motorized vehicle users have not been adequately considered.

### **5.1.4 Road Maintenance**

Historically road maintenance funding has been from budgetary allocations. However after 2006 with the setting up of the Road Maintenance Trust Fund account, there was an increase from SLR 1,116 billion to SLR 3,010 billion from FY2004 to FY2006 for maintenance of national roads. Since then it has grown but has not kept pace with the increase in capital expenditure so that as a percentage, the maintenance allocation is less in FY2011 when compared to FY2004. It is currently Rs 5 billion when sector allocation is Rs 102 billion. Moreover, a large proportion of this allocation is also spent on rural roads and roads prepared for other special events on the requests of political authorities. Thus low allocation on maintenance of national roads which has been a long-standing issue in the past remains an unresolved issue. This leads to abandonment of regular maintenance practices leading to rapid deterioration of rehabilitated roads thus reducing their design life and increasing the burden of costs of rehabilitation.

In 2010, the Road Maintenance Trust Fund was gazetted under the Ministry of Highways. In the interim arrangement the Ministry of Highways is managing the funds under the designated supervision of an Additional Secretary. The details of the new management structure or the composition of the Board of Trustees is not finalized as yet.

In the case of the provincial roads, funds are received for road maintenance from Central Government through the Finance Commission. Each provincial council also votes expenditure from own revenues for maintenance. However, such funds are driven largely by political concerns without consideration of road network requirements. In some provinces a proportion of vehicle revenue license income has been allocated for road maintenance work in the province. However there is as yet no mechanism developed by any level of government or government agency to increase and sustain a level of financing required for road maintenance. Performance Based Contracts for road maintenance are also being tried out for the national highways by the RDA as well as by the provincial road agencies even though most of it is carried out by the agencies themselves.

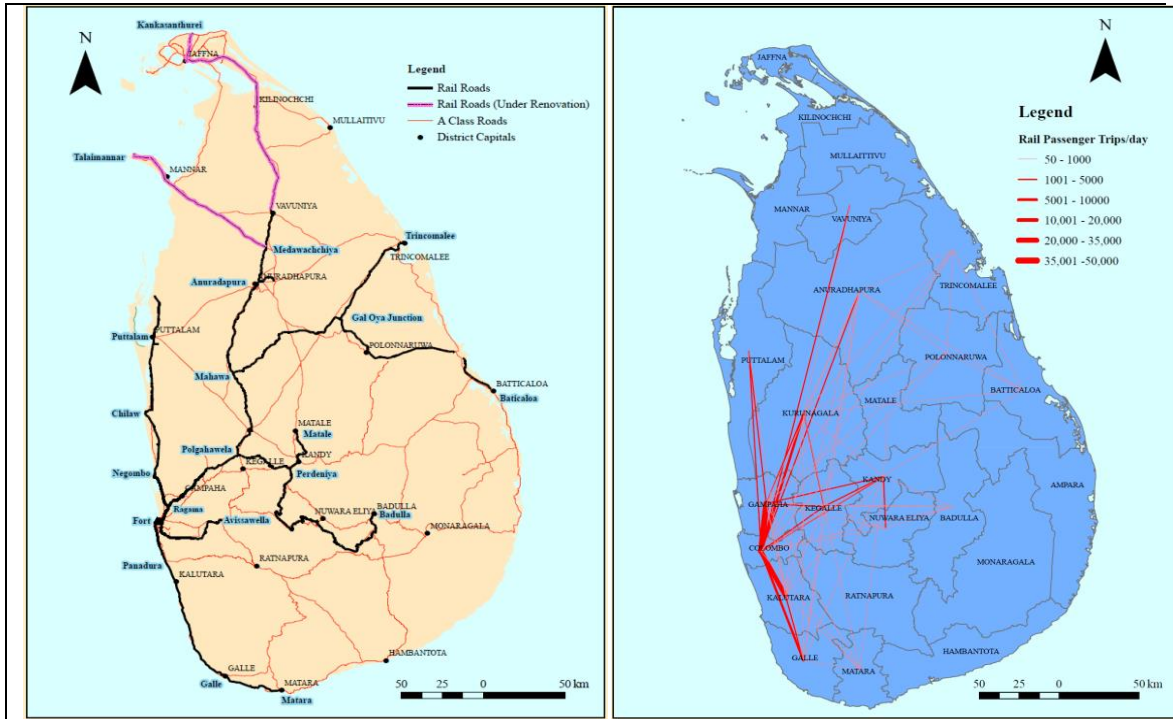
## **5.2 Railway Network**

The railway network in Sri Lanka is 1,447 km in length with 172 stations. It is extensive covering all the provincial capitals and 21 of the 25 district capitals. Even though it played an effective role as the primary transport network till the 1940s, it has become a shrinking second player in the face of competition from road transport where it is comparatively poorer in providing directness, frequency and speed of travel. Average speed of trains other than in the up country ranges between 30-45 km per hour and somewhat comparable with national roads. In the up country it falls to less than 25 km per hour. Except for the Coastal Line which is being rehabilitated for speeds of 100 km/hr, most other lines have poor condition of track that prevents speeds of over 80 km/hr and in many instances caution enforced due to weak sections where speeds reduce to less than 20 km/hr. Other than around 100 kms of track around Colombo, most of the lines are single track and the signaling systems are outdated to operate high frequencies and optimize line capacity. Most stations are in run down condition. The condition of rolling stock has improved with the addition of new units in recent years.

Railway operations in Sri Lanka from its inception have been in the hands of the government. Private sector participation is limited and restricted to non-core functions. Passenger use and freight movement have increased marginally even though growth has been somewhat erratic. But neither has been significant enough to make a serious shift in modal share back to the railways. Currently the railway carries 4% of the passenger share and 2% of the freight share. In the passenger market as shown in Figure 5.3, the traffic it carries is centered on Colombo and between Gampaha and Kalutara on either side of Colombo. Of the 300,000 daily passengers, around 80% travel exclusive within this area. Its freight market shows only Trincomalee and Puttalam as destinations for freight traffic of significant volumes.

The difficulties in improving management of its 17,000 strong work force and to introduce modernization are the main constraints for the development of the railways. Modernisation itself

includes signals and communication systems, ICT systems, improved stations and warehouses and new track in several areas. Most of the rolling stock is considered obsolete and needs replacement. The lack of administrative flexibility provided to a government department has also been cited as the reason for the inability of implementing changes required for the railway to be translated to a commercially viable institution.



**Figure 5-3: The Railway Network and its Performance (2011)**

The rail fares were benchmarked with bus fares in 2008 and the lowest level of fare is currently priced around USD 0.08 cents per km. The railway currently incurs an operational loss. The investment cost is not recovered financially.<sup>36</sup>

The railway though in continuous operation for nearly 150 years, requires re-engaging in the passenger and freight market lost to the road transport over several decades. With increased motorization and resulting congestion imposing restrictions for continuous growth of road based transport, viability of some markets will again favor the railway. As such the railway requires more market oriented approaches as well as a strategy to develop such markets upgrading speed and reliability and improved integration with ports and airports as well as with multi modal logistics centers and multi modal passenger terminals inclusive of park and ride facilities.

<sup>36</sup> Sri Lanka Infrastructure Assessment, World Bank. 2010

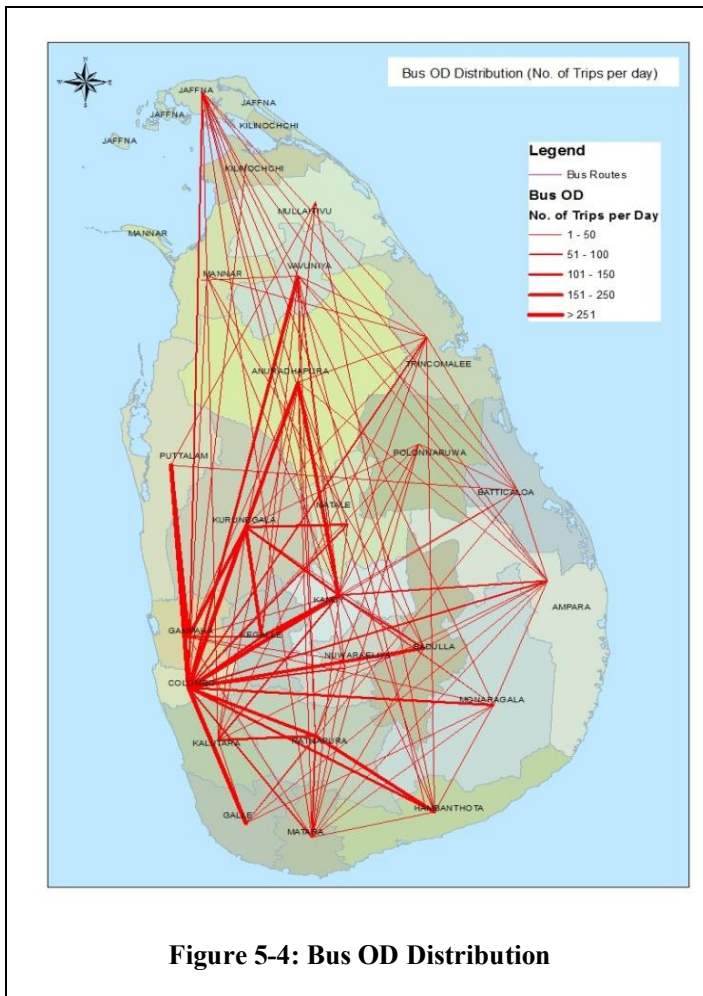
### 5.3 Bus Transport Network

Buses currently carry 55 percent of the passenger km, while para-transit, made up of chartered and non route buses, hired vans, three wheelers and taxis carry another 11 percent. There are an estimated 23,228 buses operating public transport services in Sri Lanka. Of these 4,758 are government owned Sri Lanka Transport Board buses while the balance is privately owned. Of the privately owned buses, 3,058 are issued inter-provincial permits by the National Transport Commission providing long distance services, while the others

are issued permits for intra-provincial or mostly local services by the relevant provincial authorities. The operations in urban areas fall within the purview of the respective provincial authority.

Fares are regulated, according to a pricing formula that allows recovery of cost and an operating profit. The bus and seat capacity in the sector has grown steadily due to the profitability in the sector, other than in rural areas and during off peak times where poor load factors do not allow viable operations.

The major impediment in the sector is that the regulatory agencies have not been able to achieve qualitative changes and improve services in keeping with income levels of the passengers. Permits for operations are issued to individual owners and this model of ownership is the fundamental barrier for further



**Figure 5-4: Bus OD Distribution**

development of the private bus services. Attempts at franchising of bus routes, provision of operating subsidies to low demand operations, quality improvements to buses, bus crews, scheduling have all met with limited success as there is still no clear political leadership for wanting change in the bus sector.

There are around 327 long distance routes, over 90% of which terminate in Colombo. There are an estimated 5,000 local routes which include around 514 services to remote areas and 726 school buses that are provided with compensatory payments by the National Transport Commission. Thus connectivity from Colombo to most parts of the country as shown in Figure 5.4 is quite strong. Most provincial capitals have a day time frequency of 15 to 30 minute bus operations and hourly to district

capitals. The SLTB, the state operator, is the one time monopoly operator that now carries 27% of the passengers. It provides services throughout the country and is contracted for a number of socially necessary services such as school buses, rural services and night services. Its primary role is to provide stability in the market and to prevent monopolistic behavior on the part of the private operators.<sup>37</sup>

The SLTB has a number of operational inefficiencies but is still considered by a significant majority of users, as necessary to counter the private sector cartels and their abandonment of services during lean demand periods and service to under patronized areas. However, it lacks the caliber of management required to provide a top tier transport service. Management is often effectively in the hands of trade union leaders and favored members. Decision making is often influenced with non-commercial considerations; and aptitude for operational efficiency is absent in most instances. It has poor human resource utilization, staff redundancies and currently operates at a financial loss<sup>38</sup>. An influx of competent managers, training of middle level managers and revamping operating, procurement and human resource management procedures are a priority if the SLTB is to become a modern transport service organization.

## 5.4 Para Transit

Presently para-transit in Sri Lanka includes:

- Three Wheeler taxis
- Taxis offered through Call Centers
- School Transport Services
- Office Transport Services
- Chartered transport services
- Other forms of informal transport services found especially in some rural areas.

Para- transit, which is predominantly made up of over 300,000 three wheelers, also includes a wide cross section of other services ranging from school services to rural vehicles, all of which are also fully deregulated. The high rate of accidents, low productivity and collusive behavior are reasons why some degree of regulatory control may be required for these sectors.

There have been some recent efforts to organize this sector. Some taxi companies have continued successful Call Centre operations in Colombo. This is now being extended to the three wheeler industry as well. However, there is a strong preference both from passengers as well as suppliers to continue with the informal and unregulated industry.

TWs are becoming a popular mode of para-transport due to their ready availability, provision of door to door service, ease in contacting and having a perception of being "affordable"<sup>39</sup>. Since TWs are

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<sup>37</sup> Sri Lanka Infrastructure Assessment Report, World Bank, 2010

<sup>38</sup> Sri Lanka Infrastructure Assessment, World Bank, 2010

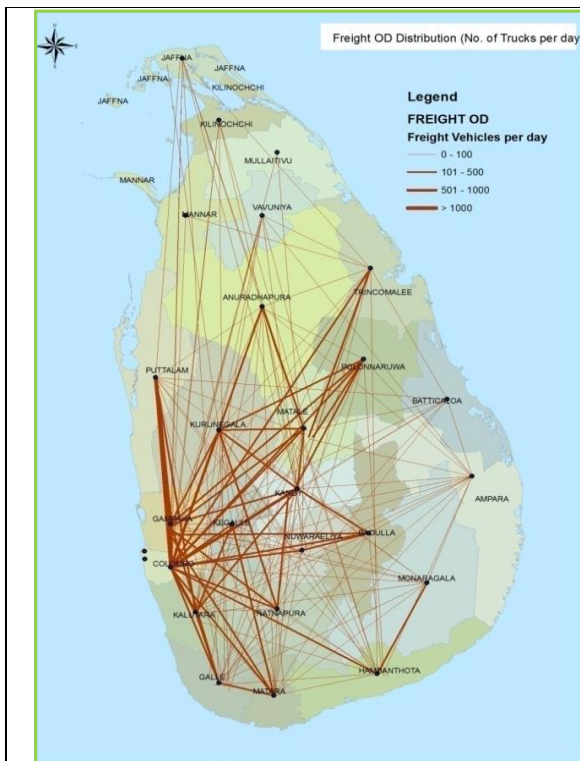
<sup>39</sup> Samarasinghe, T.A & Samarakkodi, N. C (1999) "A Study on the Operation of Three- Wheelers in Sri Lanka" Final year Thesis, Department of Civil Engineering, University of Moratuwa.

mostly unregulated, this has led to the entry of large numbers of individual operators to the market. The TW operation in Sri Lanka demonstrates characteristics of a cartelized service provision featuring oligopolistic market behaviour. TW drivers are seen as a unified sub-cultural unit of the mass culture demonstrated by their own fashion, vehicle design, music selections and speech.

Hence it could be concluded that the foremost issue at the present is the apparent over supply of the market and the corresponding under utilization which has driven up fares due to cartelized operations. Fares are currently priced at around USD 0.35 per km.

## 5.5 Freight & Logistics Networks

This is a poorly understood sub sector. Surveys indicate that the most common commodities carried by road are agricultural produce (13%) and construction material (10.7%). Most truck trips are within the WP, while the highest inter-provincial flows are between North Western and Western Provinces. The flows between provinces other than WP are highest in the districts of Kurunegala and Puttalam. It



**Figure 5-5: Freight Transport Desire Lines (Road, Rail) - 2005**

can be seen that the trucking flows are also concentrated in the WP. The port related traffic accounts for an average of around 35,000 truck trips per week with around 60% carrying containers. While import cargo is mostly headed for destinations within WP, export cargo originates outside of the WP.

As shown in Figure 5.5 the current road based freight transport has a Colombo based pattern. The Logistics network in terms of warehouses for import and export commodities are also found in Colombo city and its suburbs while a major component of the domestic trade also is handled through warehouses and distribution centres located in and around Colombo.

With more domestic trade and inter provincial passenger travel taking place, the need to move away from a uni-nodal core becomes quite necessary and urgent. The inefficiencies of the current core can be observed when one travels through Pettah (neighborhood in Colombo) where warehousing, port activity, railway and bus passenger activity all get in the way of each other.

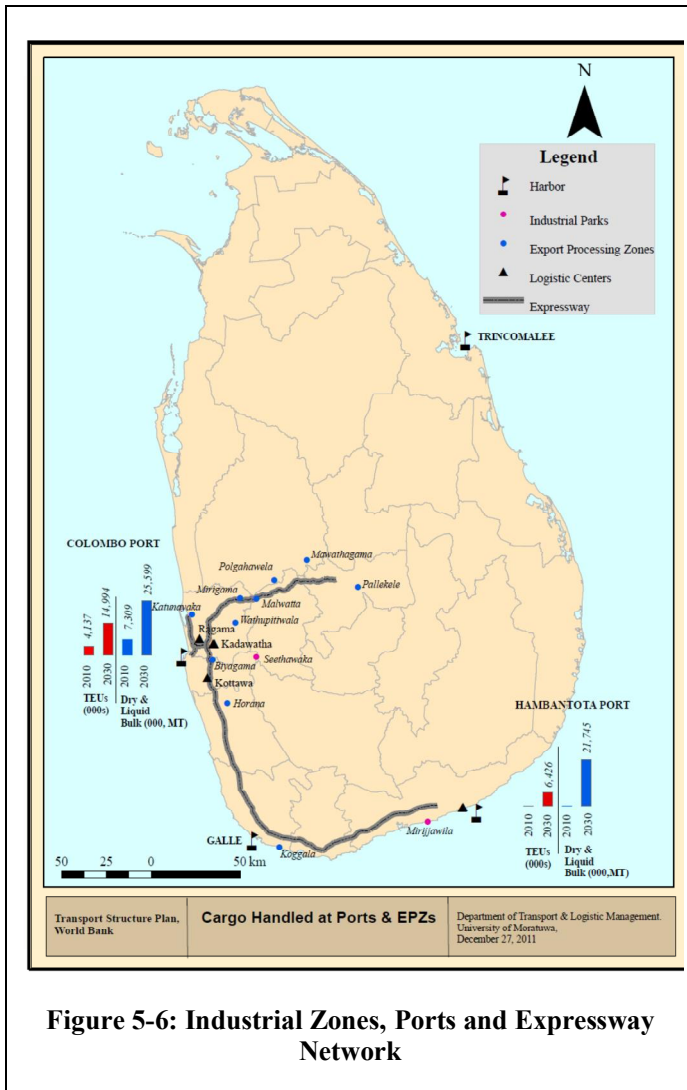
The cost of congestion, delays and damages in this outdated transport centre have not been estimated. While attention has been drawn to taking some of these activities away from the Central Business District (CBD), no study has been conducted to



determine the alternative locations. As a result, currently some confusion exists even in the on-going study for location of an Inland Container Depots (ICD).

### 5.5.1 Logistics Centres

Logistics Centers can be loosely classified as locations for goods trip ends. These usually constitute collection centers in production areas, distribution centers and warehouses and transport nodes such as ports. Most of these activities in Sri Lanka are currently located in the WP. The Port as well as many of the Distribution Centers and Warehouses for import cargo are located within the city. The logistics function has not been studied adequately. However the cost of transport and goods handling in Colombo is considered high due to concentration of logistics activities in the Colombo city and its outskirts.



