SUSTAINABLE URBAN TRANSPORT IN KUALA LUMPUR – A BACKCASTING SCENARIO APPROACH

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Abstract

Urban transport trends and issues in Kuala Lumpur have indicated that they are moving away from sustainability. Besides the conventional problems such as congestion, accidents, urban air pollution, there are signs showing that social inequality and institutional problems are confronting the transport system in Kuala Lumpur. The above issues are not the natural outcome of development; instead, they are related to specific social, economic and political policies. In view of the complexity and the great number of uncertainties, a backcasting scenario methodology has been adopted in this study to analyse the means of breaking the present trend.

The overall aim of the research is to explore a wider perspective of possible future opportunities and policy options in order to achieve sustainable urban transport objectives in Kuala Lumpur. The sustainable urban transport policy has been formulated in four major steps (the central structure of scenario backcasting methodology). Firstly, the vision of the urban transport system in Kuala Lumpur has been defined, i.e. the one that provides affordable access to all levels of the community, and does so in an economically viable, environmentally sound and equitable manner. Secondly, policy targets have been identified in accordance with the vision. Then, three Images of the Future have been constructed to represent the alternative images. Finally, measures and policy packages have been developed to bridge the gap between the present and the future images. At every stage of the methodology, local transport experts were invited to contribute their inputs to the study as part of the validation process.

The thesis concludes with an assessment of the three Images in relation to sustainability achievement and also their practicality in terms of implementation. It also recommends basic conditions and common measures to achieve a sustainable transport system in Kuala Lumpur. The contributions of this research are twofold. Firstly, it extends the frontiers of the existing transport policy considerations and formulation in Kuala Lumpur; and secondly, it demonstrates a novel application of backcasting scenario methodology to the sustainable urban transport field at the city level.

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CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

This study focuses on the sustainable urban transport system[1] in Kuala Lumpur. Kuala Lumpur, with its relatively low density and moderate population size, has experienced a rapid increase in private vehicles since 1970. Urban transport problems in Kuala Lumpur are pressing ones, and these have manifested themselves in the form of congestion, air pollution and widespread degradation of safety factors due to heavy traffic throughout the city. This thesis scrutinises an even wider range of urban transport issues from the perspective of social, environmental and economical impacts. It aims to present an overall picture of urban transport problems in Kuala Lumpur in order to see how far the transport system has diverged from the comprehensive sustainable transport aims.

Judging from the recent car-oriented patterns and car-dependent urban forms of transport, several studies have concluded that Kuala Lumpur is indeed an automobile society (Sadullah, 1997; JICA, 1998; Barter 1999). The common culprits are economic growth, rising income and urbanisation. Commonly held views are 'private vehicle ownership is a natural consumer desire as incomes rise' and 'motorization is an unavoidable result of economic development', which explain the existence of the car-oriented society in Kuala Lumpur. This implies that little could be done to change the present situation.

The researcher disagrees with this simplified version of the explanations for the present unsustainable transport system in Kuala Lumpur. This study suggests that the present trends of external forces, internal responses and individual drivers are actually the causes of an automobile society (see Figure 2.4 Chapter 2). The researcher also challenges the view that

[1] In this thesis sustainable urban transport system is a generic name used to refer to both road and rail passengers' transport systems that lead to sustainable transport aims, which are defined in Chapter Four.

the present is 'impossible to change'; the study strongly holds to the view that the future can be influenced, if not created. A proactive approach has to be taken, the present trends have to be broken and policies have to be changed, otherwise the future urban transport system in Kuala Lumpur will continue to be as unsustainable as it is now. A central concern of the thesis is to identify and evaluate sustainable urban transport policy packages that could reverse the existing trends.

Compared to alternative ways of viewing the future, the backcasting scenario methodology[2] is perceived as the most appropriate tool to serve this purpose. It is chosen in this study due to its strengths concerning proactive visionary thinking, trend-breaking features, open future choices, which have advantages when dealing with an uncertain future, and the ability to receive creative inputs from local experts. By identifying crucial external factors and strategic elements[3], scenarios of the future have been explored in the form of Images of the Future[4]. In the later part of the thesis, policy measures and policy packages are developed working backwards to create paths from the present to the future.

In this introductory chapter, some important motivations for the study are outlined. The specific aims of the thesis are then presented in the form of a series of research questions. There is a discussion of the scope and limitations of the study. This is followed by an overview of the structure of the thesis and a brief outline of the purpose and content of each chapter.

[2] See Chapter Three for a more detailed description of the methodology used in this thesis.
[3] See Chapter Six for definitions of external factors and strategic elements.
[4] See definitions of Images of the Future in Chapter Six

1.2. Importance of and Motivations for the Study

This section outlines the intellectual significance of the topics and the main motivations for undertaking the study.

1.2.1 New Direction of Transport Policy: Sustainable Transport

It is now widely recognised by politicians, academics and practitioners in many fields that a desirable development policy in future should strive for sustainability. In line with sustainable development, the topics of sustainability and related fields have flourished in the 1990s, one of which is sustainable transport. Many international organisations and agreements, such as those of the World Bank, the UN Framework Convention on Climate Change, Agenda 21, the Habitat Global Plan of Action and the United Nations Development Plan (UNDP) have raised their respective concerns about the transport sector. Obviously, sustainable transport means a redirection of transport policy, and it is now undergoing intensive development in many cities on a global scale. Particular concerns in this aspect have been raised about those regions of rapid change, where the pressure of rapid motorization has occurred, for example the Asia-Pacific region. As the transport system in Kuala Lumpur is experiencing a similar process, it is just a matter of time before the present transport policy has to be reoriented towards the aim of sustainability. As no study has been carried out which looks comprehensively at this topic in Kuala Lumpur, the researcher believes that this has to be done as soon as possible.

1.2.2 Urban Transport Problems and Opportunities in Kuala Lumpur

Kuala Lumpur, like many other major cities in the world, suffers greatly from the impacts of its transport system. Worries have long been expressed over congestion, air pollution and accidents due to the increasing fleet of motor vehicles. Other substantial environmental and

social impacts, such as excessive use of non-renewable energy and the accessibility issues of low-income people, are all pressing problems that should be taken into account in urban transport decisions. All of these will be discussed in detail in Chapter 2.

Among the South-East Asian cities, Kuala Lumpur is the most extreme case with more genuinely car-oriented land-use patterns than any of the others (Barter, 1999). However, according to Barter's, Kuala Lumpur's middle density of population means that the further rapid increases in private mobility may yet bring Kuala Lumpur's transport system up against spatial limitations. Kuala Lumpur could still accommodate and adapt to an influx of private cars and motorcycles to a greater extent than other more densely populated cities in Asia. If this scenario happens without a proactive policy to counter the negative impacts from the ever-growing number of private vehicles, Kuala Lumpur will face many serious transport problems in the future.

Recognising that access to the inner area of Kuala Lumpur by private vehicles alone will soon become unworkable, a large network of mass-transit railways is being built. This is a great opportunity to explore transport issues from the point of view of sustainability. But does the newly built rail-based public transport system offer enough to achieve the aims of sustainability? Is there any other alternative? What are the options for future sustainable transport paths for the city?

In trying to explore all the opportunities for the city, the study is motivated to search for a range of alternatives for a future transport system. They should be able to tackle the transport problems and contribute to all of the sustainable development aims of Kuala Lumpur.

1.2.3 Search for Locally Appropriate Policies

A number of initiatives centre on searching for locally appropriate transport policies by local transport experts. Urban transport problems in Third World cities, including Kuala Lumpur, have been studied by means of the one-way communication of planning expertise that commonly takes place between some international consulting firms or institutions and their

Third World clients (Dimitriou, 1990:75). Many of the disadvantages of this approach have been discussed; for example, the irrelevancy of foreigners' concepts, models and paradigms that apply to local situations. Besides being unsuitable, many measures that are proposed by those international consulting firms or institutions are inappropriate to the everyday needs of people in their local environment. A more sensitive approach to transport policy formulation by taking into account the local voice and local social economic and political circumstances is therefore essential.

This thesis aims to reassess the basic problems and establish the future vision of urban transport by considering the opinions of local transport experts in Kuala Lumpur. By extensively involving local transport experts, who are thoroughly familiar with the local requirements of urban life, this study is motivated by a hope that this search might yield insights of value for locally appropriate policies. The study is intended to be designed in such a way that local transport experts can play a major role by contributing their inputs, from setting the vision to formulating policy packages.