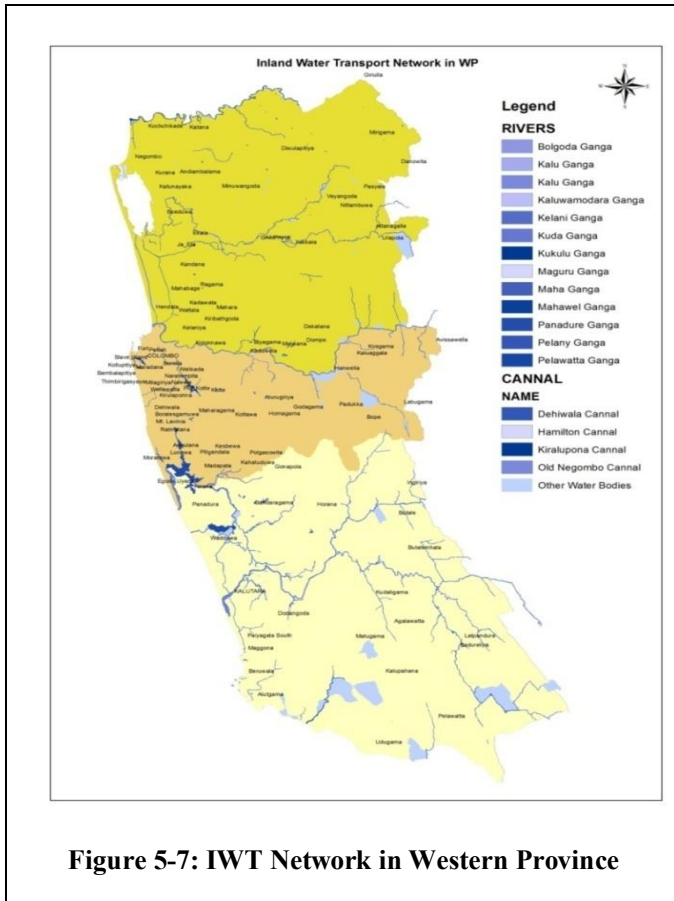
**Figure 5-6: Industrial Zones, Ports and Expressway Network**

The transport network to the provinces is not in acceptable standard and this is most evident in the observation of location of industrial zones as shown in Figure 5.6. This shows that industries are concentrated within the WP. The most densely populated part of the country has also become the most industrialized part of the country causing a number of land use and social issues. The cost of land, housing and living for employees are higher in the metropolitan areas. However industrialists still prefer locating in WP where transport access to the port and airport is relatively easier. The proposed expressways are ideally located to serve most of the existing industrial zones. It is likely that the actual growth of industries outside the WP will happen only after the expressways are built to such areas.

### 5.5.2 Inland Water Transport Network & Coastal Shipping

The current IWT network is limited to part of the canal network used during the Dutch Period. Most of these canals have shallow draft of 1 - 2 meters and are less than 10 meters wide. The distances are less than 3 kms. The height clearance is

also around 1.5 metres in most canals. They cannot in the existing form be used for heavy or speedy movements.



**Figure 5-7: IWT Network in Western Province**

The Kelani Ganga located on the northern boundary of the City of Colombo (Figure 5.7) has a depth of 6m but it varies with both the tide and water flow and is navigable up to Hanwell. The Kalu Ganga has a depth of 3m and considered navigable to a longer distance. However there is insufficient information as yet to determine the feasibility of an IWT service in the WP.

Coastal shipping began in the 1980s and continued to have some applications during the period of conflict when land routes to the north and east were closed. However, the sharing of the Port of Colombo with international traffic, the difficulties of accessing the port, the requirement for intense documentation have been cited as reasons why coastal shipping has not grown. Even if these obstacles are eased, the relatively shorter distances and the double

handling will pose considerable limitations. With a number of ports being developed around the country, the potential for Coastal shipping will increase provided such ports are also linked with good rail and road access as well a logistics centres being located adjacent to these ports. A study of IWT that includes Coastal shipping is considered a requirement.

## 5.6 Summary of Main Issues and Gaps

The main issues facing the transport sector and the gaps that exist in the supply side are set out as in Table 4-5. There are five main inter-related issues. The rapidly increasing motorization is partially fuelled by the inadequate quality of public transport services. The continuing loss of this patronage also affects the services further, thus hastening the motorization as passengers exit using public transport. Existing bus transport capacity in particular will become redundant as ridership becomes private vehicle users. This in turn will pose the need for rapid expansion of road capacities. The inability to keep pace with the required rate of growth will lead to increase in negative externalities that will result in economic and social losses that will in turn impose restriction on the growth rate.



**Table 5-2: Summary of Main Issues and Gaps**

Observation	Current Issues/Constraints	Future Gaps under BAU
Rapid Increase in Vehicle Ownership and Use	<p>Public Transport is not providing the quality of service required to retain passengers when their incomes increase and become able to own and use a private vehicle.</p>	<p>An economic growth rate of more than 3-4% will outstrip the rate of current road space provision as entire burden of transport and future motorization will fall on the road sector.</p>
	<p>Vehicle and traffic growth especially in urban areas will be constrained by space availability to provide the required road space.</p> <p>Primarily as a result of increasing incomes, but accelerated to a higher growth trajectory due to lack of effective policy on managing motorization and deteriorating public transport services.</p>	
Decreasing Use of Public Transport	<p>No effective transport demand management or transport supply management strategy being followed. Each sector institution working in isolation. No particular agency responsible for managing issues arising from rapid motorization.</p>	<p>Policy, planning and regulatory structures of public transport are weak and human resource capacity inadequate to carry out a reform program.</p> <p>Public Investment in public transport not been sufficiently directed for improvement of services quality.</p> <p>Uneven playing field between State bus and regulated bus operations of the informal private sector should be leveled out.</p>
	<p>Public Transport being viewed as a socio-welfare service and not seen by society as an economic requirement to be strategically developed for travel even when personal incomes increase.</p>	
	<p>No visionary political leadership to develop public transport to deliver satisfactory services and achieve a position of acceptance in society.</p>	<p>Informal transport providers should be transformed in to corporate entities capable of effecting change and development of the sector.</p>

Observation	Current Issues/Constraints	Future Gaps under BAU
	<p>Government is usually pre-occupied with routine operational issues of the two state transport operators. Wider issues of policy and strategy are usually ignored.</p>	<p>A gap has been created in both bus and railway between the existing quality of service of rolling stock and infrastructure and the expectations of the passengers in the income range able to afford a mode of private or para-transport</p>
	<p>Transport networks that have evolved over the last 200 years have outlived their usefulness and are not aligned to modern economic and social requirements.</p>	<p>A new and modern mode of public transport is required to lift up the status and recognition of public transport by society.</p>
<p>Outdated Transport Infrastructure</p>	<p>Transport system is centred on Colombo CBD and is road dominated without efficient linkages to other modes and nodes for a holistic multi modal transport operation and for assisting lagging-regions to develop rapidly.</p>	<p>There is a gap created in modernizing the transport network to meet the new economic challenges of the 21st Century.</p>
	<p>Generally poor performance indicators for all transport networks in terms of speed, comfort, convenience, reliability, safety and directness.</p>	<p>There is a gap in the efficient performances of all urban and inter-provincial passenger networks as well as long-distance freight networks.</p>
<p>Lack of Institutional Capacity and Coordination</p>	<p>The large number of institutions and the lack of a mechanism for coordination of planning activities for transport has created an environment in which each agency plans and manages its own network. Budget allocations are also made without an overall policy or investment strategy.</p> <p>It also calls for more professionals to be engaged in the public transport sector as well as improved institutional structures to handle modernized transport systems.</p>	<p>There is a gap in coordination of planning activities between agencies.</p> <p>There is a gap of a mechanism for determining funding between the different modes of transport.</p> <p>Inadequate number of professionals in the sector and inadequate professional practices and procedures in place. Inadequate data and knowledge bases. Some existing staff need to be re-trained</p>
<p>Increasing Negative Externalities</p>	<p>Negative externalities such as traffic congestion, air quality deterioration, road traffic accidents and injuries are increasing. The total cost of such losses is greater than the annual capital investment in the sector.</p>	<p>The overall external cost of providing transport and logistics services is high adding to the economic cost of providing transport services which impedes economic growth efforts. This inefficiency gap should be reduced.</p>

## 6 Formulation of the Intervention Scenario

The policy of managing the transport sector over the next 20 years appears to hinge on the policy on how motorization is to be managed. As shown in Chapter 5, even by continuing with the current taxes on motor vehicle imports will require rapid road expansion of road space especially in urban areas. The 'Business as Usual' scenario discussed in will result in the increase of negative economic externalities arising from transport system shortfalls that will constrain economic growth and quality of life such that the intended growth rates would not be achieved.

On the other hand, if rapid motorization and the burden of having to engage in unprecedented road building are to be averted, then a policy intervention (i.e. an Intervening Policy) is required to create this Intervention Scenario. Such an Intervention Scenario would require a twin strategic intervention of (a) improving public transport and (b) the simultaneous management of the demand for motor vehicle ownership and or use. This will require a well formulated policy intervention and setting up the associated institutional requirements for ensuring that implementation is effective.

### 6.1 Current National Land Transport Policy

The National Land Transport Policy (2010) makes a clear statement that *'the policy of the Government is to encourage the use of public transport, high occupancy vehicles and non-motorized transport. It will seek to influence modal shift from road to rail transport and from private modes to higher occupancy modes using regulatory and fiscal measures. The Government will take steps to provide the public the widest possible choice of different modes of goods and passenger transport that would be consistent with the country's objectives of optimizing land and road space use, conservation of the environment and energy, achieving cost effectiveness and ensuring the affordability for users'*.

This is a clear policy intervention statement taken by the Government which is in line with the Alternate Policy recommended in this study. However, policy implementation by the Government over the last two years has been less encouraging as BAU conditions have continued without reflecting a change in policy. In fact, during this period, import duties of motor vehicles have been lowered<sup>40</sup> and several public transport quality development programs such as corporatization of private bus owners, route management franchises, park and ride services, strengthening of bus regulations and institutional capacity building have been abandoned resulting in unprecedented motorization and modal share loss in public transport.

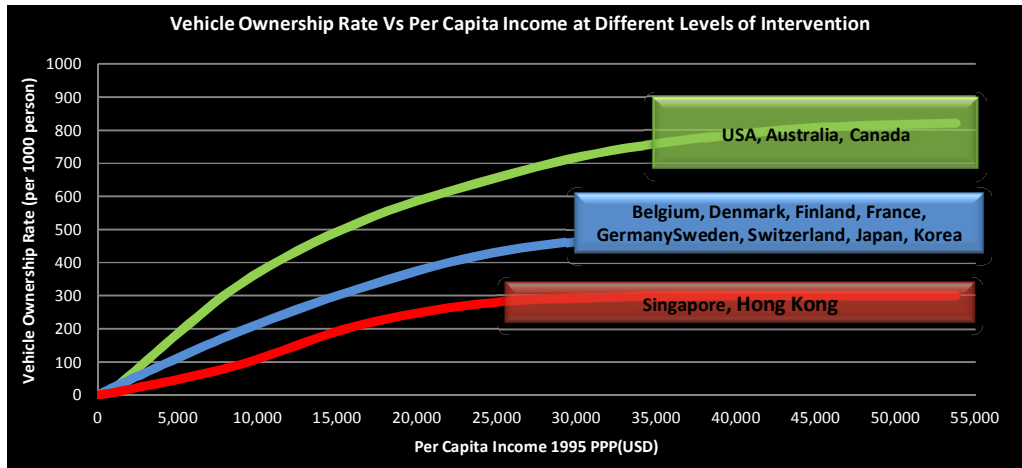
### 6.2 Sustainable Vehicle Ownership Levels

Despite the lack of adherence, the policy statement in the Land Transport Policy (2010) is consistent with global best practices for a densely populated country such as Sri Lanka where the public transport modal share is currently 60%. Based on observations of global vehicle ownership levels, the

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<sup>40</sup> Then raised again on 31<sup>st</sup> March 2012 giving a first indication that attention on reducing motor vehicle use is being considered.

following graph has been constructed to understand global motorization trends and to determine a sustainable Vehicle Ownership Level for Sri Lanka.



**Figure 6-1: Motorization Trajectories**

The relationship between income, vehicle ownership, population density, public transport penetration and road density has been clearly established<sup>41</sup>. Evidence shows that as income increases public transport use decreases. However vehicle ownership increase takes the highest trajectory (Figure 6.1) in areas where the population density is lowest. These are areas having a high road density that can support motorization and where public transport service penetration is difficult due to the low population density. In other words such areas are more effectively served by private vehicles when incomes increase. At the other end are areas where population density is high enough to keep providing a service that can continue to attract users even though incomes are high enough to own and even use a private vehicle. This situation is represented by the curve with the lowest growth trajectory. In such areas, usually cities, the road density per person is very low as road building is difficult. Singapore and Hong Kong are two solitary examples of such cities. There are however many cities globally that seem to keep an intermediate trajectory where public transport is nurtured to provide a competitive service even when incomes increase.

Table 6.1 illustrates the three generalized trajectories showing the increase in vehicle ownership and possible saturation levels as the PPP adjusted per capita incomes increase. Motor Vehicle Saturation or in other words the maximum rate under which the different trajectories are expected to peak when the per capita incomes reach USD 25,000, 30,000 and 35,000 respectively. The conditions under which such sustainability can be achieved are illustrated in Table 6.1.

<sup>41</sup> Newman, P. & Kenworthy, J. (1989) Cities and Automobile Dependence: An International Sourcebook Gower, England.

**Table 6-1: Analysis of Vehicle Ownership Saturation Levels**

Population Density	Population Density (Pop/Ha)	Roads (m/pop)	Share of Public Transport	Car Ownership Saturation (per 1000 p)	Restrictions
Low	< 25	> 4	< 5%	700-900	No restriction on ownership or use
Moderate	25-75	1-4	15-35%	400-600	No restriction on ownership but Restrictions on use
High	> 75	< 1	50-80%	200-300	Restrictions on ownership and use

This shows that in a situation where population density is over 75 persons per hectare and where road density is lower than 1 metre length per person then the scope for motorization is lower but public transport becomes more viable. Singapore and Hong Kong are two such cities that have sustained its transport requirements with a vehicle ownership of 200-300 vehicles per 1000 persons with quality public transport but simultaneous vehicle restraint policies. Most cities in the USA, Canada, Australia, New Zealand and similar low population density countries have vehicle ownership exceeding 700 vehicles per 1000 persons. These are cities that have population densities lower than 25 persons per hectare so that there is adequate land for providing the required road densities to sustain a higher level of motorization.

The table also shows the transport management policy instruments that are necessary to keep the car ownership levels at sustainable levels. In the case of Singapore, it uses heavy fiscal restraints such as Vehicle Quota System that restricts ownership and restricts usage through Electronic Road Pricing as well as through access restrictions. These however are complemented by heavy investment in public transport as a liberalized but still regulated para-transit system that has just been further broad-based<sup>42</sup>. Singapore's private vehicle use still remains moderate with public transport increasing its share during peak periods from 46% in 1974 to 59% in 2010 even though Singapore reached high income status during this period. The current Land Transport Strategy in Singapore calls for further increasing the public transport share during peak period to 70% by 2020. In Hong Kong, the public transport share is already 90%. However Hong Kong manages without direct restrictions on vehicle ownership, even though physical restrictions such as parking spaces and fees make owning a car difficult. Like Singapore, Hong Kong has invested heavily in public transport to compensate. Tokyo and Osaka in Japan and Seoul, South Korea are other Asian cities that have retained a majority share in public transit even after reaching high income levels qualifying for consideration as examples of the Moderate level of vehicle ownership shown in Figure 6.1.

In view of the impending rise in motorization, it would be necessary for Sri Lanka to set achievable and sustainable goals for managing its transport system. As the 44<sup>th</sup> most densely populated country in the world having a density of over 300 persons per square km, it is necessary for Sri Lanka to set goals that are consistent with the physical land area required for its transport requirements and to develop strategies that are space efficient. The goals would focus mostly on managing the rapid motorization that would follow the anticipated growth in incomes over the next 20 years.

<sup>42</sup>[http://www.straitstimes.com/BreakingNews/Singapore/Story/STIStory\\_761205.html](http://www.straitstimes.com/BreakingNews/Singapore/Story/STIStory_761205.html)

Table 6.2 shows that the current status of motorization in the different geographic areas of Sri Lanka. Based on the discussion in the preceding section, it is clear that the controlling parameters for transport provision for Colombo City and perhaps other metropolitan areas should be different to that of the largely suburban Colombo District and that yet again different to the rural areas of Sri Lanka.

**Table 6-2: Indicators for Transport Management Strategies in Sri Lanka**

Pop Density	Population Density (pop/ ha)	Roads <sup>43</sup> (m/ pop)	Current Share of Public Transport	Current Vehicle Ownership (per 1000 pop)
Sri Lanka	3	5	60%	Cars 25 All Vehicles 130
Colombo District	35	2	45%	Cars 74 All Vehicles 210
Colombo City	174	0.2	40%	Cars 225 All Vehicles 578

### 6.3 Recommendations for Transport Sector Interventions

In order to attain the goal of ensuring a sustainable level of motorization and thereby efficient transport across Sri Lanka, a strategic plan is required to ensure that not only roads, but all other modes of suitable transport are in place to support the new development programs of the government. In this respect this study identifies two primary interventions as set out below:

- Intervention for Managing Motorization in Metropolitan Areas:** It is seen that increasing vehicle ownership and use will result in many urban centres having a rapid increase in motorization. The Colombo Metropolitan Region (CMR) and Kandy Metropolitan Region (KMR) have already reached the given sustainability levels given that provision of additional road space is limited. As such a multi modal approach has to be followed with specific programs to maximize public transport modal shares on available infrastructure and new modes. Simultaneous measures would also be necessary to manage the vehicle use in city centres so that the level of road transport activity does not become unsustainable resulting in unacceptable drop in road travel speeds. Measure to curb ownership are not recommended as it is not possible to control ownership only in selected metropolitan areas when there is no requirement for vehicle ownership be controlled throughout the country. Moreover, the high tax rates are even at present heavy disincentives for purchase of vehicles.
- Intervention for Improving Inter-Provincial Connectivity:** Improving travel speeds and volumes between provincial centres and providing direct connectivity to international air and sea ports is a requirement to meet the current development objectives of the Government. In this

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<sup>43</sup> The measure of metre of road length per person is considered more appropriate in determining the sustainable vehicle ownership level than the more commonly used index of road length per square area

respect, the national road network should continue to be further developed but complemented by the improvement of the existing rail and bus transport systems to provide adequate choice of travel for both passenger and freight transport where it is economically viable. Especially on inter-provincial corridors that can provide competitive services to private vehicle travel.

The above twin interventions in the Intervention Scenario would be the fundamental first steps to ensure that Sri Lanka will achieve a sustainable transport system that will be fully within its limited resource base and also provide for the envisaged economic development effort. In this respect, it is envisioned that metro areas will be predominantly public transport oriented, where private vehicles would be used mostly at non peak times and in non-congested locations. Highway construction would be rationalized mostly to providing priority for public transport. All modes of public transport would be improved qualitatively, while new technology and modes such as BRT and LRT would also be introduced where viable.

Long-distance travel for improving inter-provincial connectivity would also have a rich array of choices from regular Inter City Expresses trains for distances beyond 100 kms, while intercity buses would be plying regular services especially between destinations to which the railway does not operate while supplementing the railway where it does operate. New expressways will form the backbone of the inter-provincial transport network. The promotion of public transport would be aimed at ensuring that the expressways do not get over saturated and that speeds would drop prematurely.

Due to the relatively short distances within the country, freight transport would still be mostly road based. However all port related cargo could be carried by railway up to the closest ICD. Warehouses and distribution centres should be moved to locations close to the new expressways thus reducing congestion in town centres.

#### **6.4 Coordination among Transport Sector Institutions**

The absence of an institution that coordinates planning work between agencies in the transport sector is a current gap that was identified in Table 5.2. In this respect attention is drawn to the Transport Studies and Planning Centre (TSPC) that was set up with World Bank funding and attached to the Ministry of Transport after the Transport Sector Study in 1990. This centre performed several planning studies, data collection and regular publications up until the mid 1990s after which it was disbanded and the staff absorbed to the ministry. Since then there has been a lacuna in this area.

The Inter-Ministerial Committee for the Coordination and Planning of Transport (IMCCPT) was a committee representing different stakeholder organizations and service providers, research institutions that met monthly under the chairmanship of the Minister of Transport. These meetings provided a forum for discussion. However the IMCCPT lacked authority to make decisions and was dependent on working through existing channels namely the ministries and agencies. As such even though it met for many years, it achieved little and was finally abandoned in the late 1990s.

Retrospectively, these steps were to the detriment of the industry. Their absence was never filled adequately. The general reason for their termination can be assessed as follows:

- a) They were not set up under a specific authority such as Parliament or even the Cabinet of Ministers. Thus a minister could at any given time decide to terminate them. In fact this is what happened in the case of both the TSPC and the IMCCPT.
- b) They did not have any real power or authority to make decisions or even recommendations regarding projects or investments in the transport sector.
- c) They did not have adequate financial independence and acceptance in the decision making process of the Ministry of Transport.

This study considers that the re-establishment of both the TSPC and the IMCCPT to be timely first steps at the current time. However there should be learning from the previous mistakes. Therefore the ***Transport Studies and Planning Centre (TSPC)*** should be established under an independent board comprising both public and private interests and independently funded. This may be done on approval from the Cabinet of Ministers. Its Terms of Reference should include publication of regular industry status reports and statistics as well as the provision of technical assistance to undertake and or coordinate studies that include multi modal and thus multi-agency endeavor. The TSPC could also provide secretarial services to the IMCCPT and be its convener. It should be headed by a Director who should be a professional in transport field and have a technically competent staff. It could start off as a Project Management Unit for a Technical Assistance grant or Loan and then be converted to a permanent fixture for planning studies.

It is also recommended that the ***Inter-Ministerial Committee for the Coordination and Planning of Transport (IMCCPT)*** should be re-established for the purpose of coordination of planning activities especially multi modal planning. It is recommended that this committee should be reconstituted with participation of the senior most officers responsible for planning in the respective transport sector agencies and ministries and other related agencies. There should also be participation of professional and research institutions associated with the transport sector and national transport sector trade associations as observers. The IMCCPT should meet monthly convened by the Director of the TSPC and chaired by the Minister of one of the line ministries in rotation. The following ministries are suggested:

- Ministry of Transport
- Ministry of Ports and Highways
- Ministry of Private Transport Services
- Ministry of Civil Aviation
- Ministry of Defense and Urban Planning
- Ministry of Local Government and Provincial Councils

The Secretaries and CEOs of all the agencies under the minister chairing the meeting will attend the meeting. As such Ministers and CEOs will attend the IMCCPT by annually. In the case of Ministry of Provincial Councils, the respective CEOs will include the CEOs if the provincial agencies responsible for highways, motor traffic and transport. The TSPC will follow up agenda items in assisting the coordination work including undertaking any studies and preparation of proposals and recommendations for discussions. Any major transport project that has an impact on other modes of



transport should be presented to the IMCCPT. The IMCCPT can call for a technical report from the TSPC if so required. Once the IMCCPT has made a recommendation, the TSPC could submit same to the Secretary of the Ministry responsible for implementation for further action. This should be followed up in subsequent IMCCPT meetings.

## 7 Managing Motorization in Metropolitan Areas

This chapter outlines a multi modal strategy together with a vehicle restraint strategy for managing the rapid motorization that is expected in metropolitan areas of Sri Lanka. Figure 7.1 shows the high population density areas in Sri Lanka indicated in red, where future motorization would require to be managed. This includes the municipal areas of Colombo, Sri Jayewardenepura Kotte and Dehiwela-Mount Lavinia. Kandy is the other city that even though not warranted by population density alone, should be considered due to its terrain and status as a heritage city.

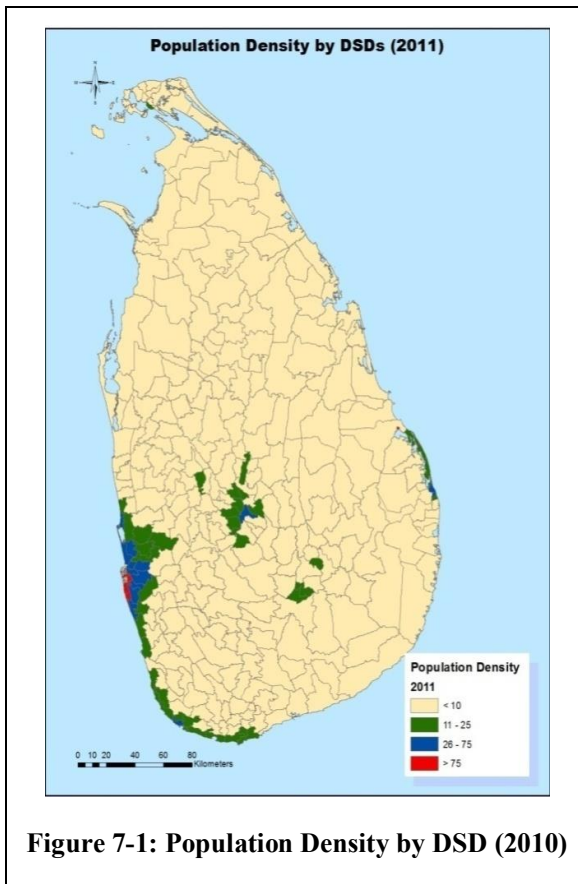


Figure 7-1: Population Density by DSD (2010)

Other areas indicated in blue which have medium population density also require public transport aligned solutions. These include the stretch along the western coast from Negombo to Matara as well as the metropolitan region of Kandy and scattered areas spread throughout the country such as Kurunegala and Batticaloa. However these areas may not require priority intervention in the next 20 years.

### 7.1 Transport Demand Management (TDM) Measures

TDM are any action or set of actions intended to influence the intensity, timing, and spatial distribution of transportation demand for the purpose of reducing the impact of traffic flow. TDM measures can be categorized under the following broad headings.

#### 7.1.1 Re-distribution of the spatial form of the demand for transport

These strategies include the urban re-planning and the *relocation* of certain land uses that may cause traffic congestion. For example, the proposal to create an ICD for the Port of Colombo, to move offices out from the CBD, and to move the vegetable market out from Pettah are in progress in Colombo. This would reduce the freight traffic to the CBD area in Colombo. Similarly decentralizing the Pettah Bus Terminal would induce fewer buses to come to Pettah and Fort areas. Relocation of administrative functions that attract travel is a common strategy (e.g. relocation of passport office). For examples unsuitable activities that need to be relocated to three satellite townships in Kandy have been identified<sup>44</sup>. The common types of land uses that may be most suitable for relocation in CBD of large metropolitan areas are: (i) transit activities

<sup>44</sup> Department of Transport & Logistics Management, University of Moratuwa, Kandy Transport Study, 2011

such as from bus to bus or bus to rail; (ii) low value adding wholesale trade; (iii) heavy traffic generating commercial activities and services such as medical consulting institutions, schools, hospitals etc.

### **7.1.2 Re-distribution of the temporal pattern of the demand for transport**

This is also known as demand spreading. There are many methods adopted in different countries to spread the traffic during peak hours. Since traffic congestion is caused by people travelling at the same time, there is an effort to *Stagger Work Hours*. This requires offices opening and closing over a longer time span (e.g. spread from say 8 am to 9.30 am). This also applies to separating school times from office time and even spreading school opening times between different areas or types of schools (e.g. private and state schools could start at different times). *Flexible Work Hours* is another method whereby workers are allowed to report for work over a period of time rather than at an exact time. *Electronic Road Pricing* (ERP) is another method used in some cities, whereby peak period road use could be varied until the demand is spread to other hours. An initial study for implementing an ERP system for Colombo City was undertaken by the National Transport Commission in 2009. *Prohibiting delivery vehicles* during working hours is another method of separating goods transport to night times. All these methods have limited applications that could be proposed for metro areas in managing traffic demand peaks.

### **7.1.3 Re-distributions between the available modes of transport**

This is done in order to move persons from low occupancy modes such as cars and motor cycles to high occupancy modes such as buses and trains. This can be done by increasing the *quantity and quality of public transport*. Financial penalties including ERP may also be used for this purpose along with increase of *Parking Charges*. In some cities, reducing parking availability and imposing time limits for parking is also a strategy. *Car Pooling* where those who have similar spatial and temporal patterns of travel together rather than each person individually using a car is also encouraged in some cities. *Park and Ride* facilities are also encouraged, which enable people who would be travelling by private cars to park their vehicles away from a city and take a bus or train from there. The initial success of the City Liner program initiated by the National Transport Commission in 2009 is encouraging. Car Free Zones is another TDM measure. Restricting vehicles entering city centres by the last digit on a license number plate is another more drastic measure. The redesign of cities as *walking* or *compact* cities where mixed use is promoted also leads to shorter trip lengths where distances between work and home is reduced thus reducing the need for using a motor vehicles for commuting.

### **7.1.4 Global Best Practises in TDM**

Cities such as Singapore, Hong Kong, Tokyo, Osaka and Seoul have implemented a dual strategy of improving public transport along with direct or indirect traffic restrain measures. Their successes have come after experimentation with different interventions, public education and awareness campaigns. However, most other Asian cities have not quite succeeded in managing motorization. In this respect it is observed that the majority of European cities even though having higher incomes than Asian cities have managed to ensure that the majority of trips are made by public transport or by non

motorized transport. With weather that is conducive for walking and cycling, these cities have turned to non motorized travel as well as public transport. Many European cities also use buses especially for access to railways. The higher population density in these cities make them conducive for public transport and as such urban tram systems and suburban commuter trains are found to be well patronized. TDM measures require careful study before implementation. They also require more than one measure to be implemented in tandem in order to be effective. Measures such as ERP can become major revenue sources from which a fund could be created to support the development of alternate TDM measures that may not be financially viable. Furthermore, examples from countries such as Singapore reveal that public awareness and aggressive marketing is required to counter popular public view that unrestrained car ownership and use should be allowed.

### **7.1.5 Interventions in TDM**

The recommended interventions in TDM for further consideration are as follows:

#### **Infrastructure**

- Study should be made on promoting physical, fiscal and other measures of reducing the peak period travel, promoting park and ride, car pooling, flexible work hours etc. Study further the introduction of electronic Road Pricing and the potential creation of a transport infrastructure fund from such revenues.

#### **Institutional Strengthening/Policy Alignment**

- Set up an institutional link between Land Use Planning and Transport Planning in Metro Areas
- Re-establish a Multi Modal Transport Study and Planning Centre to undertake the study and development of TDM measures
- Set up an integration and coordination agency for land use and transport planning and development for CMR and KMR.
- Develop detail traffic plans that would set out areas as car-free zones, parking limitations and encourage walking and public transport use.
- Long-term public awareness campaigns and pilot projects should be developed.

## **7.2 Improving Railways in Metro Areas**

The Land Transport Policy stipulates moving passengers from road to rail as an objective. The railway is well positioned for this having four lines in four major corridors in the CMR and three in the KMR.

### 7.2.1 Railway Traffic Volumes

The railway passenger ticket sales between travel zones as identified by the railways for the years 2005 to 2009 have been analyzed in this study to determine the passenger flows on each section of track on the railway network (Figure 5.3).

As shown in Figure 7.1, the highest traffic demand on the railway network is currently on the Main Line between Dematagoda and Ragama at 144,000 passengers a day. In fact the entire section of the Main Line from Fort to Gampaha has over 115,000 passengers a day. The section from Polgahawela to Moratuwa a distance of nearly 100 km has a traffic level of over 50,000 passengers a day. The section from Polgahawela to Moratuwa a distance of nearly 100 km has a traffic level of over 50,000 passengers a day. The section of track spanning over 180 km between Kalutara, Ja-ela, Kurunegala, Alawwa and Padukka has around 15,000 or more passengers a day. As such the urban commuter traffic carriage by railways maybe considered to be quite satisfactory for Colombo Metropolitan Region (CMR). It carries a total of 233,000 passengers daily in this region which actually accounts for approximately 3/4<sup>th</sup> of its total traffic. This is significant when only around 300 kms or less than 1/4<sup>th</sup> of its total network is within the CMR.

Even though the railway carries only 4% of the national passenger modal share, in Colombo it increases to 10%. However the same cannot be said of Kandy, where it is only 1-2%. In fact the railway carries considerably low traffic levels outside of the CMR with traffic levels being less than 10,000 passengers per day across most of its network such as beyond Galle on the Coast Line, beyond Peradeniya on the Main Line, beyond Maho on the Northern Line, beyond Negombo on the Puttlam Line, beyond Padukka on the KV Line and the entire length of the Matale, Batticaloa and Trincomalee Lines.

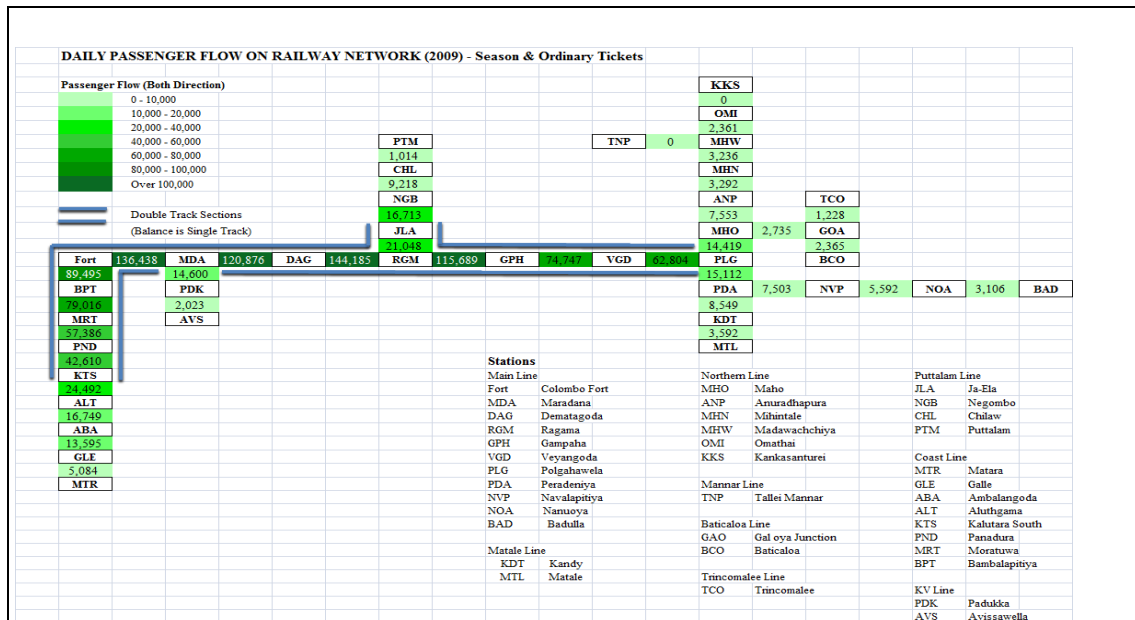


Figure 7-2: Railway Ridership (2009)

### **7.2.2 Railway Traffic Growth Rates**

The growth of passenger traffic on the railway for the period 2005 to 2009 reveals that the railway passenger market had reduced marginally. However, in the CMR there has been a low positive growth of between 1% to 7% p.a. on the Coast Line and a decline of between 2% to 4% per annum on the Main Line. Considering that railway fares during this time were increased by 50-60% for short distances travel, the performance of the railway in urban areas can be considered inelastic and stable. Outside the metropolitan region the performance has not been as favorable with annual patronage losses ranging from 2% to 27% expect in the northern areas where services were being restored during that time.

### **7.2.3 Railway Track Capacity**

The track volume to estimate capacity for the peak hour for each section of track based on International Rail Track Capacities was calculated for each section. The analysis indicates that only the section between Fort and Maradana has reached capacity during the peak hour. The section of track between Ragama and Gampaha shows unutilized capacity of between 20-30% during peak period. On the coast line, only 50% of capacity seems to be used during peak periods. On the Puttalam Line there is even lower utilization especially up to Ja-ela where double tracking has been recently completed. In areas outside the CMR, the track utilization is less than 1/3<sup>rd</sup> of what it can be even at the peak demand hour. This shows that train use can be improved considerably within the existing system. However, capacity improvement in terms of improved signaling as well as platform requirements may be required in order for this capacity to be made usable.

It seems evident however from the above analysis that even though spare track capacity exists on most lines, the section of track between Fort and Maradana which is a core operational section is currently a bottleneck. Since all train services in the CMR use this section, higher train operations will depend on increasing capacity in this section. From an analysis of train operations, it is evident that with the receipt of the 15 new power sets in 2008 intended to improve urban operations, total train operations have not increased even though reliability has improved. Around 50% of the traffic on the Mail Line is carried in the peak periods, while in some sections of the Coastal Line this increases to 75%. Hence greater utilization of existing track capacity should be a priority. However as discussed earlier, improving capacity in the Maradana-Ragama section would be a necessary pre requisite.

### **7.2.4 Railway Load Factors**

Even though the track capacity is underutilized, the passenger load factor on the urban trains is high. It means that the railway during peak periods is a preferred mode of transport and is constrained by capacity available. The double track sections (Figure 7.2) showing high load factors of between 159% and 291% indicate that capacity increments will attract even more passengers. Of the single track sections in the CMR, the track north of Ja-Ela on the Puttalam line also seems to require more trains with load factors being in excess of 100%. This may not be possible with the current single track and hence double tracking up to the international airport at Katunayake and to Negombo seem to be viable to divert atleast another 10,000 trips per day from road to rail. The KV line also shows similar operational characteristic indicating low track utilization but high load factors between Padukka and

Maradana. However the poor alignment of this track does not offer much hope for double tracking. Hence a technological replacement may need to be considered for this line such as a Light Rail option where higher two way capacity can be managed with limited crossing facilities. This should increase daily traffic to at least 20,000 during peak periods on this corridor which now carries the lowest railway modal share in the CMR.

With this two pronged railway development strategy, the peak hour railway traffic to Colombo, which is currently around 30,000 passengers, could be increased to around 45,000. This will reduce the burden on roads during peak hour flow from 90,000 to 75,000 passengers thus increasing railway peak period modal share from around 18% to 35%. In the case of the Kandy Metropolitan Region, it can be seen that the railway carries only 4,000 passengers in one direction which is around 1% of the daily traffic info to the city<sup>45</sup>. The fact that Kandy is served on three corridors but the single track does not allow providing high frequency operations as in Colombo. Double tracking and provision of urban commuter service on the 10 km track length has been estimated to enable diverting at least 10,000 trips from road to rail on this corridor increasing peak period railway share from 2% to 20%.