1.2.4 A New Approach to Transport Policy Concerns in Kuala Lumpur

A new approach to transport policy in the long term is concerned with uncertainty in the future analysis and is another important motivation. The mainstream transport planning in Kuala Lumpur has generally tended to rely on conventional extrapolative forecasting to provide the background against which transport plans should be constructed[5]. The main deficiency of this conventional transport planning practice is the ability to deal with the long-term future, which is inevitably characterised by a high level of uncertainty. As the nature of forecasting models are implicitly or explicitly reliant on extrapolation of existing trends in order to picture the future, outside the short term they are increasingly vulnerable to changes which render model parameter estimates and structures quite inappropriate. There is ample evidence within the transport sector to confirm the fact that the forecasts used are frequently inaccurate, leading to the implementation of inappropriate transport strategies, and often to

[5] This transport forecasting model is used in all major transport studies including the Kuala Lumpur Structure Plan, 1984 and JICA studies in 1986 and 1999.

their sudden curtailment, despite the absence of any reasonable fall-back policy (Pearman,1988). Similar failures have been seen in urban transport policies in Kuala Lumpur[6]. Besides being unable to tackle the uncertain future, additional limitations of this conventional model, as applied to the Kuala Lumpur context, have also been to do with the high costs of its modelling efforts and limitations of reliable data.

It is this background that motivates the adoption of different planning methods in this study. A discussion and comparison of alternative methods of viewing the future are presented in Chapter 3, in which scenario backcasting methodology is selected as a new approach to transport policy analysis in Kuala Lumpur. The advantages and appropriateness of this new approach will be discussed more fully in Chapter 3.

1.2.5 Literature gap

A large number of sustainable development and sustainable transportation articles and papers have been published, as they are both increasingly important concepts to policy-makers around the world. It is obvious that present mainstream thinking about sustainable development and sustainable transport, whether it applies to developed or developing countries, is mainly initiated from within academia and organisations of or mainly influenced by Western Europe and North America, for example, the OECD, the World Bank, the IMF, the United Nations, etc. To consider the concepts and ideas of sustainable development and sustainable transportation would indeed affect the local community's lifestyle and activities immensely, and so it is very unwise to apply them to the local situation without firstly consulting their perspectives. Unfortunately, there are very few references to Malaysia generally and Kuala Lumpur in particular. Solid concepts of sustainable transportation for Kuala Lumpur from locally derived views are especially lacking. Starting with a discussion of the appropriate concept of sustainable development in Malaysia, this research is intended to fill the gap in the literature by proposing sustainable transportation concepts for Kuala Lumpur.

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[6] An overview of urban transport policy since 1970 in Kuala Lumpur has revealed more failures than successes in forecasting and implementation (Barter, 1999). See also Section 2.1.3, Chapter 2.

1.3 Research Questions

From an overview of the transport problems, there is an indication that Kuala Lumpur needs to formulate a new far-sighted sustainable transport policy. The emphasis in the thesis is on analysing locally appropriate, long-term, sustainable transport policies for Kuala Lumpur, and on understanding the implications of these results for the choices available for the uncertain future. These issues have been brought into focus using a small number of research questions that arose from the motivations and issues raised so far in this chapter. Central to the thesis are the following three questions that have guided the study from the beginning.

Q1 Is the current transport system in Kuala Lumpur sustainable? If not, what sort of sustainable transport policy would be necessary to achieve the sustainability aim?

Q2 What type of sustainable transport concepts and visions would achieve this?

Q3 How could sustainable transport concepts and visions be achieved in an uncertain future? What sort of sustainable transport policy responses should be developed in such uncertain circumstances?

Question 1 is the starting point of the research. This is the objective of the research; it seeks out the transport problems and judges if the trend diverges from the aims of sustainability. The question leads on to the basic conditions and common policy measures necessary for achieving sustainable transport visions in Kuala Lumpur. Question 2 defines the meaning of sustainable transport concepts and visions that are appropriate to the local environment. Ideas gathered from discussion with local experts and analyses from the literature review are the primary means by which the question will be answered. The main features of the future transport vision are presented in Chapter Five and Chapter Six. Question 3 is the central focus of the study; it leads to a search for means and processes to achieve the transport vision

for the uncertain future, which is the chosen methodology of this study (Chapter Three) and the features of its transport policy formulation (Chapter Seven) is an answer to it.

1.4 What the Research Aims to Achieve (Research Objectives)

The general aim of the work reported in this thesis is to develop a locally appropriate sustainable transport policy for Kuala Lumpur in the long-term by using the backcasting scenario methodology. In order to achieve this, the research must satisfy three other objectives and they include:-

- To understand the current transport situation and future vision in Kuala Lumpur;
- To propose an analytic framework using a backcasting scenario approach for transport policy-making; this will include proposing and validating the targets, future Images and the sustainable transport policy packages;
- To propose the basic conditions and common sustainable transport policy measures for whatever the future holds.

1.5 Scope of the Study

The research questions and objectives above, together with the involvement of local experts in the task, set an ambitious agenda. The focus of the dissertation is on the large-scale, city-wide features of transport policy in Kuala Lumpur in the long term. The study aims to provide a way of looking at the transport development policy of Kuala Lumpur at a very 'broad brush' level. The idea is to provide a view of the 'big picture' for the development paths of transport policy. Most of the details of road planning or transport planning practice, such as questions of design, assessment procedures for proposed investments and details of traffic management, are beyond the scope of this study. The field of full-cost accounting in urban transport also could not be explored here.

To view the future in this study, there are many tempting side issues that are of great importance but which, in order to focus only on the prominent chosen external and contextual factors, have to be excluded from the scope of the thesis. Some assumptions have been made in this study in constructing the future Images. Firstly, the political situation is stable throughout the study's forecast period. Secondly, social and demographic changes refer to continued growth and natural migration, as in the present trend, unless specifically mentioned in the future Image. Thirdly, except for those that have been mentioned in this study, there is no other drastic technological revolution occurring in either transport or other industrial sectors. Finally, unexpected natural or man-made incidents that could change the future trend are beyond the scope of this study.

The study identified several important factors that will influence Kuala Lumpur at implementation stage, such as whose responsibility it would be to carry out the changes towards sustainability (see Chapter Nine). However, the full implementation of an Image is beyond the scope of this study.

1.6 Summary of the Thesis

The thesis is organised into nine chapters. This introductory chapter has presented the context, motivation, research questions, scope of the study and an outline of the thesis.

Chapter Two presents urban transport trends and issues in Kuala Lumpur. It disentangles the interrelated and complicated factors that contribute to the present car-oriented trend. It also analyses a wide range of transport issues that cover social, environmental, economic and institutional dimensions.

Chapter Three provides a discussion and comparison of various alternative methods for viewing the future. It discusses the advantages and appropriateness of scenario backcasting methodology, which is adopted for this study. It explains the general framework and the steps required for the research methodology. These modules cover the objectives and visions of sustainable transport in Kuala Lumpur, targets, Images of the Future and Policy Packages, which will be presented in following chapters. The involvement of local transport experts in contributing to and validating the research has been highlighted, as it is an important element in this methodology. Their inputs to every stage of methodology will be presented at relevant chapters in this thesis.

In Chapter Four the literature review on sustainable development and sustainable transport is given. Appropriate sustainable development concepts and sustainable transport approaches that are suitable to apply to Malaysia are then established as reference points for the thesis. Sustainable objectives and sub-objectives are further derived from these reference points. Judging from the defined sustainable transport, the chapter concludes that the present transport system in Kuala Lumpur (which presented in Chapter Two) has diverged from sustainability and the city is facing policy dilemmas as to which direction to follow in the future.

Chapter Five presents the targets for sustainable tansport in Kuala Lumpur. It explains the process of design and generation of targets and identifies the policy targets used in the thesis.

Chapter Six is entitled 'Developing Images of the Future'. It constructs Images for the future by using the main external factors and strategic elements. Three images have been established and their characteristics are each vividly depicted.

Chapter Seven presents the measures and policy packages. It is central to backcasting methodology as it has been developed working backwards to bridge the present and the future. Policy packages have been established for every Image of the Future, and the achievement of policy targets is discussed according to the schematic implementation of short-, medium- and long-term timescales. The major stakeholders responsible to initiate and establish the policy packages will be identified in this chapter too.

In pursuing sustainability aims, Chapter Eight rounds up the target achievements that could be attained by the three Images and their policy packages, stressing the strengths and weaknesses of each respectively. Several important topics relating to implementation levels have also been explored. It concludes with the basic conditions and common measures that are the fundamental primary elements necessary make the Images universally applicable, thus addressing the second part of Research Question 1.

Chapter Nine concludes the study by highlighting important novel aspects of the research. This is followed by the contribution of the study. Limitations of the thesis are also laid out, as well as lessons learned from this research. Future research agendas are suggested.

CHAPTER TWO
AN OVERVIEW OF KUALA LUMPUR'S URBAN TRANSPORT SYSTEM: TRENDS AND ISSUES

2.0 Introduction

This chapter reviews the present trends and issues related to the urban transport system in Kuala Lumpur.