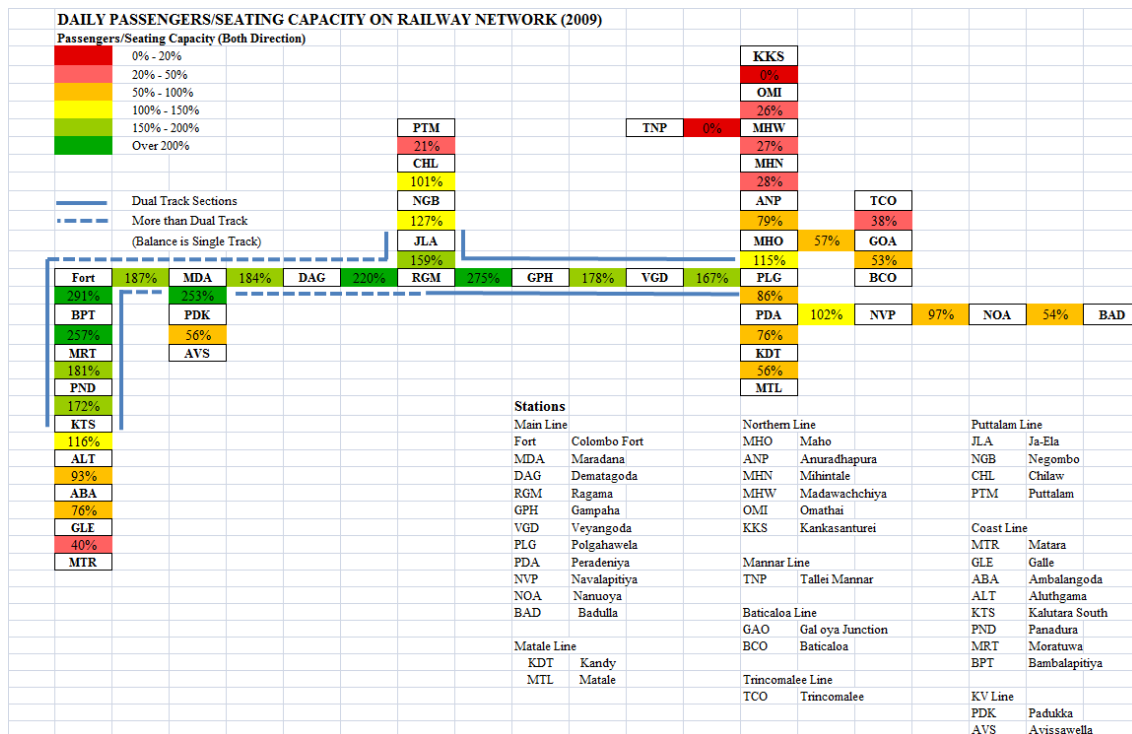


Figure 7-3: Average Railway Load Factor (2009)

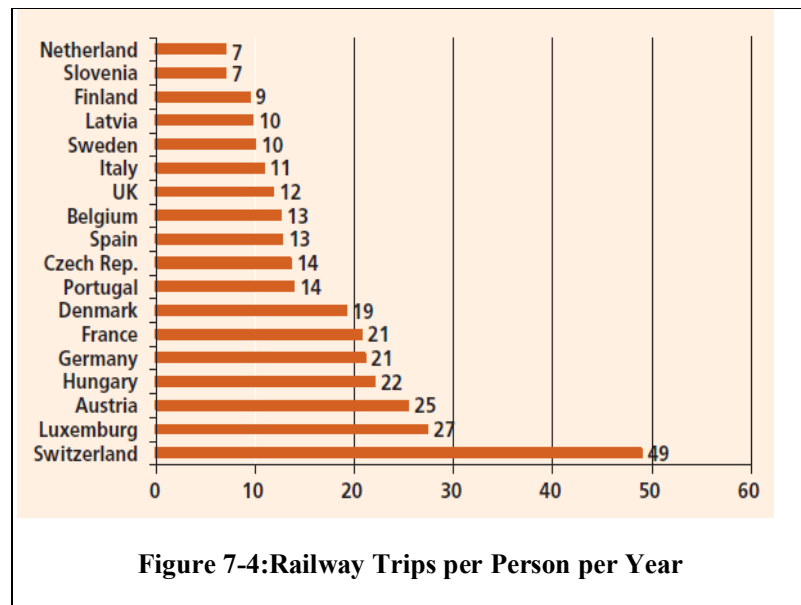
### 7.2.5 Global Best Practices in Railways

There have been several railway success stories from across the world that Sri Lanka could follow. In Sao Paulo, Brazil for example, the suburban railway system was decentralized in 1992, and then

<sup>45</sup> University of Moratuwa, Department of Transport and Logistics Management, Transport Study for Kandy Metropolitan Region, 2012

merged with the long-distance operations. Over 100 trains were replaced along with the improvement of 17 stations and rehabilitation of 26 km of track. Ridership has increased since then and level of service and safety improved with tariff being no higher than bus fares. In Rio de Janeiro, Brazil, a similar exercise has seen the ridership increase from 125,000 to 380,000. There are also several high capacity suburban systems in India such as the Mumbai Suburban Railway, Pune, Bangalore, Kolkata, etc., all of which carry large passenger flows with the Mumbai system having the world highest railway densities of 7 million passengers per day on a 465 km route length. Overall, these examples can be used to be motivated to change the management of the railways so that ridership in Sri Lanka's railway increases in keeping with trends in countries with similar population densities. Figure 7.3 shows the European per capita railway ridership for different countries. Sri Lanka at 5 railway trips per person per year should target to double or treble this over the next 20 years. This would still keep railway share at around 5% of the national modal share. However, its contribution during peak periods in urban areas would be very much higher ranging from 10-20%.

The railway could be developed as part of the multi modal transport system in both the CMR and KMR. Most other emerging metro centres are also connected by the rail network. However the railway in Sri Lanka has not shown any noteworthy progress to offer an expectation that such could be done without substantial institutional strengthening, policy realignment and investment as in many of the



above cases where reforms have brought greater use of the railways. The railway is currently unable to recover its operational losses. As a first step the cost of urban passenger carriage should be determined. These should be compared against the external cost of road transport dealt with in Chapter 2. As motorization and congestion increases, every railway line would reach a point where it would be more economical to transfer passengers from road to rail. It is likely that even at present lines within 20 km of Colombo and within 5 km of Kandy have reached this viability. Increasing off-peak patronage, increasing peak flow to reach capacities, reducing operational inefficiencies and costs, generation of revenue from non-core activities are alternate revenues sources that can make urban railways increase the financial viability as well. Operation of high-end services such as to the airport and for tourism also needs to be investigated. The development of the railway as an alternate transport network to the dominant road transport and buses also has value for use in emergencies and strikes.



## 7.2.6 Interventions for Urban Railways

In order to increase the railway traffic in the CMR and KMR the following interventions have been identified for further consideration:

### **Infrastructure**

- Increase track capacity between (i) Fort and Maradana and (ii) Ja-Ela to BIA and Negombo in the CMR and (iii) Peradeniya to Katugastota in Kandy.
- Increase track utilization on major corridors by improving signaling, station and platform facilities
- Change technology on KV line to LRT operation or similar up to Kottawa.
- Increase passenger carrying capacity to match projected increases in track capacity proposed as above in each corridor by operating more and larger trains during peak periods
- Increase frequency of railway operations in metropolitan areas during off-peak in order to provide competitive modal choice for travel.
- Establish fast high frequency connection between Airport/Negombo and city stations.
- Integrate railway with access to stations through measures such as Bus, Park and Ride, NMT to provide quality seamless travel demanded by high income users.
- Modernize stations and rolling stock used in metropolitan areas to attract high income users.
- Develop customer services and value added services such as integrated ticketing and Intelligent Transport Systems (ITS) applications for user information, coordination of inter modalism etc.

### **Institutional Strengthening/Policy Alignment**

- Improve commercial and customer service interests of the SLR
- Ensure adequate investment is provided and that investments are aligned to overall transport strategies aimed at targeted priority areas where railway traffic can and should be increased as opposed to system wide general upgrades and replacements.
- Enhance SLR's institutional capacity to provide a much higher quality of rail services and to carry a 100% increase in traffic during peak periods in CMR and potentially an increase of several-fold in Kandy area.
- Major management re-structuring should be undertaken in order to make the SLR a modern and efficient transport service provider in a competitive market.

## 7.3 Introduction of Rapid Transit

There are eight transport corridors in CMR which have more than 80,000 passengers per day. As shown in Table 7-1, two of these, the Kandy Road (Main Line) Corridor and the Galle Road (Coastal Line) have flows exceeding half a million passengers per day per in both directions. In KMR there are two corridors with daily passenger traffic exceeding 250,000 passengers and in CMR three corridors.

Table 7.1 also shows that the bus share is greater than 50% in 8 out of the 10 corridors. However it is considerably lower in two corridors where bus services have not developed adequately. For example the lowest bus modal share of 35% is on the Parliament Road/Cotta Road corridor where private

vehicle share actually exceeds bus shares even without a railway operation. The Negombo road also has a lower bus passenger share of 42%. Overall the 8 corridors in CMR carry 438,372 bus passengers daily constituting 55% of all passengers to the city. In KMR the two main corridors carry 154,625 passengers which increase to over 200,000 when the corridor from the east through Thennekumbura is also added. In the case of Kandy, buses carry around 70% of passengers to the city.

**Table 7-1 : Urban Corridor<sup>46</sup> Flows, 2005**

<b>COLOMBO CITY</b>						
<b>Corridor</b>	<b>Flow at CMC cordon (per day per</b>			<b>Passenger Flow (per direction)</b>		
	<b>Private Vehicle Passengers</b>	<b>Bus Passenger</b>	<b>Rail Passenger</b>	<b>Daily Demand</b>	<b>Peak Hour Demand</b>	<b>Options</b>
				<b>Passenger Flow</b>	<b>Passenger Flow</b>	
Parliament Road/Cotta Rd.	60,332	33,757	-	94,089	12,303	
Kandy Road	48,064	89,609	46,952	184,625	28,599	
Galle Road	35,512	113,468	33,403	182,382	27,962	
Negombo Road	39,570	60,386	20,122	120,077	17,831	
High Level Road	21,184	72,119	4,912	98,215	14,342	
Horana Road	24,234	31,080	-	55,314	7,570	
Dematagoda - Wellampitiya	9,431	18,831	-	28,262	3,956	
Orugodawatta - Wellampitiya	9,832	19,122	-	28,954	4,048	
<b>TOTAL</b>	<b>248,158</b>	<b>438,372</b>	<b>105,389</b>	<b>791,919</b>	<b>116,612</b>	
<b>%</b>	<b>31</b>	<b>55</b>	<b>13</b>	<b>100</b>		
<b>KANDY CITY</b>						
<b>Corridor</b>	<b>Flow at KMC cordon (per day per</b>			<b>Passenger Flow by PT(per hour per</b>		
	<b>Private Vehicle Passengers</b>	<b>Bus Passenger</b>	<b>Rail Passenger</b>	<b>Daily Demand</b>	<b>Peak Demand</b>	<b>Options</b>
				<b>Passenger Flow</b>	<b>Passenger Flow</b>	
Peradeniya	32,313	77,515	2,920	112,748	12,211	
Katugastota	23,418	77,110	3,172	103,700	12,201	
<b>TOTAL</b>	<b>55,732</b>	<b>154,625</b>	<b>6,091</b>	<b>216,448</b>		
<b>%</b>	<b>26</b>	<b>71</b>	<b>3</b>	<b>100</b>		

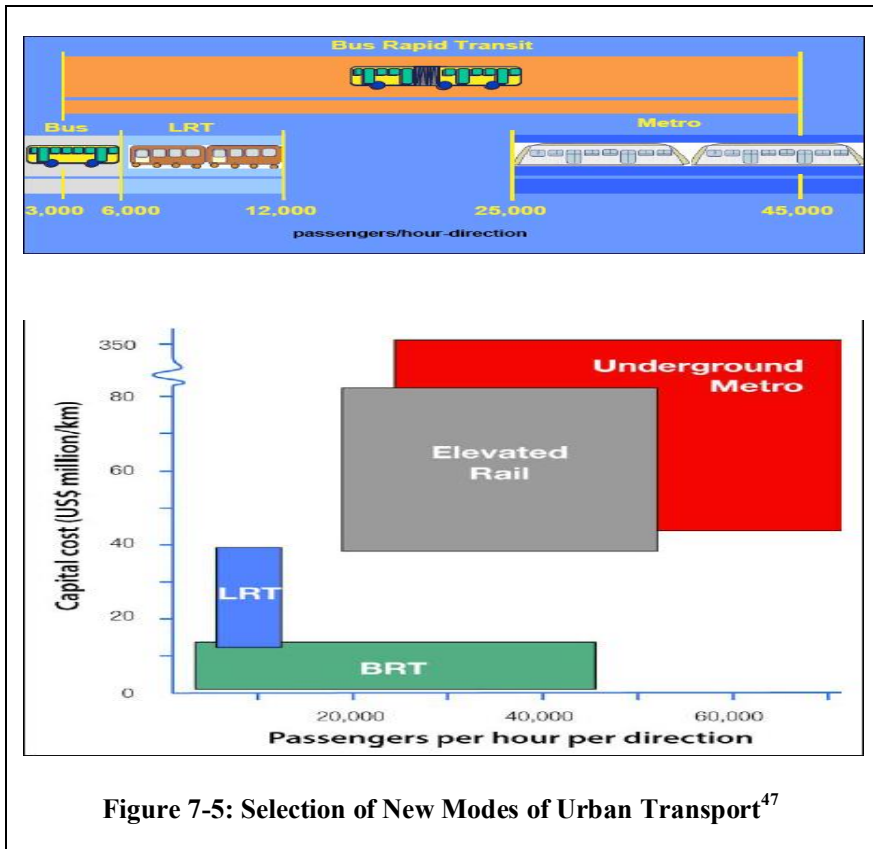
It is also seen that 7 of the 10 main metro corridors analyzed in Table 6.1 have a peak hour flow exceeding 10,000 passengers in one direction. Two of the corridors in CMR namely Kandy Road and Galle Road have over 25,000 passengers per hour. The number of buses on these corridors currently exceeds 200 buses per hour which makes bus operations slow and complex. Thus all these corridors could be considered for conversion to rapid transit in order to provide a viable public transport option that would be comparable to use of private cars. However some further study and analysis needs to be undertaken to determine the appropriate technology from BRT, LRT and Metros.

The global experience of best technologies for urban transport as a function of traffic demand during peak period and relative cost are given in Figure 7.4. Accordingly, it can be concluded that BRT and LRT are both viable modes with respect to the additional capacity that is required for both CMR and KMR. While Metros which are fully elevated or underground railway would have greater capacity and speed of travel they are estimated to cost more than USD 40 million per km. This cost is likely to

<sup>46</sup> The length of these corridors typically range from 10-30 kms in Colombo and between 5-10 km in Kandy

be difficult to justify on ridership alone as none of the urban corridors in Colombo or Kandy would exceed 30,000 passengers during the peak hour. Even if a metro line carries 50% of the total traffic on the corridor this would still be 15,000 passengers which is below the minimum threshold for metro or elevated rail. On the other hand, BRT and even LRT can be provided at much lower cost and is suited for volumes lower than 20,000 passengers per hour. Given that railway have potential for increased capacity on several corridors the role of a new mode of transport would be complementary.

For both CMR and KMR given that the metropolitan regions are not expected to grow much further,



the metros would be beyond the scope of the transport requirements for the next 20 years both in terms of passenger demand as well as in cost.

Table 7.2 gives the modes of transport recommended for Colombo and Kandy. The total traffic estimated for the year 2031 assumes that total passenger inflow to the city would grow by 2% per annum<sup>48</sup>. It also assumes that over the next 20 year period, maximum allowable private car

flow would be 50% more than what it is in the Base Year. This means that additional road capacity of 50% is expected from 2011 to 2031. It also assumes that the railway will be improved as discussed earlier with railway modal shares both in Colombo and Kandy increasing. Moreover, except for corridors where the total flow is less than 50,000 passengers a day, two modes of public transport have been recommended to provide multi modal choice.

<sup>47</sup> Source: EMBARQ, Pre-feasibility Study for BRT in Colombo, study for National Transport Commission, Sri Lanka, adapted from ITDP/GTZ Bus Rapid Transit Planning Guide

<sup>48</sup> It does not include potential generated traffic due to a new mode of transport being introduced. This would make justification of rapid transit more favorable. However such an increase even if it were to result in 30% more trips, is unlikely to yield adequate traffic to justify metro or elevated rail.

**Table 7-2: Proposal for New Modes of Transport in Urban Corridors (2031)**

COLOMBO CITY								
Corridor	Flow at CMC cordon (per day per direction)					Passenger Flow (per direction)		
	Private Vehicle Passengers	Bus Passenger	BRT Passenger	LRT Passenger	Rail Passenger	Daily Demand	Peak Hour Demand	Options
						Passenger Flow	Passenger Flow	
Parliament Road/Cotta Rd.	90,498	9,863	39,451		-	139,811	18,282	<i>BRT, Bus</i>
Kandy Road	72,096	-	120,082		82,166	274,344	42,497	<i>Rail, BRT,</i>
Galle Road	53,268	-	144,675		73,068	271,010	41,550	<i>Rail, BRT</i>
Negombo Road	59,354	-	48,647		70,428	178,429	26,495	<i>Rail, BRT</i>
High Level Road	31,776	36,059		78,107	-	145,942	21,312	<i>LRT, Buses</i>
Horana Road	36,351	9,169	36,674		-	82,194	11,249	<i>BRT, Bus</i>
Dematagoda - Wellampitiya	14,147	27,849			-	41,996	5,879	<i>Bus</i>
rugodawatta - Wellampitiya	14,748	28,276			-	43,024	6,015	<i>Bus</i>
<b>TOTAL</b>	<b>372,238</b>	<b>111,216</b>	<b>389,528</b>	<b>78,107</b>	<b>225,661</b>	<b>1,176,749</b>	<del>173,280</del>	
%	32	9	33	7	19	100		
KANDY CITY								
Corridor	Flow at KMC cordon (per day per direction)					Passenger Flow by PT (per hour per		
	Private Vehicle Passengers	Bus Passenger	BRT Or LRT Passenger		Rail Passenger	Daily Demand	Peak Demand	Viable Options
						Passenger Flow	Passenger Flow	
Peradeniya	48,470		84,034		35,034	167,538	18,145	<i>Rail, BRT Or L</i>
Katugastota	48,470		67,564		38,058	154,092	18,130	<i>Rail, BRT Or L</i>
<b>TOTAL</b>	<b>96,940</b>	<b>-</b>	<b>151,598</b>		<b>73,092</b>	<b>321,630</b>	<del>36,275</del>	
%	30	0	47		23	100		

There are altogether six corridors in Colombo and two in Kandy where bus passenger flows exceed 60,000 per day. The peak directional peak hour flow on these corridors would exceed 4,000 passengers. At such volumes BRT and LRT become feasible options. Bus flows become dysfunctional when routes have more than 6,000 passengers in the peak hour. This has been exceeded on three routes in Colombo and two in Kandy. Thus new a mode of transport is required as buses have outlived the volumes they can handle on these urban corridors.

### 7.3.1 Bus Rapid Transit (BRT) Systems

BRT attempts to combine the advantages of a rail system (notably a partially or completely dedicated right-of-way, so that punctuality and reliability are improved) with the advantages of a bus system (low construction and way maintenance costs, low vehicle costs, right-of-way not required for entire length, and the ability of feeder bus services to join a bus corridor). BRT services are usually compared to metro-quality rail, and normally results in consistently similar enclosed stations featuring smartcard turnstiles and level-platform boarding.

When available, the dedicated right-of-way lanes of BRT systems allow an increased average vehicle speed bypassing traffic congestion, to provide more passenger kms with the same number of vehicles and personnel than conventional bus services. A smoother ride can also be expected, because the BRT is not immersed in stop-and-go traffic. BRT services usually feature higher frequency service than conventional routes; BRT systems rely heavily on short headways to achieve their ridership capacity. But when compared to normal bus service in mixed traffic, addition of BRT dedicated lanes requires

wider roads or reduction of mixed traffic lanes as such they cannot be implemented everywhere. The ideal road width for a two-way BRT operation is given as 30 metres or six lanes. However, there have been some sub-standard designs on four lanes as well as incorporation of route splitting where directions are split to two adjacent parallel roads when the required width is not available on a single road.