As the capital of Malaysia, an emerging nation with a thriving economy, Kuala Lumpur has grown rapidly in terms of its physical development and social economic characteristics over the past twenty years. The city, with an area of 243 sq. km and a population of nearly 1.3 millions (2000 Census), has been the focus of development in every dimension of an urban system. The development of Kuala Lumpur has brought tremendous benefits: higher quality of life, wealth and welfare to its citizens. Urban transport in Kuala Lumpur, as one of the major components of the urban system, is the main backbone supporting the city's functions of trade and commerce, business services, tourism and education. However, in recent years, the developing trend of urban transport has evolved along an auto-driven path and has brought immense threats to the city itself.

Section 2.1 in this chapter will look at how and why the urban transport system in Kuala Lumpur exists in this way today; the later section will then discuss the associated issues resulting from the present trends. In section 2.3, there is a brief discussion which looks at the recent efforts towards putting in place modern rail-based transport in Kuala Lumpur. Section 2.4 presents the opinions and views from local transport exports in regards to present Kuala Lumpur transport system. Section 2.5 concludes with the findings of the overview. This chapter provides the background to the study of this thesis: will Kuala Lumpur achieve sustainable transport with the present transport system and its 'business as usual' trends?

This will be answered in Chapter Four, after discussing what is the meaning of "sustainable transport" in Kuala Lumpur.

2.1 The Auto-driven Transport Trends in Kuala Lumpur

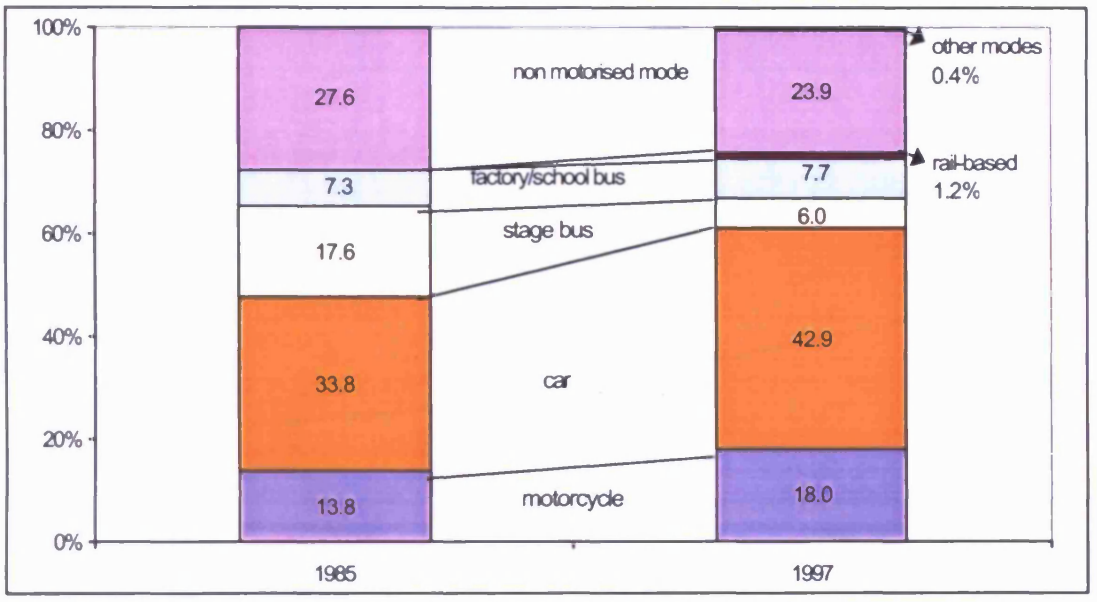
Motorisation has rapidly developed in and around Kuala Lumpur from the mid-1980s. Travel demand has increased from 6,425,500 person trips to 8,293,100 person trips from 1985 to 1997 (see Table 2.1). To study the present transport trends, the researcher has made a comparison of the modal composition in Klang Valley between 1985 and 1997, and it is obvious that Kuala Lumpur and its catchment area has evolved into an auto-driven society. As Figure 2.1 shows, the two decades have seen an increase from 34% to 43% in use of the car mode and 14% to 18% in motorcycle mode, whilst stage bus use has reduced dramatically from 18% to 6.0%, and the non-motorised modes have dropped from 28% to 24%. Although 1.2% of rail-based trips has resulted from the newly established KTM commuter and Light Rail Transit (LRT), if compared to the proportion of private vehicles, this is still very insignificant and does not change the whole picture of the transport system in Kuala Lumpur. The daily lives of the residents in Klang Valley region are apparently heavily reliant on their private vehicles.

Table 2.1 Person Trip Demand and Composition in Klang Valley: 1985-1997

	Person Trip Demand		Percentage Composition	
	1985	1997	1985	1997
Non-motorised Transport Modes	1,775,500	1,980,600	27.6	23.9
Private Mode of Transport				
Motorcycle	884,200	1,492,200	13.8	18.0
Car	2,170,000	3,555,200	33.8	42.9
Subtotal	3,054,200	5,047,400	47.5	60.9
Public Mode of Transport				
Stage Bus/ Mini Bus	1,129,900	493,900	17.6	6.0
Factory Bus/ School Bus	465,900	638,700	7.3	7.7
Rail-based Transport		103,200		1.24
Subtotal	1,595,800	1,235,800	24.8	14.9
Motorised Mode of Transport	4,650,000	6,283,200	72.4	75.8
Other Mode		29,300		
TOTAL	**6,425,500**	**8,293,100**	**100**	**100**

(Source: JICA, 1997)

Figure 2.1 Change in Modal Composition: 1985-1997 in Klang Valley

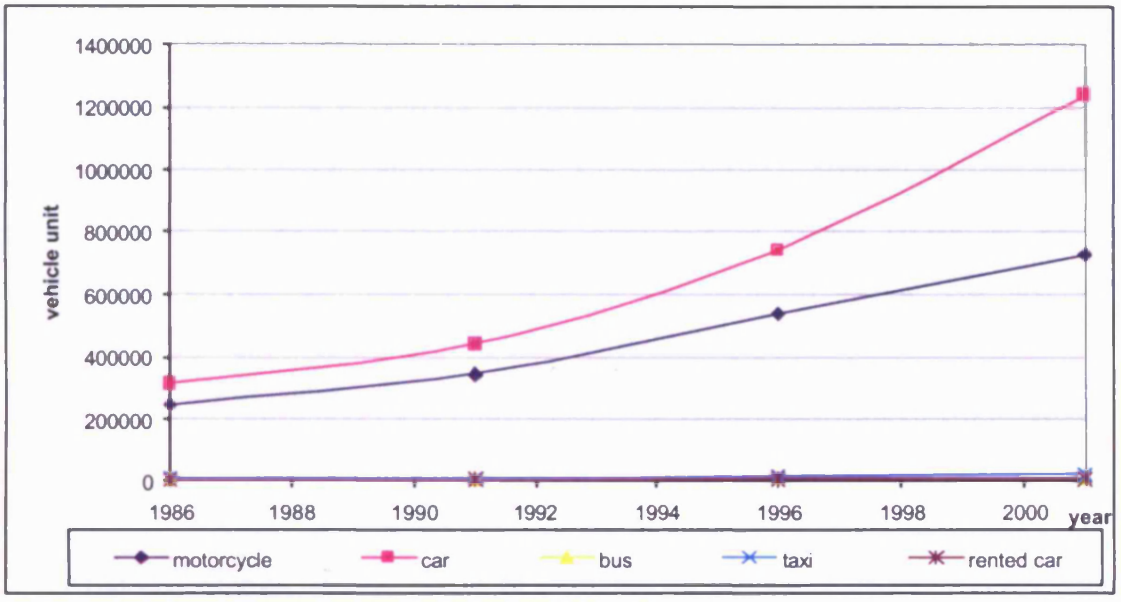


(Source: Modified from SMURT-KL Home Interview Survey 1997 (JICA, 1998,1987))

Recent studies (Ab Rahman,1993; Sadullah,1997; JICA, 1998; Barter, 1999) have also shown that there are major increases in private transportation in Kuala Lumpur. As shown in Figure 2.2, private vehicle registration in Kuala Lumpur has been increasing with an average annual growth of 10.5%[7] over the past one and a half decades, and there seems to be no sign of this market reaching a saturation level. Car ownership has been increased four-fold (see Figure 2.3) in about 20 years. For the next 20 years, if these trends continue in this 'business-as-usual' way, there will be no chance of a declining growth rate in both private vehicles ownership and usage in Kuala Lumpur.

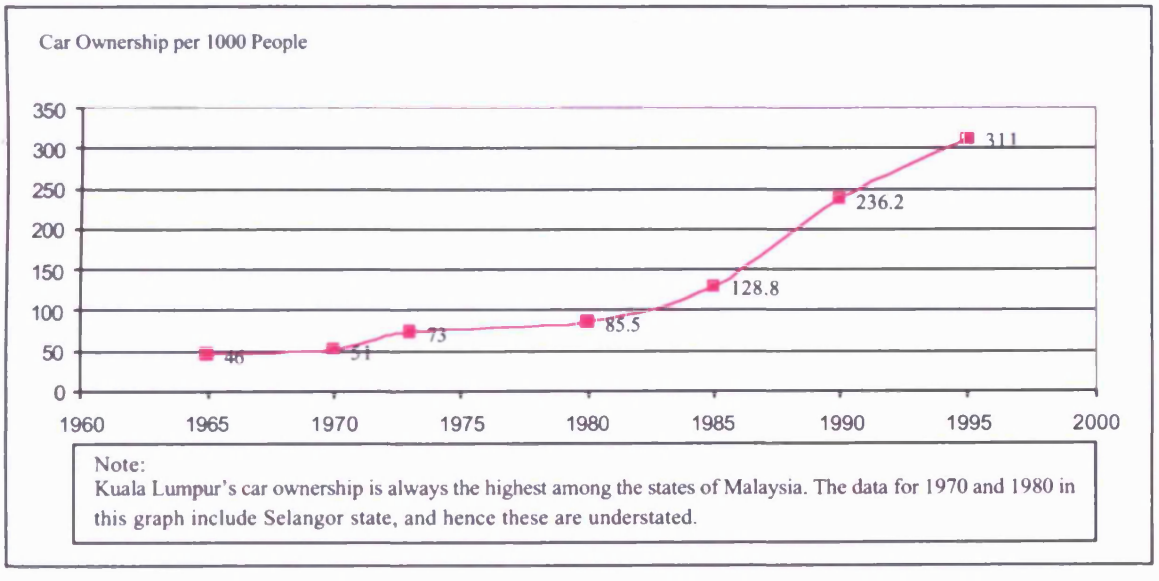
[7] Calculation based on statistics for private vehicles (motorcycles and cars) registered in Kuala Lumpur from 1986 to July 2001 (sources of statistics: Road Transport Department and Minister of Transport Malaysia)

Figure 2.2 Number of Vehicle Registrations in Kuala Lumpur



(Source: Road Transport Department and Minister of Transport, Malaysia)

Figure 2.3 Car Ownership in Kuala Lumpur



(Source: Spencer and Madhavan (1989); JICA Study (1998); Sadullah (1997))

The present auto-driven trend has always been regarded by the government as an inevitable result of Malaysia's strong and fast growth rate in economic development. In the past (and even at present) supply-driven approaches[8] to a transport strategy that is strongly linked to economic growth have been deemed part of the natural process in pursuit of better quality of life, and consequently, private vehicle ownership is regarded as a natural consumer desire as incomes rise. Of the Asian Pacific countries, Malaysia's 23 million people are the third biggest buyers of passenger cars after Japan and Korea (Low, 2002), with the highest proportion of these cars located in and around Kuala Lumpur. Can the 'economic growth' and 'natural consumer desire' convincingly explain the people's extremely strong tendency to own private vehicles?

The present auto-driven trend is leading to various transport-related issues (which will be discussed in Section 2.2), and this has to be redirected for the benefit of environmental, social and economic dimensions. How and why the present transport system has evolved in this way have to be explored and understood so that solutions may be sought to put a stop to this trend. The simple excuses of 'economic growth' and 'natural customer desire' are not sufficient to explain the trend, and useful discussion will not be achieved if these 'excuses' are accepted.

The researcher has searched for the answers. Through the literature review and discussions with local transport experts, a more complete explanation for the present auto-driven trend in Kuala Lumpur has emerged, and this is presented in the following section.

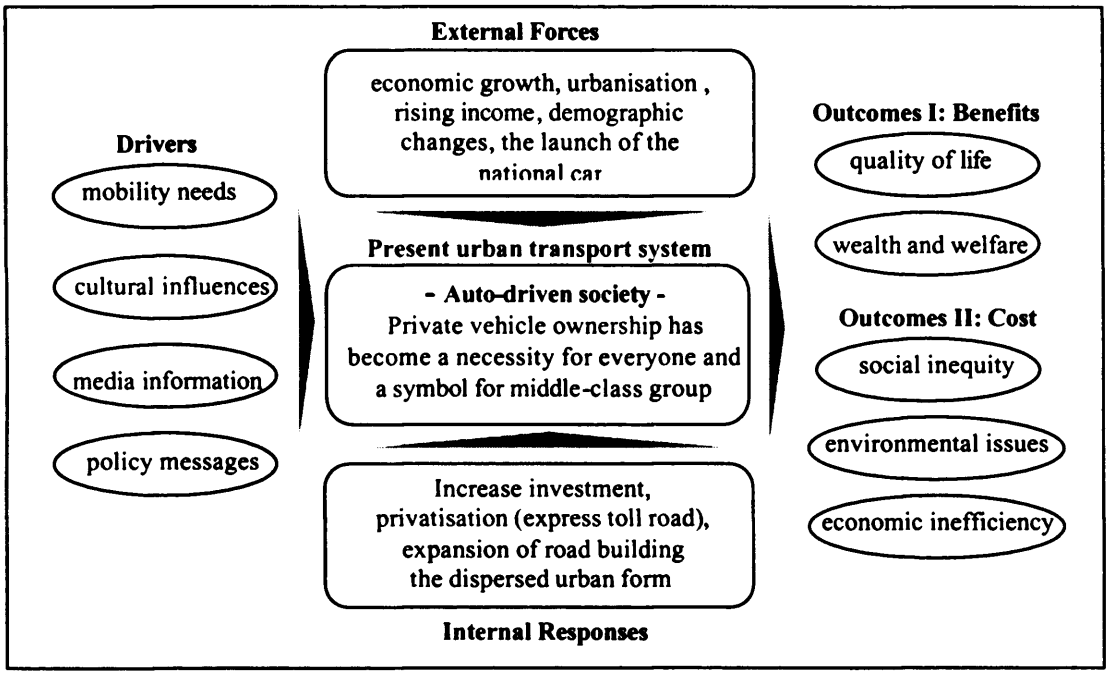
[8] This supply-driven strategy has been advocated by S. Samy Vellu, the Work Minister since 1979 (except for 1990-1995 when he was Energy, Telecommunications and Post Minister). In his article 'Meeting The Nation's Infrastructure Requirement'(1997), he stated that new highways would be built even before there is a demand.

2.1.1 Key Factors that Contribute to the Present Transport System in Kuala Lumpur

Major influences on the transport system at city level, that are identified in the literature, include infrastructure choices, income changes, economic development, urban planning policy, prices, economic instruments and technology choices. Some authors put heavier emphasis on one or two factors than on others; for example, Goodwin (1994) emphasised the link between the enormous growth in traffic with a huge amount of road building; Gomez-Ibanez (1991), Lave (1992), and Ingram and Liu (1997) believe that in modern times car domination is an inevitable outcome of successful economic development in market economies; Hall (1983) and Breheny (1993) have discussed in detail the links between urban form and transport; Litman (1995), Maddison et al (1996) and Kirwan (1992) place strong emphasis on fuel prices and economic instruments; Barter (1999) has pointed out that besides the above, active policy choices have clearly influenced the adoption and rejection of particular transport technologies.

In general, the Malaysian government and the general public have taken the view that increasing car use and declining public transport and non-motorised transport use is unavoidable as incomes rise. The researcher has a different opinion. Economic factors and income are highly relevant to urban transport, but the present transport condition of Kuala Lumpur has definitely been influenced by more than just these two factors; indeed, it is a complex interaction of the above key factors. Reviews of past historical trends in relation to economic and demographic factors, infrastructure investment, urban patterns and consumer choice and their influence over transport modes in Malaysia and Kuala Lumpur have all strengthened the researcher's view. Discussion with local transport experts has confirmed this opinion. The central idea of how the present transport situation has come to exist is summarised in graphic form in Figure 2.4. In order to achieve succinct understanding, the graph does not indicate the complex relationship between the factors; the discussion of these relationships will only be made in the next section.

Figure 2.4 Inputs and Outputs of Kuala Lumpur's Transport System



The first category of key factors is referred to as *External Forces*, i.e. influences beyond the control of a transport system. Examples of the external forces are economic growth, income levels, population, employment structure, etc. Although to a large extent the transport system does have an impact on these external forces (for example, road building in a new area can bring the potential of increased economic activity), in general the transport system seldom leads the direction of these factors, rather it usually reacts to them.

The second category of key factors is referred to as *Internal Responses*, i.e. policies and decisions taken regarding the transport system. Infrastructure and technology choices, investment in the transport sector and any other policy decisions that are directly relevant to the transport system are included in this category.

The third category of key factors is the *Drivers* from the grass roots level. Individual choices over modes, mobility needs and perception of certain modes are all considered to be in this category.