### 7.3.2 Global Best Practices in BRT

The experience of Bus Rapid Transit in South America and its success where 97 cities have either introduced it or are planning to do so, argues well for its consideration in Sri Lanka. These have become popular especially in high to medium population density cities. In India 17 medium and large cities have or are currently planning Bus Transit Systems, ten of them under the Jawaharlal Nehru Urban Renewal Mission.

#### ***The BRT—A Success Story in Curitiba, Brazil***

*The popularity of Curitiba's BRT has affected a modal shift from car travel to BRT leading to a reduction of about 27 million car trips per year, saving about 27 million liters of fuel annually. In particular, 28 percent of BRT riders previously traveled by car. Compared to eight other Brazilian cities of similar size, Curitiba uses about 30 percent less fuel per capita, resulting in one of the lowest rates of ambient air pollution in the country. Today about 1,100 buses make 12,500 trips every day, serving more than 1.3 million passengers—50 times the number from 20 years ago. Eighty percent of travelers use the express or direct bus services. Best of all, Curitibaanos spend only about ten percent of their income on travel—much below the national average.<sup>49</sup>*



### 7.3.3 Identified Interventions for Rapid Transit

Accordingly the identified interventions for new modes of urban transport recommended for consideration are:

#### ***Infrastructure***

- Study and Introduce Bus Rapid on priority basis in order to arrest the continuing loss of bus ridership to private vehicles on following corridors:
  - **Colombo:** Kandy Rd; Galle Rd, Parliament Rd; Negombo Rd and Horana Road.
  - **Kandy:** Peradeniya Rd and Katugastota Rd (these could be LRT either)

The KV line may be converted to Light Rail (LRT) since initial studies do not indicate that the current KV line can deliver the level of service that is expected from a suburban railway

<sup>49</sup>Joseph Goodman, Melissa Laube, and Judith Schwenk, Curitiba's Bus System is Model for Rapid Transit,

service due to single track operation and high curvature. An LRT may be viable even if it costs more than BRT since it could essentially operated on its current right of way width, whereas a BRT would require 4 lanes of traffic for the same capacity.

The engineering details have not been assessed in this report. The right of way availability may differ on each road corridor as would the options for design. It is recommended that all seven corridors identified by examined for both LRT and BRT operations utilizing existing, road right of way, parallel roads, elevated or underground sections where required or new traces. One of the constraints for a BRT would be the available right of way on the major corridors serving the city. While the seven roads identified in Table 7.1 have road sections which have the required width there are also corridors where the road width is not available. Options that include reducing the space for existing vehicles, widening the roads, use of parallel roads, short elevated or new sections can be considered in such cases.

- New Multi Modal Terminals for bus and private vehicle access including park and ride at BRT/LRT stations.

### ***Institutional Strengthening/Policy Alignment***

It is required to develop a Public Transport Masterplan for Metro Areas which would include both bus and rail. This is a subject that currently does not fall within any particular transport agency and as such an agency to be made responsible for this should be identified.

Create a new institution that has the required capacity for managing rapid transit operations in urban areas and one which will:

- a. Determine Ownership, Management and Pricing policies with respect to BRT
- b. Set up a Coordination mechanism for transport in Metro Areas

## **7.4 Improving Bus Transport in Metro Areas**

Bus transport has a strong island-wide operational and commercial base that has evolved over 100 years but it needs qualitative improvements in order to retain its modal share. It is most likely to decrease sharply with increasing vehicle ownership over the next 20 years. On routes where BRT or LRT would be introduced the role of buses would have to be complementary. Their primary role would be to provide access to stations and not line-haul function. On other routes they would continue to provide vital services in orbital routes and access routes and on corridors where rapid transit is not viable. Bus services in an urban area would need to provide a two pronged service. On the one hand it has to provide basic services that are affordable across society and on the other hand have value added public transport options for those who can even afford private transport. In this respect it is recommended that air-conditioned urban bus services be given special consideration. The current service is made of vehicles that are very old and operating conditions quite unacceptable. Upgrading this to provide a regular service on commercial basis would require some assistance especially in the financing of modern vehicles. Improving route management would also be required so that scheduling

and operational parameters of services would improve. The quality of service, use of ICT for passenger convenience and user information would also be required.

#### **7.4.1 Global Best Practices in Improving Quality of Urban Bus Transport**

India under the Jawaharlal Nehru Urban Renewal Mission has provided many cities such as Thiruvananthapuram, with Low Floor buses to improve the quality of urban bus transport. Order have been placed for a further 7,815 buses under this one time financial assistance to the States by the Centre. Brazilian urban buses are operated by private enterprises under administrative contracts to local transport authorities. Usual contract duration is five-to-seven years, but competitive re-tendering may be avoided through a renewing option to be applied if incumbent presents good performance. A number of competitive bidding arrangement have been successfully employed around the world in managing buses in urban areas where operating issues are complex for single bus operators to provide an effective service. Yet another development is the use of ICT in bus transport in ticketing and especially in the use of smart cards and real time information.



#### **7.4.2 Interventions in Urban Bus Transport**

The required interventions in the urban bus sector are mostly technological and institutional. Currently there is little focus on reform of regulatory and management processes which will be pre requisites for developing sector capacity to provide high quality services.

##### **Infrastructure/Technological**

- Modernize the bus fleet providing air-conditioned services in metro areas.
- Introduce ICT enabled customer services including value added services for integrated ticketing, information etc
- Develop modern terminals and stops in CMR and other metropolitan areas.

##### **Institutional Strengthening/Policy Alignment**

- Implement route based management of services and demand based dispatching starting with the air conditioned services.
- Undertake re- routing and new services to improve bus service penetration to new residential areas and to provide direct access to Railway Stations.
- Train industry stakeholders in providing satisfactory customer case to retain modal shares starting with air conditioned services.
- Institutional Strengthening of Provincial Regulators and align regulatory practices to fall in line with strategy for developing bus transport in urban areas.
- Align procurement procedures to ensure that providers who can deliver quality services only are awarded permits starting with air conditioned services.

- Increase the award of concessions for low income operations in a bid to keep users in public transport.

## **7.5 Highway Development in Metro Areas**

The saying that ‘traffic fills space’ cannot be truer in an urban context where more highways simply lead to requiring yet more highways as cars fill any and every space that is created. This has happened to several new roads such as the Duplication Road opened in the 1980s, the Baseline Road in the 1990s and the Marine Drive opened two years ago. A city that is experiencing income increases that make owning a private vehicle possible, will end up with every household and every employee wishing to own and use a private vehicle to travel to or within the city. Without any limitation this will be the desired option. However, as discussed before, each city has its sustainable vehicle population. When faced with high population density and increasing incomes, the demand for road space cannot always be met at the same speed of growth in vehicle ownership and use. In fact it rarely can be met in a developing country context.

### **7.5.1 Analysis of Road Traffic in Colombo and Kandy**

There are 10 major road corridors for Colombo city and an estimated 200,000 vehicles bring the 750,000 people who arrive in the city by road. Of these vehicles 11,000 are buses and 15,000 goods vehicles. The balance 175,000 is private vehicles. Presently around 15% of the road space is utilized for bus transport even though they transport 55% of road passengers. On the other hand, 65% of the road space is used by private and hired vehicles which carry only 40% of the passengers<sup>50</sup>.

There are approximately 56,000 vehicles entering the Kandy City on a weekday. A total of 318,000 people arrive by road in these vehicles. All categories of private vehicles jointly carry only about 19% of passengers even though they consume around 65% of the road space. The number of buses entering the city makes approximately 4,800 trips carrying 200,000 passengers. At the same time there are around 1,000 school vans entering the city carrying over 16,000 passengers. The goods vehicles make up around 5,500 entries. The balance of nearly 45,000 private vehicles dominates the traffic flow carries around 100,000 passengers in to the city.

### **7.5.2 Impact of Roads in City Centres of Metro Areas**

A city has to decide if it wishes to continue to attract more business or to allow such growth to happen elsewhere. If a city wishes to continue growing, then there must be provision for more business and economic activities which require more people to come to work or for conduct of business activities into the city centre as well as for the necessary goods to move in and out of the city. In the period 1995 to 2005 it was found that the total number of vehicles entering the Colombo city increased by 52%, while the number of people entering reduced by 3%<sup>51</sup>. Simply speaking, more vehicles came to

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<sup>50</sup>Kumarage Amal S. and Janaka Weerawardena, Greater Colombo Traffic Management Plan, University of Moratuwa, 2008

<sup>51</sup> Kumarage Amal S. and Janaka Weerawardena, Greater Colombo Traffic Management Plan, University of Moratuwa, 2008



the city not more people. This is a symptom that people are squeezed out of a city when more vehicles enter on limited road space. In other words businesses seem to be migrating away from the city centres to peripheral areas where transport services are more difficult to provide.

This is amply demonstrated in the CMR where locations such as Battaramulla to where administrative functions have moved, Nawala to which hardware stores have moved, Maharagama and Kiribathgoda to which textile trade has moved have led to the creation of bottlenecks affecting the free movement of commuters along major corridors to the city centre. As the city centre becomes more inaccessible then it is assumed that more businesses would wish to move out to locations along the main corridors thus further stifling access to the city.

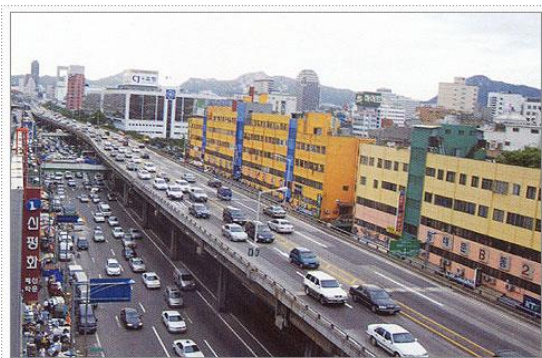
This effect is clearly shown in the table below that gives the TransPlan output for two urban expressways namely the Outer Circular Highway and the Colombo-Katunayake Expressway that are currently under construction. These two roads designed for speeds of 80 and 100 km/hr respectively are forecasted to have average speeds of around 40 km/hr within 10 years of opening and grid lock during peak period by 2031. The only solution at that time would be to keep adding more lanes or more expressways, a task many Asian cities are finding difficult to sustain given the cost and land constraints. The damage to urban landscape and quality of life by having to continue to provide more road space in urban areas is considered irreversible. Thus proposals to construct urban expressways other than when they would provide some priority public transport facility such as a BRT or bus priority lane should be discouraged.

**Table 7-3: Speed of Urban Expressways in Colombo 2021, 2031**

	2021	2031		Years to Double Capacity required to maintain Speeds
	Daily Average Speed (Km/Hr)	Peak Hour Speed (Km/Hr)	Peak Hour Speed (Km/Hr)	
Outer Circular (Kottawa-Ja Ela)	40.4	19.7	8.0	7-10 years
Colombo ó Katunayake	47.8	24.7	8.0	6-8 years

**7.5.3 Global Best Practices in Urban Expressway Consideration**

In the 1970s, it was considered a symbol of progress when the Cheonggyecheon River in Seoul, Korea, was covered and a road and elevated freeway were built above it. But by the year 2000, the Cheonggye area was considered the most congested and noisy part of Seoul, badly in need of revitalization, and people agreed that nothing could be done to improve the area as long as the freeway remained.



One of the key campaign promises by the Mayor who got elected in 2001 was to remove this freeway and restore the Cheonggyecheon River. He developed a dramatic plan to remove Seoul's major freeway and to accommodate the displaced traffic by building a BRT system and by cutting car use in half which was completed in 2005. San Francisco, Portland, New York, and Milwaukee all are deconstructing urban expressways. All four cities are undoing damage done to them by providing excessive access to city centres by replacing expressways with avenues and boulevards. Many cities worldwide are now resorting to encouraging high occupancy vehicles such as Bus Priority Lanes, BRTs and HOV (Car Pool) lanes on urban highways. These facilities are built into new roads by providing exclusive lanes.

#### **7.5.4 Recommended Use of Road Space for City Growth**

As such, new space that can be provided on new urban highways or through widening of existing highways should be given priority for higher occupancy vehicle use, so that more passengers can be transported as opposed to simply carrying more vehicles. In the Sri Lankan context of increasing vehicle ownership and high population density it would be considered a good practice not to build any new urban roads without explicitly providing facilities for public transport or for high occupancy vehicles.

Another important attribute of urban roads is the advent of road pricing especially through the use of Electronic Road Pricing (ERP). This is widely considered as a suitable proxy for congestion pricing and can bring economic value to be paid by users, especially when the demand for such space is at a premium. While Singapore took the lead in ERP in Asia, Japan and Hong Kong have followed together with several European cities. Last year, Indonesia announced 5 cities including Jakarta would have ERP. India and China are both proposing several urban ERP systems<sup>52</sup>. This is a recommended strategy for managing congestion on urban roads. Furthermore, road capacity could also be improved by traffic management measures including engineering of intersections and roads to provide for smoother flows. A ITS based advanced transport and traffic management systems should also be developed to manage speeds, parking and intersection control as well as congestion management.

#### **7.5.5 Interventions for Urban Highways**

The interventions recommended for urban highways are as follows:

##### **Infrastructure**

- New roads and road widening to accommodate public transport priority measures
- Upgrade existing links for capacity and speed on roads especially those of a radial nature which can promote traffic diversion away from urban centres.
- Identify and provide Missing Links to provide more direct connections between suburban areas with by-pass options to take traffic away from urban and suburban centres.

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<sup>52</sup><http://roadpricing.blogspot.com>

- Identify and provide missing links especially by upgrading roads of lower grade in order to provide direct bus routes and access to new communities.
- Improve capacities of existing urban roads through traffic management and traffic engineering of links and intersections as well as introduction of Intelligent Transport Systems (ITS) based advanced transport/traffic control system.
- Improve Road Safety by providing safer facilities for pedestrians and non-motorized users as well as reducing head-on crashes.

### **Institutional Strengthening/Policy Intervention**

- It is essential that the RDA develops a Road Development Masterplan for each metro area in which strategy for road building in urban areas are set out clearly so that road building can follow wider transport and urban development policies.
- Develop traffic management capacities in the RDA as well as the provincial and local government institutions handling urban roads.
- Investigate and implement traffic management methods (Electronic Road Pricing, Parking Controls etc) for urban centres such as Colombo and Kandy.

## **7.6 New Multi Modal Passenger and Logistics Nodes**

There is evidence from public transport passenger origin-destination data for Colombo<sup>53</sup> and Kandy<sup>54</sup> that the current transport hubs in both urban centres are both ineffective and inefficient. As such, there is a need to identify and develop a set of suburban multi modal transport nodes for passenger transport that would move the current bus operations from the centre of Colombo and Kandy to new nodes that are better located. The evidence of passenger origin-destination patterns indicate that interchanges of expressways with major roads should be developed as modern multi modal hubs for the future. One important aspect would be not to overload urban areas with inter-provincial travel. Locations such as Katunayake, Kottawa, Biyagama and Ragama are proposed for Colombo, while Katugastota and Peradeniya have been proposed for Kandy based on the origin destination flows of the respective regions. In almost all these cases, these would be adjacent to railway stations where the advantage of having a bus station would be that access to the railway is increased. Currently in most of these locations the bus terminal is located away from the station so that access by bus to railways is less than to other buses. .

There are estimated to be 15,000 goods vehicles movements made to and from the city every day. Beside this, there are perhaps twice as many freight vehicle trips circulating within the city. Around 2,500 of such movements are made to and from the Port. This includes containers, tankers and trucks. Thus around 10% of all goods movements within the city are related to trip ends in the Port<sup>55</sup>. Surveys however show that around 50% of such movements are empty, underlying the lack of coordination in

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<sup>53</sup> University of Moratuwa, Department of Transport & Logistics Management, CMR Transport Database, 2011/12

<sup>54</sup> University of Moratuwa, Department of Transport & Logistics Management, Kandy Transport Study, 2011

<sup>55</sup> Kumarage Amal S and Janaka Weerawardena, Greater Colombo Transport Management Plan, University of Moratuwa, 2008

securing return hauls for freight vehicles. The other significant freight vehicle generators in the CBD of Colombo are the vegetable market and the dry goods and hardware markets. Heavy movement of goods vehicles in such dense areas, results in road congestion.

The origin-destination of freight transport flows also indicates that commodity based logistics centres should be set up at strategically located nodes. This is especially so for increase in transport in internal trade and the increase of travel between provinces. The same locations could be developed for freight transport hubs. The movement of warehouses and distribution centres from urban CBDs to peripheral locations would also enhance domestic trade between provinces. Providing a railway connection between the port and such logistics centres would also lead to substantial reduction in demand for road space within Colombo City.

### **7.6.1 Identified Interventions for Improving Multi Modal Nodes**

#### **Infrastructure**

The following recommendations can be made for establishing multimodal nodes for both public transport and freight in CMR:

- At Kottawa ó where Southern Expressway, Outer Circular Road, A3 Highway to Ratnapura and KV Line Railway meet.
- At Biyagama ó where Outer Circular Road and Low Level Road meet, with potential for new railway track and IWT on Kelani River.
- At Ragama ó where Outer Circular Road and A3 Highway to Puttlam meets as well as the Puttlam and Main Lines of the railway.
- At Katunayake- where the CKE and the A3 Highway to Puttlam can be served as well as the airport and the Puttlam railway line.

The following recommendations can be made for establishing multimodal nodes in KMR:

- At Peradeniya ó where the A1- Colombo Road, A5 Nuwara Eliya Road and Main Line of the Railway meets.
- At Katugastota ó where the A9 ó Kandy-Jaffna Road, A10 Kandy- Kurunegala Road and Matale Line of the Railway meets.

#### **Institutional Strengthening/Policy Intervention**

Such multi modal centres would require planning between a multitude of agencies. The lead for such would require to be taken by a centralized metropolitan transport authority.

## **8 Improving Inter Provincial Connectivity**

Improving inter-provincial connectivity in Sri Lanka was identified as the second most important strategy to fill the transport sector gaps discussed in Chapter 6. In this respect, the poor condition of the existing road network as well as the poor quality of the public transport network identified earlier as being outdated, needs to be considered for improvement.

Moreover, inter-provincial connectivity should also move away from being completely road based and offer choice in movement of passengers and goods to users. In this respect, fast connections are required from provinces to:

- Ports/Airports
- Other provinces
- By pass the congested Western Province

### **8.1 Ports& Logistics**

As a strategic intervention, the Mahinda Chinthanaya 2010 sets out to transform Sri Lanka to a dynamic global maritime hub.