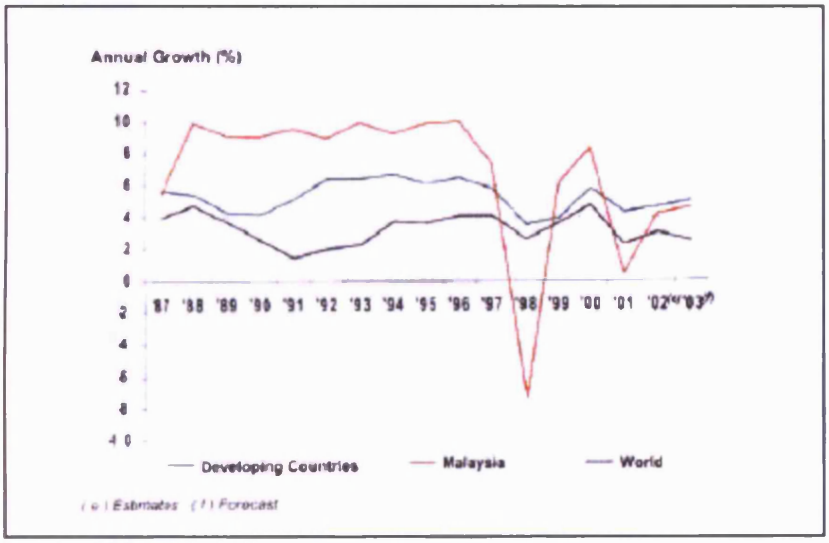
Before discussing the relationships between the factors, some significant indicators and facts about these key factors are presented below, giving an overview of how the trends have developed over the past years:-

External Forces

Economic Growth

Malaysia had achieved significant progress in economic growth until just before the 1997 Asian financial crisis. The nation was able to sustain its pace of development with a strong real GDP which was growing at above 8.0 per cent per annum during the period 1988-1996. Recovering from the crisis since mid-1998, the economy has managed to record an average growth rate of above 4.0 per cent per annum for the last two years. As Figure 2.5 shows, such a growth rate is above average for the world and also for other developing countries.

Figure 2.5 Real Growth Rate 1987-2003

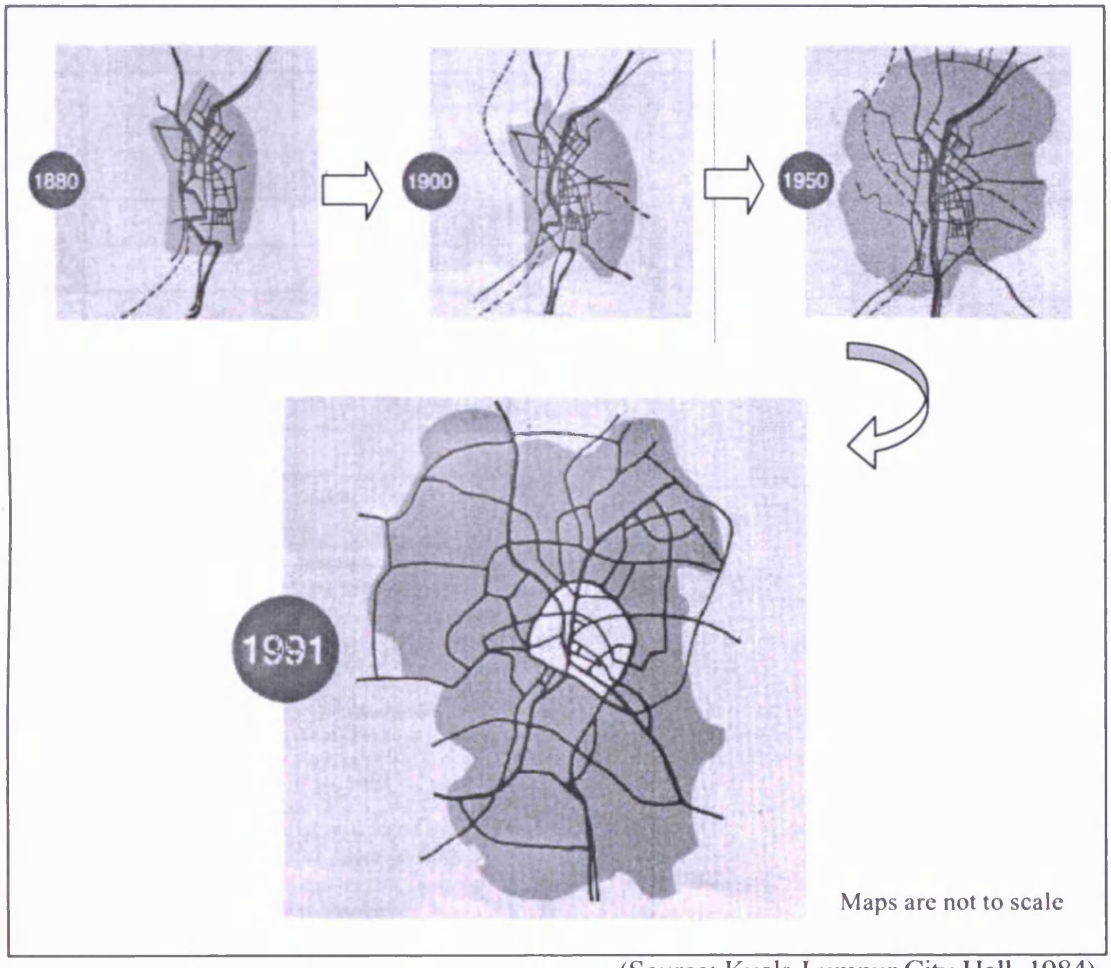


(Source: EPU, 2004)

Urban Expansion

Kuala Lumpur's Central Business District (CBD) has spread and grown into several areas along major roads beyond the old centre. It has expanded along major road corridors, with the longest being the 35 kilometre corridor of almost continuous development along the Federal Highway between the city and Port Klang to the south-west. Another long corridor extends about 22 kilometres to the south-east to Kajang (Barter,1999). The maps in Figure 2.6 show the expansion of the city and today's Kuala Lumpur is 100 per cent urbanized area.

Figure 2.6 Urban Expansion in Kuala Lumpur

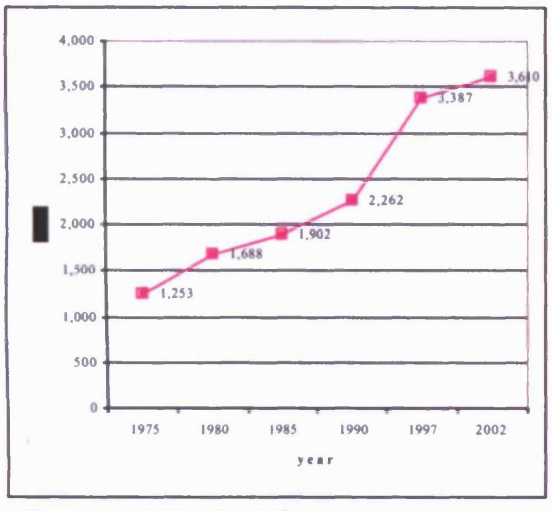


(Source: Kuala Lumpur City Hall, 1984)

Sharp Increase in Income and Expansion of Population

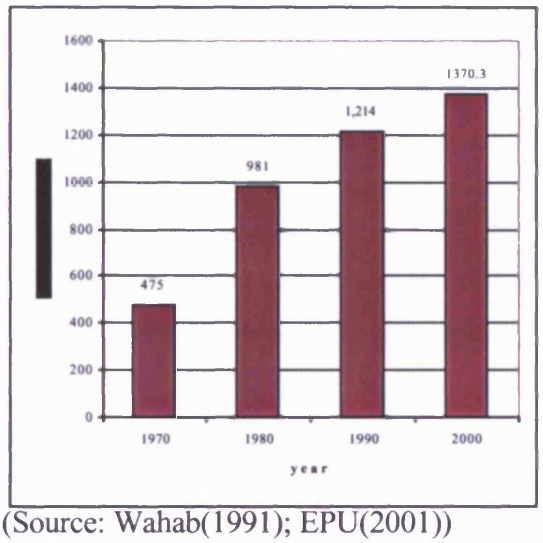
Over the past three decades, there has been a sharp increase in income levels in Malaysia generally and in Kuala Lumpur in particular. GDP per capita in Malaysia has risen from US$1,253 in 1975 (UNDP, 1999) to US$3,610 in 2002 (EPU, 2001): this is nearly a three-fold increase in the period. Among the states, KL has always recorded the highest per capita GDP in Malaysia: statistics in the year 2000 shows that it recorded US$8,086 (EPU, 2001) more than double the national average of US$3,387. Meanwhile, as Figure 2.8 shows, population in Kuala Lumpur has increased nearly two-fold from 475,000 (Wahab, 1991) to 1,370,300 (EPU, 2001) in the same period.

Figure 2.7 Malaysia: GDP per Capita



(Source: UNDP(1999); EPU(2001))

Figure 2.8 Population in KL



(Source: Wahab(1991); EPU(2001))

The Launch and Growth of the National Car

The decision to build the national car, although seemingly a transport-related policy, was taken totally from the perspective of economic development. In other words, this is an external force that contributes to the present car-driven situation.

Kuala Lumpur's national car programme dates from 1983, when the government invited Mitsubishi to help form Perusahaan Otomobil Nasional Bhd., or Proton. The company built a factory near Kuala Lumpur and the government shielded it from outside competition by imposing high tariffs on imported cars[9]. Since the launch of the national car (and later on the motorcycle) in 1984, the project has been considered to have developed into a successful industry. There are various measures which have been taken by government to stimulate the car industry, such as easier loans, more favourable hire purchase terms, various incentives, etc. Throughout the 1990s Proton averaged sales of about 105,000 cars per year. Today Proton dominates the market with 64 per cent of total passenger car sales; the second national car company, Perodua, came second with a 29 per cent market share (MAA, 2004).

The launch and growth of national cars could be regarded as one of the most influential factors in changing Malaysian's perception of the car. Apart from economic reasons, the car has a complicated hold on Malaysia's national psyche. To a great extent, it encapsulates the former prime minister's vision of Malaysia becoming a developed country. The perception of car-making, car usage and car ownership that are strongly linked to an image of a developed nation have nurtured a 'car culture' in the society. This will be further discussed in the section on 'Individual Drivers'.

[9] Duties on a fully assembled imported car in Malaysia range from 150 per cent to 300 per cent, depending on engine size.

Internal Responses

Land Use in a Dispersed Pattern

One related and important underlying reason which boosts the private vehicle demand as an 'Internal Response' is the prevailing spatial arrangements in Kuala Lumpur. Map 2.1 shows the land-use pattern in and around Kuala Lumpur and its development concept is presented in Figure 2.9.

Apart from the urban expansion of the old city, over the years new towns and growth centres have radiated out from Kuala Lumpur in response to the urbanisation process. Petaling Jaya, the first dormitory town, and Shah Alam, the second new town, were planned in 1954 and 1966 respectively to respond to the development pressures. Then Subang Jaya, Puchong, and Ampang were further developed on a large scale to disperse the huge demand for residential accommodation (Wahab, 1991). In the coming decade, there will be more drastic changes in regional development, which will take on a more dispersed patters (JICA, 1998). The new Administration Capital City, Putra Jaya, the development of Kuala Lumpur International Airport (KLIA), and the Multimedia Super Corridor (MSC), an area of 15km by 40km to the south of KL, and its new growth core, Cyberjaya, are all part of the new development of the new Southern Growth Corridor (Asian Strategy & Leadership Institute, 1997).The land will be more intensely developed with a sizeable population and employment dispersed in this corridor

According to the study by Barter (1999), Kuala Lumpur had 69 CBD residents for every 100 CBD jobs, which indicates a very high ratio of residents to jobs in Kuala Lumpur. Many prefer to work in KL but have chosen to reside in the new towns and neighbourhood centres. Such a land-use pattern has encouraged a lifestyle that is strongly dependent on private vehicles as well as inducing inefficient development of public transport[10].

[10] See Wahab, I. (1991) and the JICA Report (1998), Volume 1, for spatial factor influences on the transport system in Kuala Lumpur.

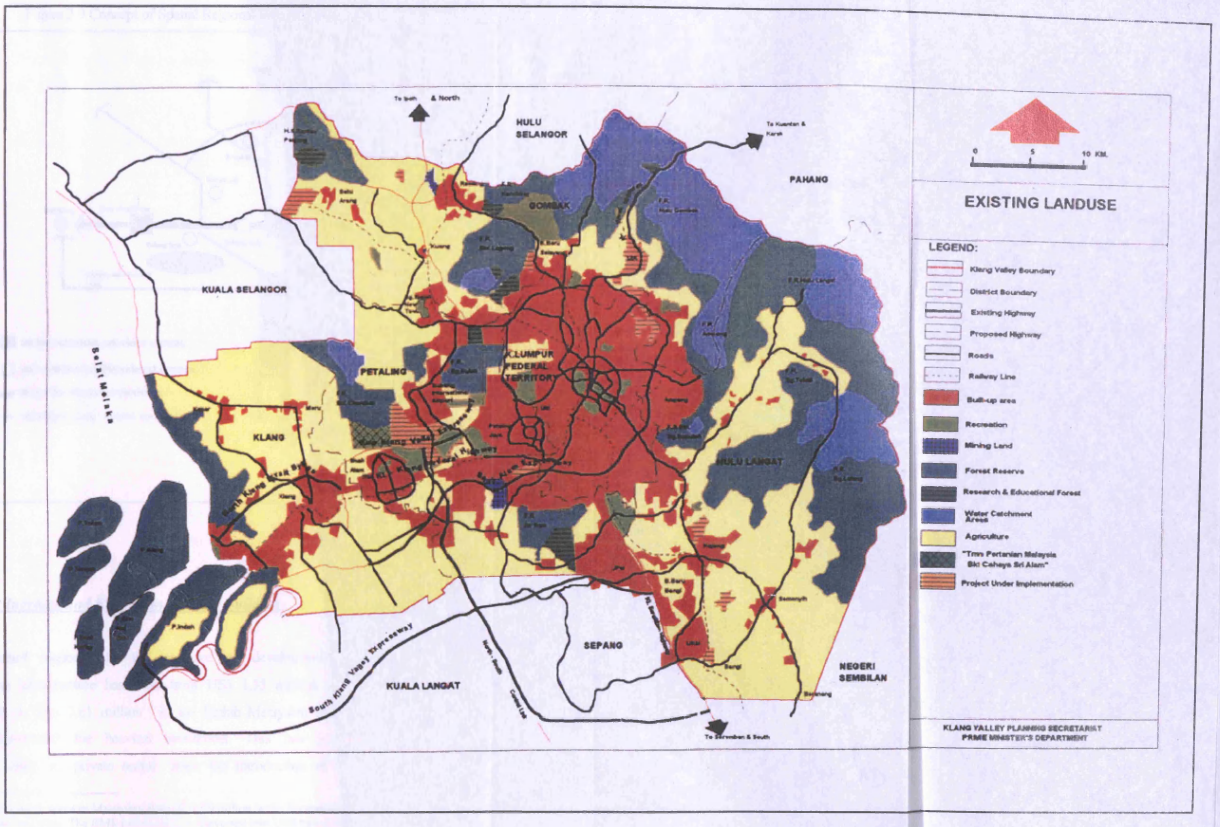
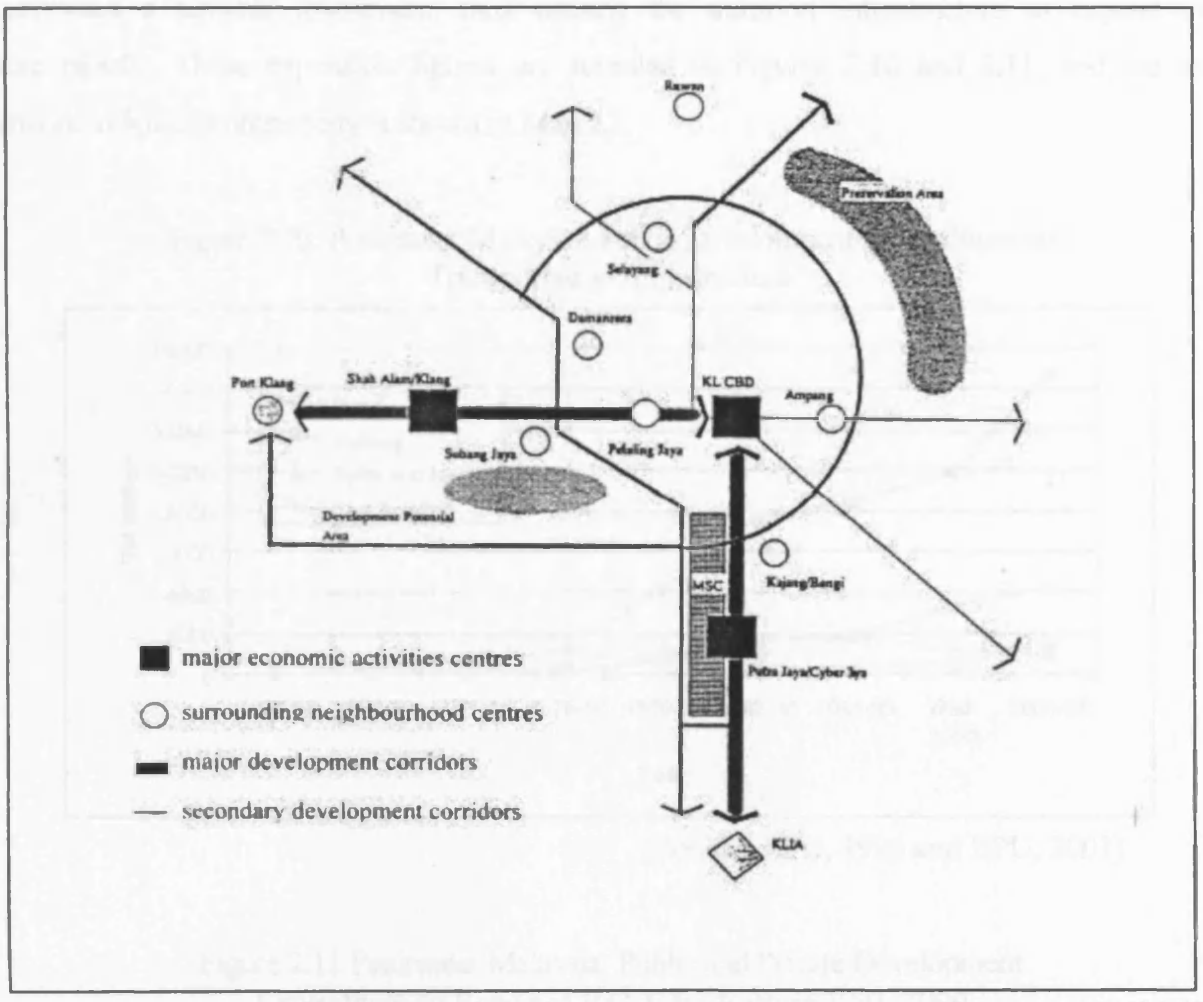