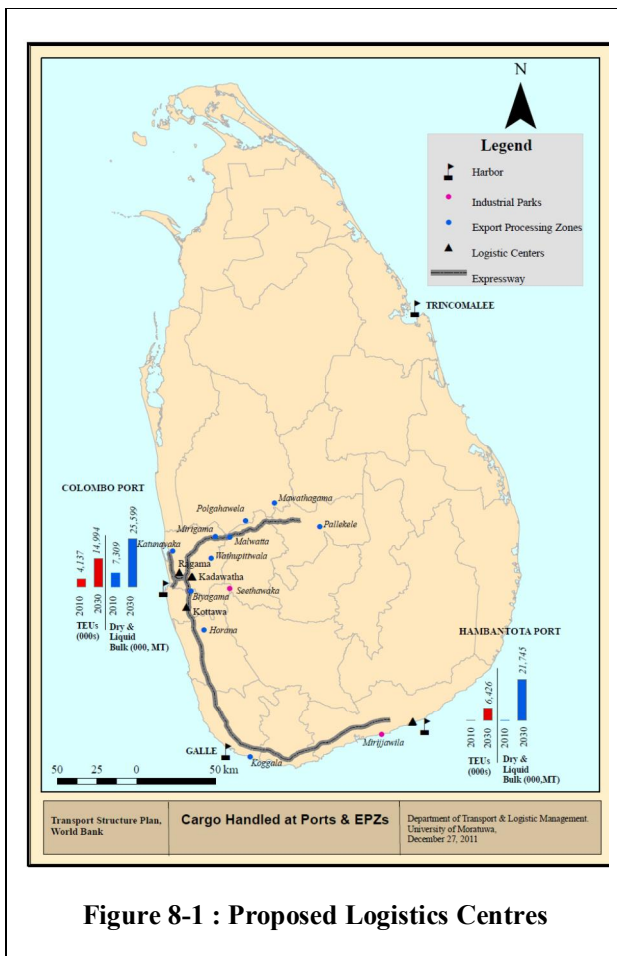
#### **8.1.1 International Ports**

The container traffic in the Port of Colombo in 2011 exceeded 4 million TEUs and is expected to grow at between 6 to 7 percent per annum for the next 20 years, reaching 15 million TEUs by 2031. In this respect, investment in ports is aligned to transform the economy towards a maritime hub. Whilst congestion in the Port of Colombo is a growing problem the first concession on the long delayed expansion, through the first phase of the Colombo Port Expansion Project, the South Container Terminal, scheduled to commence operations in 2014, will add 2.4 million TEUs of container throughput capacity in Phase I and include the Port of Colombo among the list of global ports capable of servicing the latest generation of the largest container vessels afloat. The project, when completed is expected to increase total capacity to 12 million TEUs. The land access to the Port of Colombo is considered a problem as the port is located within the CBD of the city. Currently all passenger and freight movements are by road and even movements within the port are becoming difficult. The plan to have a rail connection to an ICD at Peliyagoda or suburbs is a step in the right direction. However it is not clear if all container movements can be accommodated by rail especially when the South Port begins operations. This should also be considered in a future freight transport study.

In addition the Phase I of the Hambantota Mahinda Rajapakse Port was completed in 2010. It is currently intended to be used for break bulk cargo, vehicles and liquid cargo. While the traffic to this port is yet to develop, it has the potential to develop as an alternate port to Colombo especially for import and export cargo and even for coastal shipping. The extension of the Southern Expressway to

Hambantota<sup>56</sup> is currently under design as is the extension of the Coastal Railway from Matara. The availability of land in Hambantota for logistics and distribution activities makes Hambantota a potential alternate node for international shipping and logistics. Hambantota Port is also suitable to arrange repair facilities, even though most of the support services and inputs have to be provided from Colombo at least for a period. Hambantota's value as a service port is significant but efficient and high quality services would be required.

The biggest concern in the sector however is if the Sri Lanka Port Authority revenues can bear the running expenses of the island's ports as Galle, Trincomalee, Hambantota, Oluvil and KKS ports which are all expected to make heavy losses on top of the loan repayments of the new port projects. The on-line clearance initiated by the SLPA is a positive trend that is expected to include customs clearance and banking when fully implemented. The initiative by the Ministry of Transport to study a location for an Inland Container Depot is also a positive step. Meanwhile, the SLPA has announced plans for the setting up of such a facility at Peliyagoda highlighting the need for greater inter-agency coordination.



**Figure 8-1 : Proposed Logistics Centres**

### 8.1.2 Logistics Centres

The connection of the Southern Highway to the Outer Circular Highway as presented in Figure 8.1 shows how the Hambantota Port could be connected to the expressway network and other roads for island wide distribution from Hambantota. This connection could be used to relocate the current warehouses and distribution centres from Colombo City and its suburbs to locations along the OCH and Southern Highway. These centres could be developed as Logistics Centres for facilitating distribution of import and export goods as well as domestic trade including agricultural produce such as vegetables, fruits and rice. Encouraging the location of logistics centres with railway access could facilitate a higher use of the railway for different types of cargo. The railway however has to make freight transport a priority activity in order to attract such traffic. It also requires a policy change in making its limited resources available for freight transport. The railway

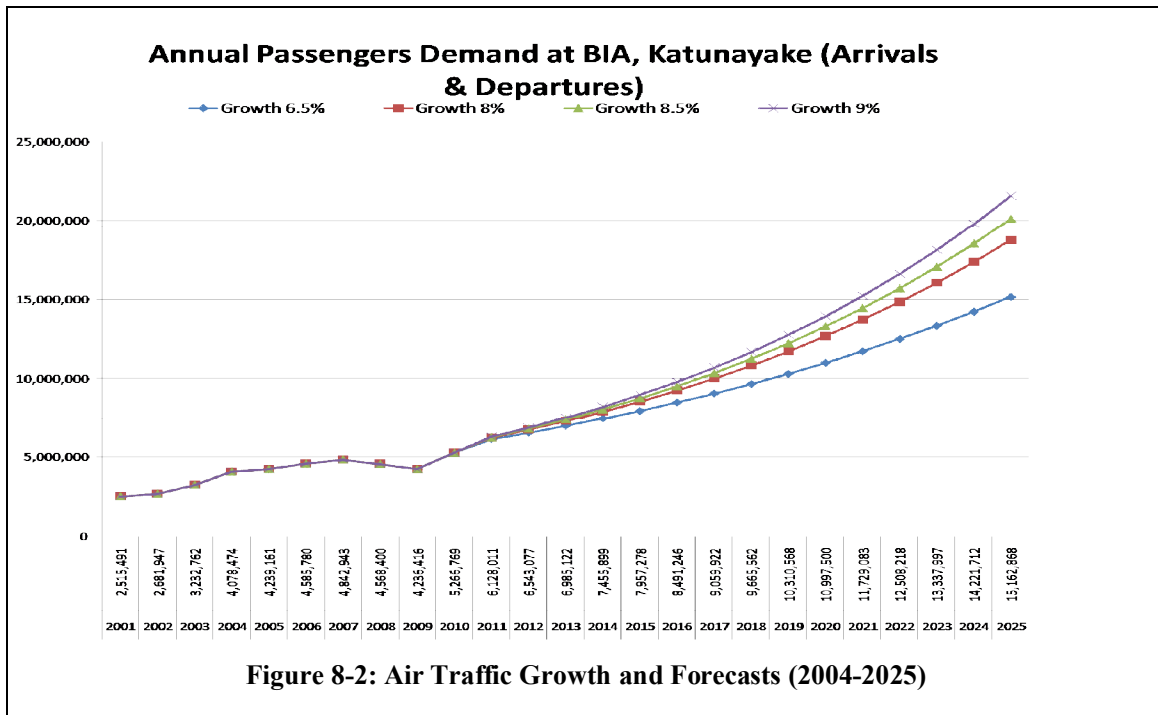
<sup>56</sup> Department of Transport & Logistics, University of Moratuwa, Feasibility Study for the Extension of the Southern Highway, 2008

also requires substantial investment in rolling stock, warehousing and loading and unloading equipment. The logistics centres could also be located near ports such as Hambantota, Galle, Oluvil and Trincomalee in order to encourage the use for coastal shipping from these ports to other ports.

## 8.2 Airports

Sri Lanka has currently one international airport, the Bandaranayake International Airport at Katunayake. The second international airport is being constructed at Mattala about 25 km north of Hambantota and its new port. There are 13 domestic airports scattered around the country and several waterdromes that have been commissioned for tourist based aviation operations.

The aviation industry has continued to enjoy rapid growth on the passenger front as a result of an upsurge of travel. Srilankan Airlines augmented its fleet during the year and added both destinations and frequencies to their network supplemented by Mihin Lanka, although both carriers continue to operate at a considerable loss. While passenger throughput increased by 13% this last year, cargo volumes and revenues fell on the back of a significant decline in exports, even though there was marginal growth in import and transshipment volumes. Plans to improve and grow the domestic aviation segment appear to have generated renewed interest in the sector with several applications being received by the Civil Aviation Authority for air operator certificates, one of which commenced operations recently.



### 8.2.1 International Airports

Total passenger volumes handled by the BIA have crossed 6 million in 2011 with around 800,000 tourist arrivals recorded. The airport is serviced by around 35 airlines. The projections estimate traffic growth to reach between 15 and 22 million by 2025. It would necessary to provide a modern multi-modal transport hub at BIA and also to improve railway travel to the city centre as well as to provide improved road access between the different places of tourist interest and resorts. Its freight handling capacity was recently boosted to 300,000 metric tons even though traffic seems to have reached a plateau at around 130,000 metric tons since 2009. The ground access to the BIA will get a boost with the opening of the four-lane Colombo-Katunayake Expressway (CKE) in 2014. However public transport access including to the railway as well as for bus connections have not been adequately integrated for passenger convenience. A special train operated by the airport was not successful for the same reason. Extending the railway line to the terminal building and running regular trains at 30 minute headways would be required to attract airline passengers to use railways. A modern bus terminal with regular services to key tourist and provincial destinations is also recommended.

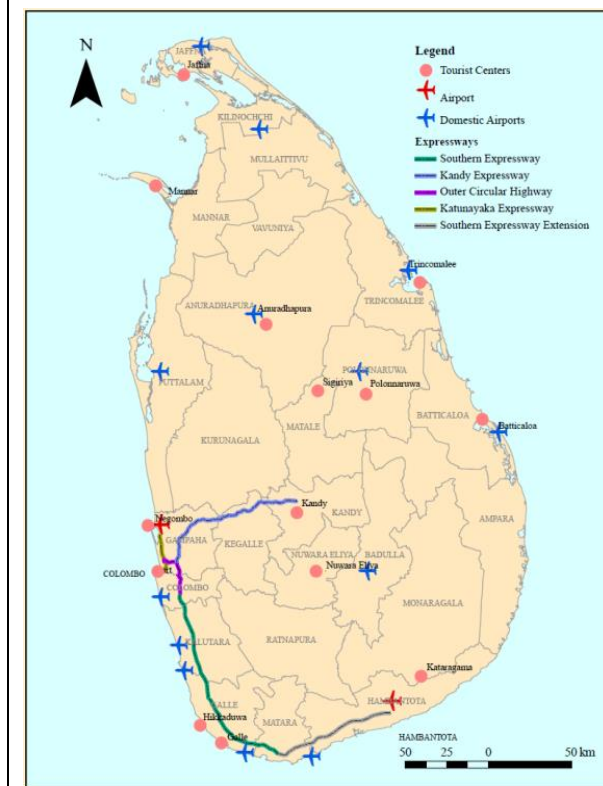
The opening of the Mattala International Airport in 2013 is also expected to become a destination for tourists arriving especially for destinations in the southern part of Sri Lanka. The proposed extension of the Southern Highway would be an attractive link to Colombo. The linkage to be provided between the port and the airport is also designed to connect both these to a logistics park.

### 8.2.2 Developing Domestic Airports

Domestic air transport even though beginning to become popular again, has been largely undeveloped especially due to the many restrictions being imposed on domestic flying during the period of conflict. Coupled with poor land transport speeds, air travel is a potential mode of internal transport for those with higher incomes and for tourists especially to reach the more distance parts from Colombo such as the east coast resorts and the north.

However, flights have resumed based on promoting tourism in the country. Helicopter operations have grown nearly 100% during post war showing the potential of developing domestic aviation in the light of leisure and tourist operations. Destinations covered by current scheduled operators including, ExpoAir, Heli tours and Sri Lankan Air taxi are; Jaffna, Trincomalee, Batticaloa, Ampara, Vavuniya, Anuradhapura, Kilinochchi, Bentota, Koggala, Dikwella, Kandy and

**Figure 8-3: Domestic Airports and Proposed Expressways**





Nuwara Eliya. The average return fares range between Rs. 6,000 to 24,000 depending on the destinations. Charter operators offer services to customized destinations. Current rates vary between 500 to 2000 USD depending on the destination.

However with the expressway network being planned, it is necessary to complement their development with road access. It is expected to see a boost in domestic operations with the government policies to promote tourism in the country. Ratmalana-Jaffna route which was making profits during the war has ceased operations with the popularizing of cheaper road transport. The proposed city airport development at Ratmalana is estimated at Rs 500 million, while the costs for Amparai, Koggala China Bay and Jaffna is given as Rs 410 million, 203 million, 265 million and 600 million respectively.

A further Rs1000 million is estimated for the initial development of the tax free shopping mall at BIA. USD 25 million is estimated for the Airport Hotel project for 300 rooms. AASL will look for funding for these public investments in developing the above infrastructure. Mattala is also expected to have similar opportunities for funding in terms of supportive business infrastructure. Though the Act presumes AASL's monopoly in airport ownership and operations; private interventions would be feasible in managing commercial/ non aeronautical operations, especially in the areas of terminal sales, shopping malls, car parks, surface transport access, airport hotels, conference facilities etc.

### **8.3 New Expressways**

In this respect the several interventions are required for planning and funding the extension of the expressway network that satisfies the above criterion while satisfying the overall socio-economic objectives of regional development.

The Figure 8.4(a) shows that current demand for travel between district capitals as estimated by TransPlan demand estimation model. The thickness of the desire lines indicates the traffic volumes. The Colombo-Gampaha district flows show two way traffic flows exceeding 100,000 vehicle trips per day while Colombo-Kalutara records over 50,000 trips. Other major destinations such as Kurunegala, Kandy and Galle fall below 20,000 trips per day. Much of the traffic is currently metropolitan or regional by nature. Inter-provincial traffic is still quite small and in most cases the flows are less than 10,000 per day.

As shown in Figure 8.4(b), the current expressway network requires a number of extensions to cover parts of the country that are required to be connected to each other for rapid development. These are areas where the vehicle access is currently quite low but where extensions need to be studied in the future. The possibility of high speed railway connection with India at a future date should also be borne in mind. These should then supplement the expressway network and the existing railway network. Some direction for such a network is also indicated.

#### **8.3.1 Interventions for New Expressways**

- Undertake an Expressway Extension Plan as a priority step
- Funding of the following extensions that have been identified already including the investigation of private funding on BOT or JV basis:
  - Colombo-Kandy Alternate Highway (up to Mirigama)

- Northern Expressway from Mirigama northwards
- Kandy Expressway from Northern Expressway to Kandy
- Set up long-term maintenance funding program

## 8.4 Improving Existing Highways

The existing highways connecting provinces should also be developed for speed, safety and capacity. In this respect the following general interventions are proposed. Currently less than 50% of the length of the national road network has been rehabilitated in the last 20 years. This still leaves around 6,000 km of road length to be rehabilitated.

### 8.4.1 Interventions for Improving Existing Highways

- Rehabilitation of Trunk Roads for increasing speed, capacity and safety.
- Providing by-passes to urban centres
- Traffic management on national road network
- Reservation of Street Lines for future widening
- Upgrade roads to National network and provide missing links
- Implement Safety Audits on all roads having more than 10,000 vehicles per day.
- Set up long-term maintenance funding program

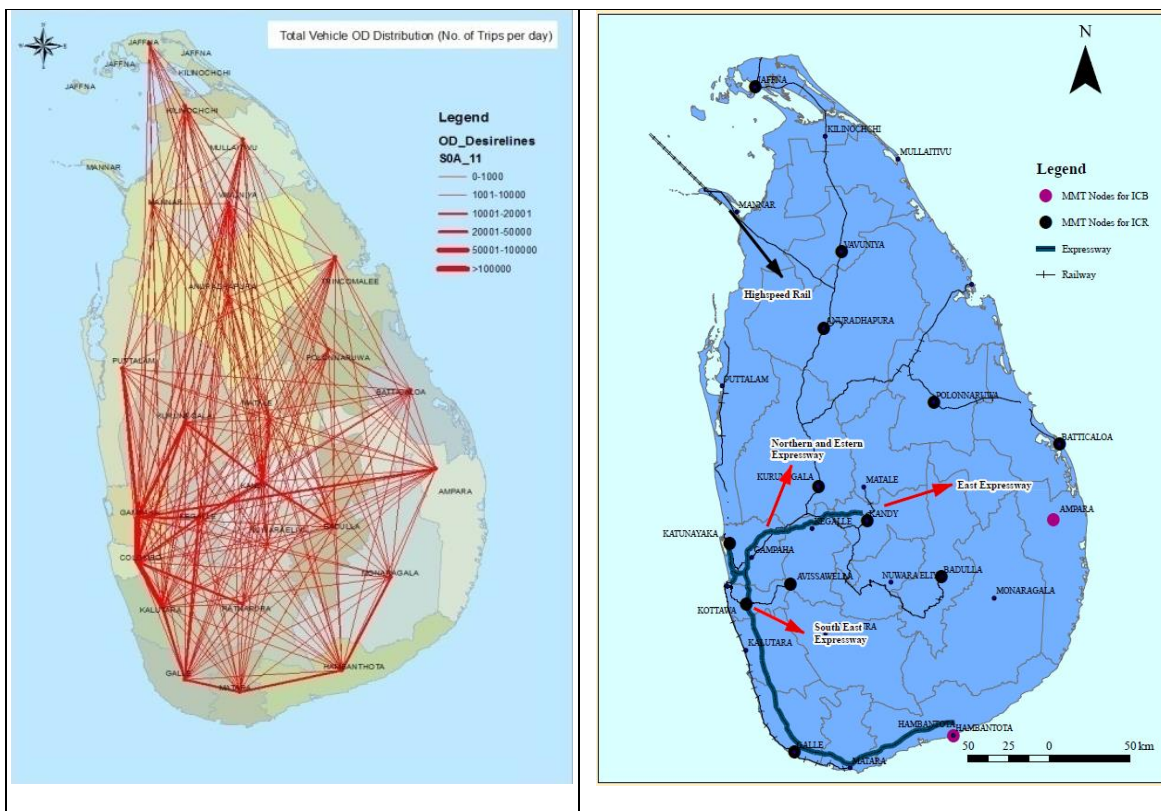


Figure 8-4: Inter-Provincial (a) Demand for Vehicle Trips and (b) Proposed Expressways

## 8.4.2 Regional (South Asian) Transport Connectivity

Regional Transport in Sri Lanka's context refers to its connectivity to the South Asia region referred to as the SAARC region. Currently passenger movement out of Sri Lanka is confined to air travel, while goods transport is mostly through maritime transport and to a small extent, air. Since Sri Lanka is an island and as there is no land bridge across the Palk Strait, there are no international intra-regional roads or railways at present.

## 8.5 Improving Long-distance Railways

While it is understood that owing to the geographical size of the country, the railway in Sri Lanka is unable to compete in all passenger and goods transport markets for long distance travel, there are potential markets where the railway can penetrate by providing a competing service to road transport. These can be identified as follows:

Country	Modal Share [%]
 Austria	9.8
 Belgium	6.9
 Denmark	9.0
 France	9.2
 Germany	7.7
 Hungary	12.6
 Japan	27.0
 Netherlands	8.3
 Sweden	8.2
 Switzerland	16.4
 United Kingdom	5.9
 United States	0.3

**Figure 8-5: Global Railway Modal Shares**

i. **Long-distance passenger transport:** by providing modern, convenient, comfortable, accessible and competitively priced road passengers services, long-distance passengers can be attracted to rail where road capacity is unable to handle passengers moving from buses to private vehicles. In this respect, high quality intercity rail services could be operated at regular frequency to destinations that are just outside the urban area. Moreover, railway has a captive market for destinations over 200 kms when compared to road transport. This distance however would increase when expressway are built.

ii. **Port-related cargo:** all port cargo, especially in and out of the Colombo Port could be carried by rail to Inland Container Depots (ICD) and logistics centres prior to re-distribution by road and rail. Freight services to destinations such as Trincomalee, Vavuniya and Jaffna could be considered financially viable.

iii. **Support tourism sector:** by providing customized services to the airport as well as to other tourist destinations including resort areas and the up country.