HULU SELANGOR
PAHANG
GOMBAK
KUALA SELANGOR
PETALING
KLANG
KUALA LANGAT
SEPANG
HULU LANGAT
NEGERI SEMBILAN
EXISTING LANDUSE
LEGEND:
Klang Valley Boundary
District Boundary
Existing Highway
Proposed Highway
Roads
Railway Line
Built-up area
Recreation
Mining Land
Forest Reserve
Research & Educational Forest
Water Catchment Areas
Agriculture
Project Under Implementation
KLANG VALLEY PLANNING SECRETARIAT
PRIME MINISTER'S DEPARTMENT

Figure 2.9 Concept of Spatial Regional Structure of Kuala Lumpur



(Source: JICA (1998))

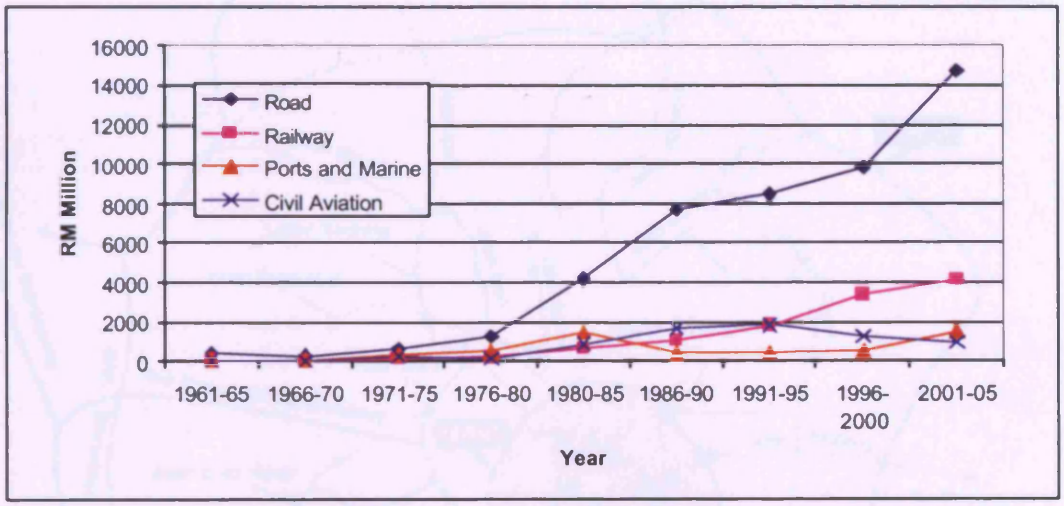
Investment Increase and Expansion of Road Building

As an instant response to the pressure of development, government investment in transportation infrastructure has risen from US$ 1.55 million in the Second Malaysian Plan (1970-1975) to US$ 3.61 million[11] in the Eighth Malaysian Plan (2001-2005), in which road transport represented the heaviest investment. This has yet to include the significant contribution from the private sector. Since the introduction of the Privatisation Master Plan

[11] The values are equivalent to Malaysian Ringgit 0.59 billion in the Second Malaysian Plan and 1.37 billion in the Eight Malaysian Plan. The RM$ currencies are converted into US$ based on exchange rate on 21 September 2004.

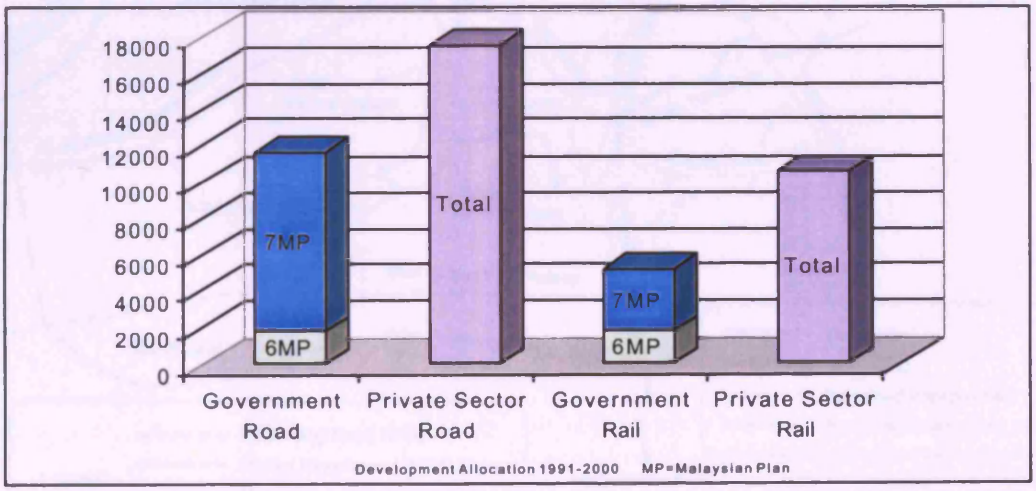
(1991), the private sector has been actively involved in the transport business having contributed a sizeable investment, thus causing the transport infrastructure to expand even more rapidly. These expansion figures are revealed in Figures 2.10 and 2.11, and the road network in Kuala Lumpur city is shown in Map 2.2.

Figure 2.10 Peninsular Malaysia: Public Development Expenditure on Transportation Infrastructure



(Source: EPU, 1996 and EPU, 2001)

Figure 2.11 Peninsular Malaysia: Public and Private Development Expenditure on Road and Rail Infrastructure 1991-2000



(Source: EPU, 1996)

Map 2.2 Road Network In Kuala Lumpur City

Road-building activities have been going on intensively since the 1980s in Kuala Lumpur. The toll expressways were particularly expanded after involvement of the private sector from the early 1990s. Kuala Lumpur was estimated to have about 60km of expressway per million persons in 1985, and this increased to 70km of expressway per million persons[12] in 1997, with numerous additional projects under construction or at an advanced planning stage.

Individual Drivers

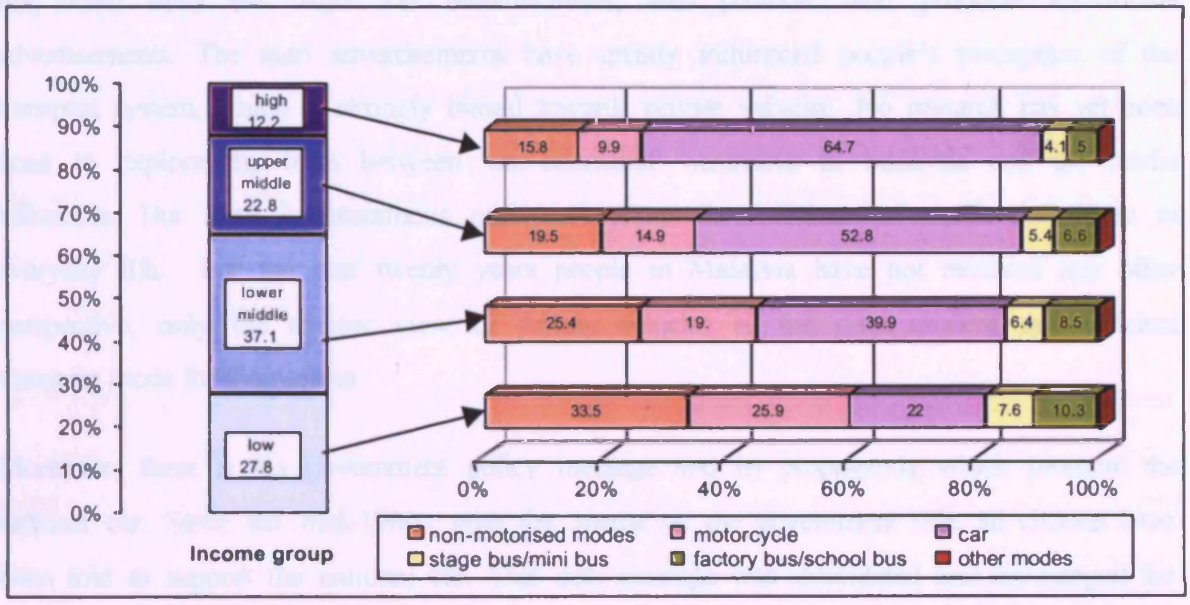
Mobility Needs – Reacting to the Poor Public Transport System

The first driving force for individuals refers to their basic mobility needs; this is also the first and foremost objective served by a transport system.