These are markets that could be developed for the railways. The railway as an alternate mode of land

transport has an intrinsic value for Sri Lanka's transport sector. It is noted in Figure 8.5 that several European countries have achieved this even with high vehicle ownership. A separate railway masterplan study should be undertaken to identify the viability of expanding each of the above sectors.

### 8.5.1 Proposed Interventions for Long-distance Rail Services

Undertake a study to determine the viability of improving long distance intercity, freight and tourist services which will include:

- Improving track utilization by improving signaling, crossing facilities and stations capacities and track speed to operate regular (hourly) Intercity Express Trains to Kandy, Kurunegala and Galle.
- Operation of Intercity Express Trains to destinations which are over 200 kms from Colombo where railway can effectively compete with road speeds for example Anuradhapura, Jaffna, Trincomalee, Polonnaruwa and Batticaloa.
- Providing the required high quality rolling stock for long distance travel including air conditioned coaches and sleeping berths where required.
- Improving selected stations for tourist/recreational travel and provide rolling stock required for same.

### 8.6 Improving Intercity Bus Services

There are currently over 3,000 intercity buses plying on 327 bus routes carrying around 300,000 passengers daily. Over 90% of these buses terminate in Colombo while passenger trips ends indicate that around 70% trip ends are in WP. The heavier bus corridors such as the Colombo-Kandy and Colombo-Galle services carry over 10,000 passengers per day. Providing these bus services is considered a profitable enterprise.

Figure 8.6 shows the long-distance passenger flows between districts. The lines indicated in red are the connections where the railway can provide a better service than buses and as such railway ridership between these districts should be promoted. In the case of the other lines which are in purple, there are no railway connections at present so that bus transport should be promoted. However some of these will also change with the ongoing restoration of the rail connection to the north. Commencing more direct services between provincial centres would improve inter-provincial connectivity and provide services without going through the congested WP and the equally congested central bus terminals in Colombo and in Kandy.

#### 8.6.1 Proposed Intervention for Intercity Bus services

The interventions in this respect are also mostly

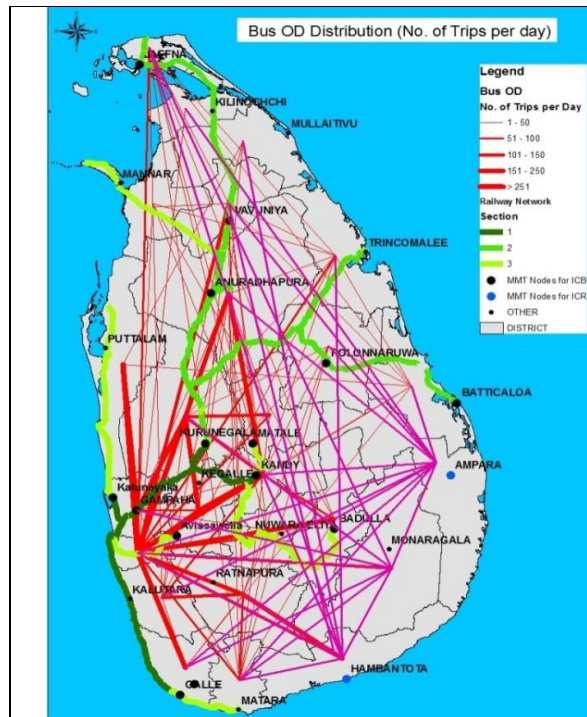


Figure 8-6 : Long Distance Passenger Flow between Districts

institutional and policy re-alignment.

- Modernize buses on Intercity Routes starting with air conditioned services
- Commence direct routes using new roads that have been improved in recent years.
- ICT enabled value added customer services for integrated ticketing, information etc
- Institutional Strengthening of National Regulator for better management of routes and services.

## **8.7 New Multi Modal Terminals**

In pursuit of a new travel pattern that suits the modern economic and trade flows, it is essential to create a network of Regional Multi Modal Terminals for improved transfer between bus and rail as well as between buses. The multi modal terminals are where convenient transfers between bus and rail should be facilitated.

From the preliminary analysis shown in Figure 8.6 the locations suitable for passenger terminals are Jaffna, Vavuniya, Anuradhapura, Dambulla, Avissawella, Badulla, Galle, Hambantota, Amparai and Katunayake (BIA). Of these Hambantota and Dambulla are two locations without railway access to which new rail lines have been proposed. Amparai is the only other location without railway access. Adequate data is not available to determine the locations for the freight transport centres.

### **8.7.1 Interventions for Multi Modal Terminals**

#### ***Infrastructure***

- Develop Railway facilities and rolling stock for Long-Distance Freight (200 km and over)
- Develop Railway for Port Access & ICDs for Colombo (ADB funded project is ongoing)
- Study the viability of setting up Modern Multi Modal Logistics (Distribution) Centres at:
  - Western Province: (possibly: Ragama, Kadawatha, Biyagama, Avissawella)
  - Nationally (possibly: Dambulla, Anuradhapura)

#### ***Institutional Strengthening/Policy Alignment***

- Improve Commercial and Service interests of SLR for Freight
- Align policy on prioritizing Railway Use for Freight

## 9 Conclusion

### 9.1 Evaluation of Intervention Scenario

In this chapter, the Intervention Scenario formulated in Chapter 7 and detailed in Chapters 8 and 7 has been evaluated against the BAU scenario discussed in Chapters 4 and 5. The new modal shares as estimated by TransPlan and DEMIDEPT models for the alternate policy for the forecast year 2031 are given in Table 9.1.

The transport sector interventions recommended in Chapters 7 and 8 under the Intervention Scenario include:

- Improve quality and capacity of railways services so that the national railway modal share will increase from 4% in 2011 to 10% in 2031, arising from the proposed increase of metro modal share from 10 to 20 percent and an increase in intercity passenger and tourist travel as well.
- Introduce BRT on the main metropolitan corridors, quality improvement as well as institutional and regulatory interventions in metropolitan regional passenger transportation. As such the national bus modal share will be arrested at 24% instead of dropping down to 20%.
- ERP and other traffic demand management (TDM) measures to be in place.
- Improve capacity and quality of Freight Railways inducing an increase in modal share to 6%.
- There would be only 7 million motor vehicles in 2031, 800,000 units less than the BAU scenario.

<i>2031</i>					<i>7.0 mn Motor Vehicles</i>	
<b>Mode</b>	<b>Vehicle km Operated (mn)</b>		<b>Passenger km Carried (mn)</b>		<b>Ton km Carried (mn)</b>	
<b>Bus/BRT</b>	1,655	2%	55,177	24%		0%
<b>Railways</b>	35	0%	21,461	10%	1,177	6%
<b>Private Vehicles</b>	70,646	71%	112,797	50%		0%
<b>Para-Transit</b>	9,354	9%	26,652	12%		0%
<b>Goods/Land Vehicles</b>	18,083	18%	9,632	4%	18,225	94%
<b>Water Transport</b>	3	0%		0%	32	0%
<b>Total</b>	<b>99,759</b>	<b>100%</b>	<b>225,719</b>	<b>100%</b>	<b>19,435</b>	<b>100%</b>

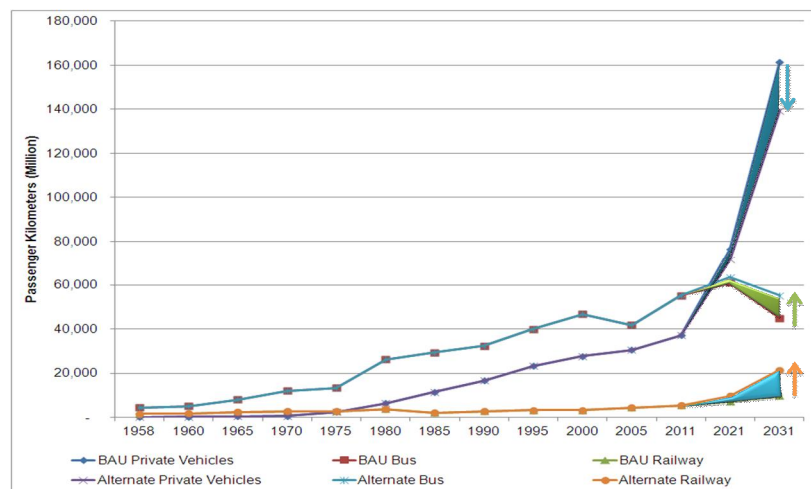
**Table 9-1: Transport Sector Performance under Intervention Scenario**

Table 9.2 shows the differences between the BAU scenario and the Intervention Scenario in 2031. This shows that an estimated 11,402 million vehicle kms per annum including around 800,000 (around 10%) of the vehicles could be taken off the road network without reducing the passenger kms through the Intervention Scenario. This translates to 10% of the passengers being retained in public transport with buses operating 532 million kms additionally and trains 18 million kms additionally. The value of saving from Vehicle Operating Cost from these interventions is estimated to be over Rs 300 billion per year. Thus the twin strategies seem to have favorable economic rates of return. Further assessment of these should be under a more detailed study of the specific interventions and their benefits.

2031			800,000 Vehicles less			
Mode	Reduction in Vehicle km Operated (mn)	% reduction	Reduction in Passenger km Carried (mn)	% reduction	Reduction in Ton km Carried (mn)	% reduction
Bus/BRT	-532	-1%	-10,231	-5%		0%
Railways	-18	-110%	-11,771	-5%	(549)	-3%
Private Vehicles	9,607	10%	15,339	7%		0%
Para-Transit	1,782	2%	6,663	3%		0%
Goods/Land Vehicles	545	1%	0	0%	549	3%
Water Transport	0	0%	0	0%	-	0%
<b>Total</b>	<b>11,402</b>	<b>11%</b>	<b>0</b>	<b>0%</b>	<b>0</b>	<b>0%</b>

**Table 9-2: Savings in the Intervention Scenario over BAU**

Figure 9.1 shows the respective modals shifts that are envisaged with the Alternative Scenarios.



**Figure 9-1: Comparison of Passenger Kms of BAU and Alternative Scenarios**

## 9.2 Summary of Recommended Interventions

The summary of the conclusions and recommendations for each problem identified is in Table 9.3. Since this study has been based on existing data dating from 2004 to 2010, in most instances further study has been recommended as the first intervention in order to validate the recommendations made in this study. Interventions in reforms, institutional strengthening as well as new infrastructure can only be formulated after detailed studies based on adequate data and analysis and adequate stakeholder discussions are completed. As such an umbrella study termed the *Sri Lanka Transport Sector Study* has been proposed to encompass the formulation of the different policy, strategy and project based plans that are required for the development of the transport sector to face the challenges it would face in the next 20 years. Previously the World Bank undertook a Sector Study in Transport in 1988/89. This may be considered an update of that study to occur 25 years later.



Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
<p><b><i>A. Rapid Increase in Vehicle Ownership and Use: Primarily as a result of increasing incomes, but accelerated to a higher growth trajectory due to lack of effective policy on managing motorization and deteriorating public transport services.</i></b></p>			
<p><b>Insufficient road capacity:</b> An economic growth rate of more than 3-4% will outstrip the rate of current road space provision as entire burden of transport and future motorization will fall on the road sector. Growth especially in urban areas will be constrained by the gaps that would be created by the inability to provide required road space.</p>	<p>Align investment to transport policy and ensure future transport capacity is adequate to support the desired economic growth rate.</p>	<p><b><i>Include in Sri Lanka Transport Sector Study a Strategic Investment Plan for Transport Sector</i></b> that would identify the targets and investment both public and private required to develop a multi modal transport system aligned to transport policy.</p>	<p>MOF</p>
<p><b><i>B. Decreasing Use of Public Transport: The deteriorating quality of public transport services and its history of being treated as a socio-welfare service support the public and political perception that it is a mode of transport for the poor and not a modern infrastructure that needs to be strategically developed for travel even when personal incomes increase.</i></b></p>			
<p><b>Current engagement in the public transport sector does not support the Land Transport Policy.</b></p> <p>Public Transport is not providing the quality of service required to retain passengers when their incomes increase and are able to own and use a private vehicle</p> <p>Policy, planning and regulatory structures in public transport are weak and human resource capacity is inadequate to carry out a reform program.</p> <p>Uneven playing field between State bus and regulated bus operations of the informal private sector.</p> <p>Low Corporate private sector investment in public transport due to regulatory structures.</p>	<p>Ensure that public transport services would be aligned to meet quality and capacity requirements of the future and that the respective service providers both public and private possesses adequate institutional and human resource capacity and are integrated with each other and that the regulatory regimes are reformed to achieve the targets set out in the Land Transport Policy (2010) and the Alternate Policy in this study.</p>	<p><b><i>Include in Sri Lanka Transport Sector Study:</i></b></p> <p>an <b><i>Integrated National Public Transport Development Plan</i></b> to set out the different targets at a national level for each mode/agency of public transport by investment, technology, location, regulatory reforms and institutional capacity building, integration, and the sequencing of all such interventions.</p>	<p>MOT/ MLGPC</p>

Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
<p><b><i>C. Outdated Transport Infrastructure: Transport networks that have evolved over the last 200 years have outlived their usefulness and are not aligned to modern economic and social requirement AND Transport system is centred on Colombo CBD and is road dominated without efficient linkages to other modes and nodes for a holistic multi modal transport operation and for assisting lagging-regions to develop rapidly AND Generally poor performance indicators for all transport networks in terms of speed, comfort, convenience, reliability, safety and directness.</i></b></p>			
<p><b><i>Unattractive Urban Transport Services.</i></b> A new and modern mode of public transport is required to lift up the status and recognition of public transport by society.</p> <p>There is a need to re-structure the transport network as a <b><i>modern multi modal network</i></b> in order to meet the new economic challenges of the 21st Century.</p>	<p><u>Improve Performance of Public Transport Network in CMR and KMR</u></p> <p>Regulatory and service providers including infrastructure development agencies need to be brought under a common program where the strategy for TDM in metro areas is accepted and followed by all stakeholders. BRT and/or LRT modes to be considered as a mode of urban transport for Colombo and Kandy</p>	<p><b><i>Undertaken Study of</i></b> (a) <b><i>Transport Master Plan for CMR</i></b> and (a) <b><i>Transport Master Plan for KMR</i></b> that would include road, rail, bus and new modes of mass transit and would be a concerted program of TDM, including traffic restraint methods, ERP and ITS interventions.</p> <p>Study the feasibility of BRT for 7 routes having required traffic levels and the KV line as a LRT proposed in this study. Set up new multi modal terminals for public transport especially at locations along the Outer Circular Highway.</p> <p>Institutional and regulatory reforms required for integrated and quality service provision should also be consistent with the <b><i>Integrated National Public Transport Development Master Plan</i></b> discussed above.</p>	<p>MoT/ MoLGPC</p>
	<p><u>Improve Performance of Highway Network</u></p> <p>To develop methods to improve capacity, utilization, safety and speed of urban roads in urban centres and to add missing and new links to networks without adding more traffic while giving priority to modes of urban</p>	<p><b><i>Include in Sri Lanka Transport Sector Study:</i></b> the revision of the <b><i>National Roads Master Plan</i></b>: with special emphasis on (a) the interventions through improved traffic engineering, intersection design, introduction through</p>	<p>RDA</p>

Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
<p><b>Poor Performance of the National Transport network.</b> There is a need to improve the performances of all urban and inter-provincial passenger transport networks, as well as, long-distance freight transport networks.</p>	<p>transport such as bus lanes and BRT systems and HOVs.</p> <p>Undertake an expressway development masterplan and secure funding for early construction of 3 expressways identified</p> <p>Continue re-habilitation programs along with traffic management, ITS, intersection control, safety audits and by passes to urban centres as well as review of maintenance funding systems.</p> <p><u>Improve Performance of Railway Network</u> Railway system requires to be developed to compete with road transport in both passenger and goods markets in urban and long distance services.</p> <p>Adopt policy intervention on railway making goods transport an equal priority area to passenger operations.</p> <p>Develop tourism related businesses. Major institutional re-structuring required to make it a modern and efficient transport service provider.</p> <p><u>Improve Performance of the Bus Sector</u> Provide higher quality buses, ICT based user</p>	<p>ERP and ITS in urban areas that are likely to experience congestion including CMR and Kandy and (b)to identify the traces and the funding for the long-term expansion of the expressway network of around 600 km may be required along with 6,000 km of national roads to be rehabilitated;</p> <p>( c) improvements to road safety through safety audits and</p> <p>(d) develop a program to ensure that adequate funding for road maintenance is always available by utilizing existing and new sources.</p> <p><b><u>Include in Sri Lanka Transport Sector Study:</u></b> the revision of the <b><i>Railway Development Master Plan</i></b> to include</p> <p>(a) railway development of urban, freight and tourism markets (b) provide rolling stock to operate long-distance freight over 200 kms, and port related movements and</p> <p>(c) Provide fast rail connection to BIA airport and develop services for tourism.</p> <p><b><u>Include in Sri Lanka Transport Sector Study:</u></b> the revision of the <b><i>Bus Services</i></b></p>	<p>SLR</p>

Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
	<p>services, develop urban multi-modal terminals, improve route management through more rigorous regulation by setting up route based management companies.</p>	<p><b>Development Master Plan</b> to include the stage-wise implementation of reforms in managing better operation of routes, program to improve quality of buses and crew conduct, procurement on competitive basis of low income rural and school services for which performance based subsidies are paid and setting up a competition model for state and private sector services.</p>	<p>NTC PRPTAs</p>
	<p><u>Development of Domestic Airports</u> Develop domestic airports that are away from the proposed expressway system</p>	<p><b><u>Include in Sri Lanka Transport Sector Study: a Domestic Aviation Development Plan</u></b> to identify the airports that need to be developed in keeping with tourism and business travel demand.</p>	<p>AASL</p>
	<p><u>Develop Freight &amp; Logistics Sector</u> Study the potential of IWT in WP and Coastal Shipping</p> <p>Creation of new multi modal centres to provide for new trade and travel patterns especially between provinces that have evolved in recent times.</p>	<p><b><u>Include in Sri Lanka Transport Sector Study: a freight and logistics development plan</u></b> that would investigate locations for new logistics centres, ICD, development of IWT and coastal shipping to link up with ports and airports and the expressway centres as well as export processing zones and agricultural centres for export and import freight movements as well as what is domestically produced and consumed.</p>	<p>MoT</p>

Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
<p><b><u>D&gt; Lack of Institutional Capacity and Coordination:</u></b> The large number of institutions and the lack of a mechanism for coordination of planning activities for transport creates an environment in which each agency plans and manages its own network. Budget allocations are also made without an overall policy or investment strategy. The industry also lacks professionals to be engaged in the public transport sector as well as for improved institutional structures and skills to handle modernized transport systems.</p>			
<p><b>Inadequate institutional capacity to plan for and manage a modern and integrated transport system.</b></p>	<p>Set up an on-going multi-disciplinary planning function of transport sector with linkages to all sector institutions, land use agencies as well as other relevant institutions including research agencies</p>	<p><b><u>Re-establish:</u></b> the <i>Transport Studies and Planning Centre</i> under an independent board comprising both public and private interests and independently funded.</p>	<p>MOT</p>
<p>Inadequate data and knowledge bases. There is no agency to lead sector wide data collection, research and development work.</p> <p>There is a gap in coordination of planning activities between agencies</p>		<p><b><u>Re-establish the Inter-Ministerial Committee for the Coordination and Planning of Transport (IMCCPT)</u></b> for the purpose of coordination of planning activities especially multi modal planning.</p>	<p>MOT</p>
<p>Inadequate number of professionals in the sector and inadequate professional practices and procedures in place. Some existing staff need to be re-trained.</p>	<p>Inadequate number of professionals in the sector and inadequate professional practices and procedures in place. Inadequate data and knowledge bases. Some existing staff need to be re-trained</p>	<p>Include in <b><u>Sri Lanka Transport Sector Study:</u></b></p> <p>a <b><i>Human Resource Development Plan</i></b> to assess the skills required for the sector and to identify the institutional structures, cadre posts available currently and to get government agreement to fill these with skilled staff in State institutions. Also to identify skills required in the private sector and to identify agencies that can be provided one-off assistance to commence and continue providing such programs as self-financing courses.</p>	<p>MOT</p>

Gaps under BAU	Result/Outcome Expected	Earliest Intervention	Lead Agency
<p><b><i>E. Increasing Negative Externalities:</i></b> <i>Negative externalities such as traffic congestion, air quality deterioration, road traffic accidents and injuries are increasing. The total cost of such losses is greater than the annual capital investment in the sector.</i></p>			
<p><b>Traffic congestion, air pollution and traffic accidents worsening.</b></p> <p>The overall social cost of providing transport and logistics services is high due to high external costs.</p>	<p>Reduced fuel use will create less air quality impacts</p> <p>Less vehicle use will lead to less accidents and less need for infrastructure and use of land and negative social impacts</p> <p>Will reduce overall cost of transport in Sri Lanka, reduce balance of payment issues.</p>	<p><b><u>Include in Sri Lanka Transport Sector Study</u></b></p> <p><b><i>A Plan to Manage the Resource Utilization and Impacts</i></b> that would include the changes to strategic investments as well as choice of technology giving special attention to land use and energy utilization as well as road safety, environmental and social impacts.</p>	<p>MoT</p>

**Table 9-3: Summary of Conclusions and Recommendations**

### 9.3 Sequencing of Proposed Interventions

The overall sequencing of the proposed interventions are summarized as follows:

**Action 1:** Re-establish the *Transport Studies and Planning Centre (TSPC)* under an independent board comprising both public and private interests and independently funded. The centre could be set up as a project management unit for the studies recommended below and then be continued as a permanent institution.

**Action 2:** Re-establish the *Inter-Ministerial Committee for the Coordination and Planning of Transport (IMCCPT)* for the purpose of coordination of planning activities especially multi modal planning.

**Action 3:** Carry out a *Sri Lanka Transport Sector Study* that would clearly set out the direction for development of the sector along the lines of transport policy and the recommendations made in this report. These studies are required since no integrated studies have been conducted for many years and also since this study has been undertaken with existing data and its recommendations should be tested with the proper and current data.

Sector/Study	Reforms & Institutional Structure Outcomes	Infrastructure & Service Outcomes
<p><b>All Modes:</b></p> <p><b>Strategic Investment Plan for Transport Sector</b> that would identify the targets and investment both public and private required for developing a multi modal transport system aligned to the transport policy.</p> <p>The plan should be developed in consultation with the relevant stakeholder institutions in order to set out the different levels of capital investment required and expenditure for operations and maintenance along with identifying potential sources of funding for the different sub sectors based on the Land Transport Policy (2010). This will be a policy level plan to be used for strategic interventions.</p>	<ul style="list-style-type: none"> <li>• Identify investments envelopes on policy considerations for inclusion in the Public Investment Program as well as budget formulation-target 2014 budget.</li> <li>• Calculate transport user costs, suitable user charges and basis of recovery of investment costs in order to achieve the desired multi modal transport network and their respective modal shares.</li> <li>• Identification of investment and ownership in transport sector along with the regulatory interventions including subsidy payments where</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate funding for agencies for developing modes of transport as required.</li> <li>• Adequate recovery of costs from users and raising of revenue from other sources.</li> <li>• Adequate provision of funds for maintenance.</li> </ul>

Sector/Study	Reforms & Institutional Structure Outcomes	Infrastructure & Service Outcomes
<p><b><u>All Agencies/Sectors</u></b></p> <p><b><u>Transport Sector Institutional Development Plan</u></b> to assess the institutional structures and skills required for the sector and to identify the changes to structures, administration processes, cadre posts available currently and to get government agreement to fill these with skilled staff in State institutions. Also to identify skills required in the private sector and to identify agencies that can be provided one-off assistance to commence and continue providing such programs as self-financing courses. Improve professionalism in the sector. This would be a project level plan.</p>	<p>necessary and taxation structures most suited to achieve the desired modal shares.</p> <ul style="list-style-type: none"> <li>• Recommendations of reforms intended to solve the issues of public and private sector investment and management in transport supply provision as well as the issues arising from informal suppliers.</li> <li>• Reform in institutional structures and</li> <li>• Institutional human resource capacity building to follow.</li> </ul>	<ul style="list-style-type: none"> <li>• Setting up of Skill development programs with vocational training institutions.</li> <li>• Institutional structures and processes that are modernized.</li> <li>• More professional engagement in the sector</li> </ul>
<p><b><u>Resource Use and Impacts:</u></b></p> <p><b><u>Plan to Manage the Resource Utilization and Impacts</u></b></p> <p>This would be a strategic level plan.</p>	<ul style="list-style-type: none"> <li>• Identify the changes to strategic investments as well as choice of technology giving special attention to land use and energy utilization as well as road safety, environmental and social impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Efficient and low polluting transport vehicles</li> <li>• Safer transport infrastructure</li> </ul> <p>Transport infrastructure that would reaffirm good social values and practices.</p>
<p><b><u>All Modes of Public Transport Integrated National Transport Development Plan</u></b> to set out the different targets at</p>	<ul style="list-style-type: none"> <li>• Set up an agenda for implementation of projects by the</li> </ul>	<p>.</p>



Sector/Study	Reforms & Institutional Structure Outcomes	Infrastructure & Service Outcomes
<p>a national level for each mode of transport by investment, technology, location, regulatory reforms and institutional capacity building, integration, and the sequencing of all such interventions based on the transport sector policies and the . This would be based on the Strategic Investment Plan for Transport Sector.</p> <p><b>Bus Sector:</b></p> <p><i>Bus Services Development Master Plan</i> to include the stage-wise implementation of reforms in managing operation of routes, program to improve quality of buses and crew conduct, procurement of low income rural and school services and competition model for state and private sector services. This would be a Project Level Plan.</p>	<p>different agencies and coordination by the IMCCPT.</p> <ul style="list-style-type: none"> <li>• Set up targets for different modes for different functions such as urban, inter-provincial, passenger and freight sub sectors.</li> <li>• Develop a national plan on common regulatory issues and standards with separate studies for each province. Such studies would address operational and management issues that fall in line with the Integrated National Transport Development Plan.</li> <li>• Earlier initiatives such as corporatizing of operators on route basis, tendering of routes on competitive basis, performance based service provision of routes that have low incomes, implementation of time tables and schedules and strengthening of public representation to be reconsidered for inclusion in reforming the regulatory and management structures.</li> </ul>	<ul style="list-style-type: none"> <li>• Procurement of new bus services for un-served and underserved areas.</li> <li>• Development of new Multi modal terminals</li> <li>• Improved quality of bus services including improvements to operation of routes.</li> </ul>

Sector/Study	Reforms & Institutional Structure Outcomes	Infrastructure & Service Outcomes
<p><b><u>Railways:</u></b></p> <p><b><i>Railway Development Master Plan</i></b></p> <p>to include</p> <p>(a) railway development of urban, freight and tourism markets  (b) provide rolling stock to operate long-distance freight over 200 kms, and port related movements and</p> <p>(c) Provide fast rail connection to BIA airport and develop services for tourism. This is also a project level plan</p>	<ul style="list-style-type: none"> <li>• Carry out of technical and economic feasibility studies to determine ways and means of developing projects for improving identified rail services.</li> <li>• Identify the institutional reforms and strengthening of skills, processes and equipment required for carrying out the above.</li> <li>• Specify strategies best suited for achieving the targets within given identified timelines.</li> </ul>	<ul style="list-style-type: none"> <li>• New urban, intercity, freight and tourist trains services.</li> <li>• Improved rolling stock</li> <li>• Increased track capacity at bottlenecks in urban areas</li> <li>• Station development along with park and ride and other measures to improve rail access.</li> <li>• New freight transport infrastructure</li> <li>• Development of tourist service infrastructure.</li> <li>• New service to airport</li> </ul>
<p><b><u>Roads:</u></b></p> <p><b><i>National Roads Master Plan:</i></b></p> <p>Update existing NRMP with special emphasis on (a) the interventions through improved traffic engineering, intersection design, introduction through ERP and ITS in urban areas that are likely to experience congestion including CMR and Kandy and</p> <p>(b) the long-term expansion of the expressway network of around 600 km may be required along with 6,000 km of national roads to be rehabilitated;</p> <p>(c) improvement in road safety through safety audits and (d) develop a program to ensure that adequate funding for road maintenance is always available by utilizing existing and new</p>	<ul style="list-style-type: none"> <li>• Updated NRMP in keeping with policy level and strategic plans.</li> <li>• Prioritizing redevelopment and maintenance of the existing road network over the next 10 years.</li> <li>• Improve capacity to manage issues on traffic management, road safety, maintenance, network planning and institutional reforms.</li> <li>• Reforms in the road sector including funding for maintenance, the setting up of a road fund.</li> <li>• Improve institutional capacity to implement traffic management</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of expressway network</li> <li>• Rehabilitation of existing national roads</li> <li>• Introduction of improved traffic engineering of roads</li> <li>• Better maintenance of roads</li> <li>• Introduction of Traffic Restraint measures utilizing ERP and ITS infrastructure on urban roads.</li> </ul>

Sector/Study	Reforms & Institutional Structure Outcomes	Infrastructure & Service Outcomes
<p>sources.</p> <p>This would also be a project level plan.</p>	<p>strategies including use of ITS, as well as policies on traffic restraint including the use of ERP, parking charges and other forms of demand management that can be introduced along with improvement of public transport options.</p>	
<p><b><u>Aviation:</u></b></p> <p><b><i>Domestic Aviation Development Plan</i></b></p> <p>This would be a project level plan</p>	<ul style="list-style-type: none"> <li>• Identify the airports that need to be developed in keeping with tourism and business travel demand that would fit the overall national transport development plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of City Airport at Ratmalana</li> <li>• Development of Provincial Domestic Airports</li> </ul>
<p><b><u>Freight &amp; Logistics:</u></b></p> <p><b><i>Freight and Logistics Development Plan</i></b></p> <p>This would be a project level plan</p>	<ul style="list-style-type: none"> <li>• Understand the requirements of new trends in freight flows including the domestic trade that is made between provinces.</li> <li>• Identify new nodes and multi modal opportunities for developing efficient freight movements between provinces.</li> <li>• Provide Inland Container Depots for more efficient clearing of containers coming in to and out of the Port of Colombo.</li> </ul>	<ul style="list-style-type: none"> <li>• New Logistics Centres along expressways and adjacent to new ports.</li> <li>• New ICD for Port of Colombo.</li> </ul>

**Table 9-4: Summary of Actions and Expected Outcomes**



**Figure 9-2: Plans to be conducted through the Sri Lanka Transport Sector Study.**

***Action 4:*** Implementing recommendation that have been made up to now such as those in the Transport Study for Kandy Metropolitan Region<sup>57</sup> and some of the expressway and road rehabilitation projects including the recommendation for maintenance funding. For CMR, the proposed JICA Transport Masterplan Study which envisages conduct of a household survey could be expanded to cover the demand for existing and proposed new modes of transport for the CMR including road traffic and development of existing modes of public transport.

***Action 5:*** To pick up for implementation, projects that are found to be feasible from the Sri Lanka Transport Sector Study proposed under Action 3.

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<sup>57</sup> Department of Transport & Logistics Management, University of Moratuwa, Kandy Transport Study, 2011

## APPENDIX I- Stakeholder Views

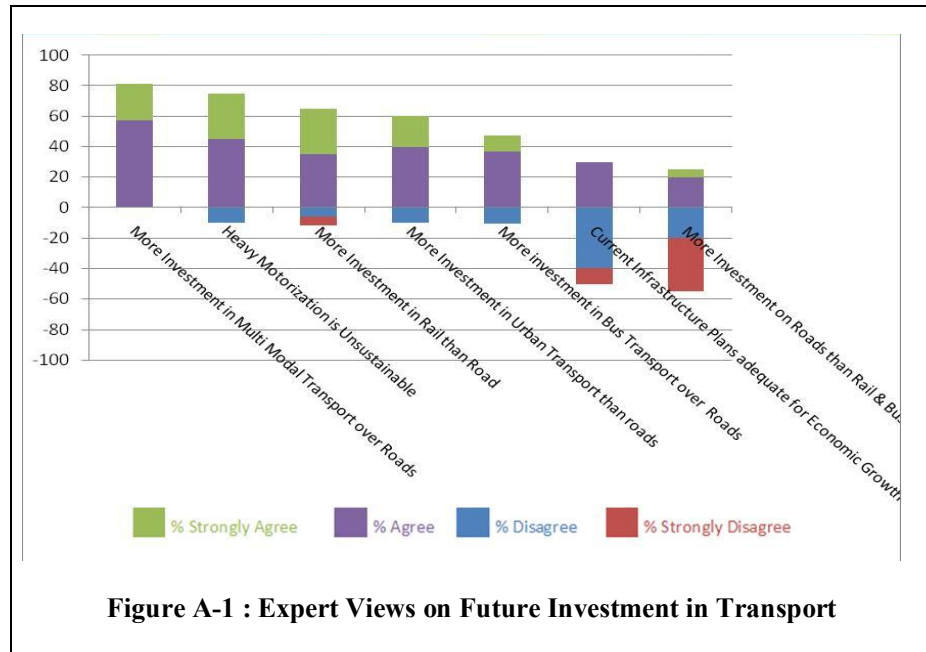
Stakeholder views were solicited through interviews, meetings and workshops. Twenty expert and 10 user interviews were conducted. The interviews covered all modes of transport and were based on the Likert Scale response system. The interviews included assessment of the performance of the current modes of transport as well as opinion on future interventions.

Heads of transport and logistics user or provider institutions such as the Association of Container Transporters, Private Omnibus Owners Association as well as leading private companies including Hayleys Logiwiz, Aitken Spence Transporters, John Keels Logistics, as well as professional bodies such as the Chartered Institute of Logistics and Transport and trade chambers were invited for the first workshop. The workshop also included officials of almost all the state agencies that provide or regulate transport services and infrastructure. The second workshop included leading local academics in the transport and logistics sector. The workshops were conducted specifically to obtain the confirmation from industry and academic on the identification of existing issues as well as the strategies and interventions proposed under each primary issue identified.

Meetings were held with several Heads of Institutions and Ministries that are key transport sector providers. The objective of these meetings were also to present to them the findings of the report and to obtains their views on the strategies and interventions identified in the study.

### Expert Opinion on Capacity of Transport Networks

Figure A-1 shows the response to investment in different sectors. It is clear that there is more disagreement that the current level of transport sector investment which is concentrated in the roads sector is adequate to maintain an 8% growth rate. There is equal



**Figure A-1 : Expert Views on Future Investment in Transport**

disagreement that the additional investment should be in the road sector. Instead it is clear that there is greater agreement for investment to be directed towards multi modal transport including railways and

to a lesser agreement on buses. There is general agreement that the current motorization is unsustainable and that urban solutions to traffic congestion should come from improved public transport.

### Expert & Corporate User Views on Adequacy of Transport Infrastructure

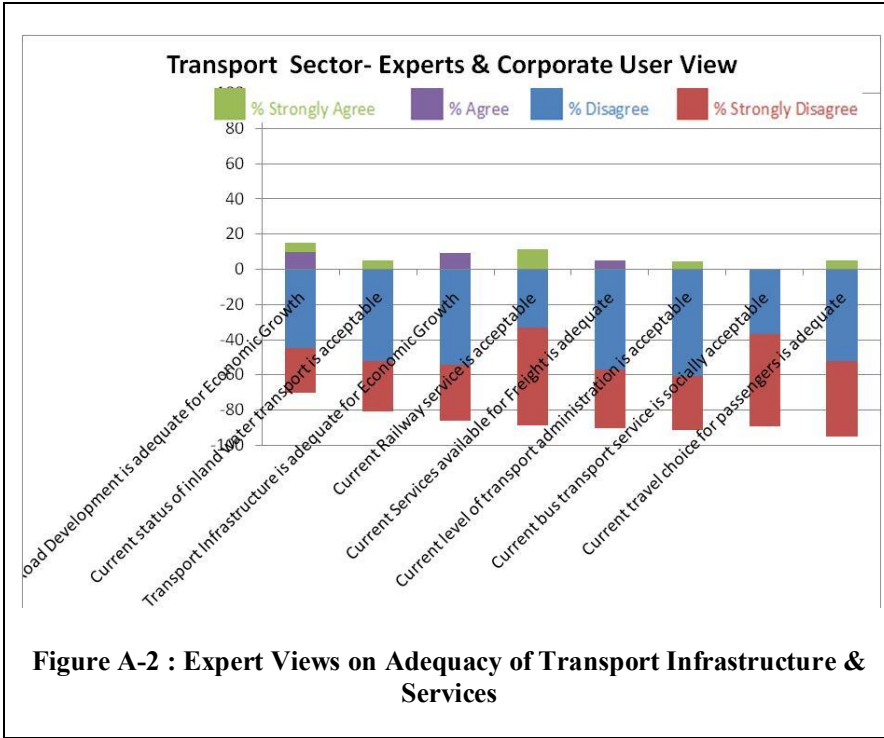
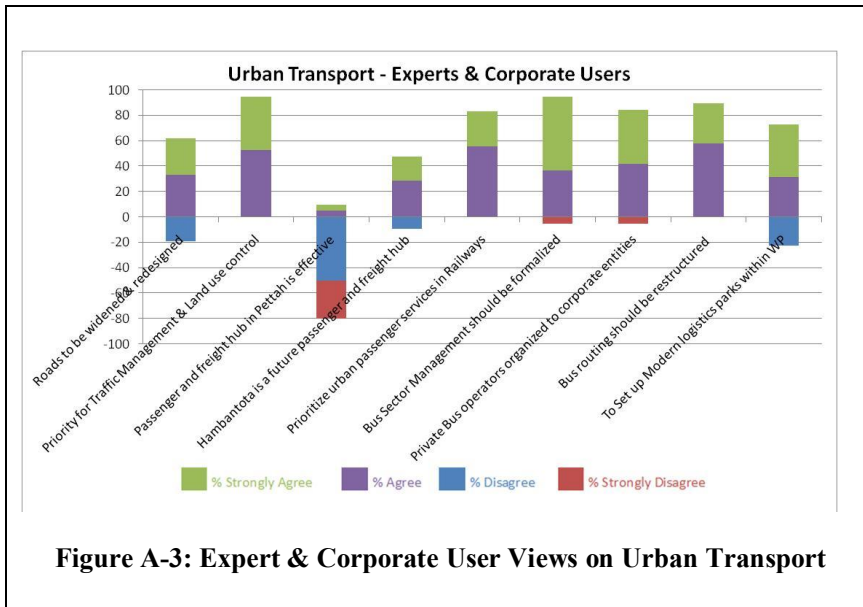


Figure A-2 shows that there is general disagreement to the proposition that the current infrastructure and services are adequate to achieve the anticipated economic growth rate of 8 percent. It is interesting to note that none of the sectors providing land transport services have been considered adequately prepared for the forthcoming

challenge. Transport sector administration is also considered inadequate.

## Expert & Corporate User Views on Urban Transport



The evidence that road development alone will be inadequate in urban areas is strongly supported by the agreement of sector experts who state that public transport options should include improving both bus and rail. It is also agreed by the sector experts that bus and rail alone will not be adequate and that new technologies such as

LRT, BRT and to a lesser degree metros should be investigated. There is mixed responses on the benefit of providing urban expressways while there is support for improving multi modal transport options.

Experts are agreed that the current level of administration including planning, commitment to policy and professional inputs are inadequate to provide the leadership to achieve the changes required in the sector to support the economic growth goals.