An observation has been made by the researcher with regard to the mobility needs served by various transport modes as against income level in Kuala Lumpur. It is found that the higher the income of the group, the greater its dependence on private vehicles and less on non-motorised modes, as shown in the Figure 2.12. And another more striking observation is that there is a significant percentage (nearly 50%) of low-income groups who use private vehicles for mobility purposes (the issue of mobility needs and low-income groups will be found in various sections in the thesis). More detailed data about the changes in trends over the years do not exist, but this Figure suggests that the present mobility needs of the whole range of income groups are generally fulfilled by private vehicles.

[12] From the figures studied by Barter (1999), the levels of motorization (from the indicator of kilometers of expressway per million persons) in Kuala Lumpur is much higher than for London (9) and Paris (61) in the year 1990.

Figure 2.12 Income Groups and Transport Modes in Kuala Lumpur



(Source: Modified from JICA, 1998)

Many past studies have suggested that this is due to the lack of a good public transport system in Kuala Lumpur (Ab Rahman,1993; Sadullah,1997; JICA, 1998; Barter 1999) so that people have no other choice but to opt for private vehicles for their mobility needs. The switch from the poor public transport system in the past is definitely one of the reasons which contributes to the present auto-driven situation, and this fact has been officially recognised by government. Kuala Lumpur has started to build massive rail-based public transport in recent years. But will the planned public transport system be enough to support the mobility needs and change the present situation? This question will be discussed in Session 2.3 in this Chapter.

Policy Messages and Media Information

The second driving force at an individual level comes from well-received policy messages and media information.

The past two decades have been an era of globalisation that has brought Western culture (American in particular) into Malaysian society. One of the strongest impacts of globalisation

has come from the major car manufacturers, who promote their products via media advertisements. The auto advertisements have greatly influenced people's perception of the transport system, which is strongly biased towards private vehicles. No research has yet been done to explore the links between 'car-orientated' behaviour in Malaysia and the media influences. But there is unanimous agreement about the existence of media influences in everyday life. For the past twenty years people in Malaysia have not received any other perspective, only the narrow view of private vehicles as the only modern and efficient transport mode for themselves.

Moreover, there is the government policy message and its propaganda which promote the national car. Since the mid-1980s, with the media on the government side, all citizens have been told to support the national car. This dear message was assimilated and encouraged the usage and ownership of the car.

As many have observed, since Proton's inception in 1985, it has been a point of pride for the nation, serving up an image of autonomy, innovation, patriotism and industrialization. The launch and growth of national cars may be regarded as one of the most influential factors in the strengthening of Malaysia's perception of private vehicles, on top of global car manufacturers' advertisements. Apart from this, the car has a complicated hold on Malaysia's national psyche. To a great extent, it encapsulates the former prime minister's vision for Malaysia to become a developed country. The perception of car-making, car usage and car ownership that are strongly linked to the image of a developed nation have nurtured society's enthusiastic car-orientated behaviour.

The implicit promotion of national cars, the explicit message of road-building and dispersed land use are all government policies that have been well received by the citizens, and have become the key motivation for the individual to own and use private vehicles as a response to these messages.

Cultural Influences

This refers to the 'car dependency culture' that has gradually developed in Malaysia. Again, no other study has been carried out to investigate this topic in depth in Kuala Lumpur; therefore there is a lack of references to data and evidence. Nevertheless, it is an obvious fact that society (especially the middle-class group) is so obsessed with the car that it has become a yardstick by which to judge a person's social class.

This phenomenon has been studied by Vasconcellos (1997), who has observed the demand for cars and the emergence of new middle-class groups in developing countries: 'to ***be*** a middle-class citizen, required the performance of a set of new (commodified) social, cultural and economic activities, whose time-space optimisation relies on the car...the attempt to perform these activities by non-motorised means would result in disaster'. It is a truth that in Kuala Lumpur the required mobility for work, leisure, shopping and other social activities has expanded in such a way that the private vehicle has become a necessity for middle-class groups, and, public transport is associated with the inferior, unsuccessful and low-income groups.

In Kuala Lumpur the researcher has found a circular relationship between the car and middle-class people. While middle-class groups think that these modern lifestyle activities (and hence private vehicles) are needed to maintain their identity and hence separate them from lower-income groups in society, poorer people also think that to own a private vehicle makes them more mobile, with better opportunities and would enable them to upgrade themselves into the middle class[13].

2.1.2 A Discussion: Is the Present Urban Transport System an Inevitable Result?

The key factors described above often interact with each other and all operate at the same time. Judging from the historical trends of Malaysia and Kuala Lumpur, however, it is fair to say that individual choice (Driver) is responding to the transport decisions and the associated

[13] The issue of social inequity due to this phenomenon will be explored in various parts in this thesis.

policy messages (Internal Response), which reacted to the overall economic development (External Forces). This sounds familiar and accords with the old ideas of 'natural consumer desire as income rise' and 'an inevitable result of economic development', but it is not the same. The major divergent point is that the present car-driven situation is not an inevitable result, nor is it due to natural consumer desire. Instead, it is an outcome of specific social, economic, political and institutional decisions, as shown in the graph in Figure 2.4.

In response to the External Forces, all the efforts and decisions taken over the past two decades were clearly part of a car-oriented strategy. This is manifested in the expansion of road-building, dispersed patterns of urban development and promotion of the locally made national vehicles, Protons. Since then society has been encouraged to upgrade itself materially and associate car driving with a modern and developed image. In a way the government has linked motorisation with modernisation, an example of Western style, especially with reference to US model. An article in 'Malaysia Today: Towards the New Millennium' (1997) reveals that this concept has been strongly held: 'adequate and efficient transport infrastructure *(refers to road-building)* will contribute towards providing an environment required to support Malaysia's rapid economic expansion'.

The impact of the launch of the Proton was especially marked and resulted in the sharp increase in ownership of private cars and motorcycles. Since then, due to economic factors, both government and the local automobile industry have sent a clear message to encourage people to own and use private vehicles. Every effort has been made to ensure that the Proton is a success story initiated by the Malaysian government; various incentives and soft loans plus other messages; have convinced the public to use private vehicles. The Proton has also become a symbol to show the world that Malaysia is capable of making the automobile, an enthusiastic act to get rid of its image as a developing country.

Apparently, in a situation in which no other transport alternative of an equal standard was provided, individuals responded positively to the media information and car-orientated policy messages to fulfil their mobility needs. The dispersed land-use pattern has enhanced this need as walking and cycling have become unsuitable. As a result of the government enthusiasm to

become a developed nation by the year 2020[14] and the media influence, the society has gradually labelled private vehicle usage as a basic necessity for a modern lifestyle, and private vehicles, especially the car, have taken root as part of the social culture in Kuala Lumpur. This also coincides with the growing number of middle-income groups[15] in Malaysia and Kuala Lumpur, who strongly associate their mobility needs, as well as their image, with the car. This subtle relationship between the car and the middle class is an unspoken reality that influences the thinking and culture of society in Kuala Lumpur.

Whilst from the perspective of the poor, the overwhelmingly car-oriented trend has left the city with no room for the development of other affordable modes, as non-motorised modes are not regarded as part of formal urban transport planning: walking and cycling environments are dangerous and unpleasant; bus services are very poor. These factors left the poor no alternative but to go for (cheaper) private vehicles. This issue will be further discussed in section 2.2.5.

In short, private vehicles have become the major transport mode for every level of society in the city. If the unsustainable car-driven trend is to be broken, this car dependency aspect of social culture is one of the subjects that has to be dealt with.

So far, the key factors described above have somehow seemed to form a whole *package of car-oriented strategies*, and it has proved *so successful* that it shapes the present urban transport system in Kuala Lumpur. Nevertheless, the *package* was not planned or formulated systematically (this will be explained later). Was the car-driven trend inevitable? The answer is, no. Did Kuala Lumpur plan its present situation? The answer is again, no.

The present situation is not inevitable as there were other choices that Kuala Lumpur did not make. Facing similar external forces, cities such as Seoul, Singapore, Hong Kong and Tokyo have been following a fundamentally different path in their transport development; all of

[14] Vision 2020 is a long-term policy target of Malaysia to become developed nation: it is a most influential policy document that underlies other development policies in Malaysia.

[15] Not only were there an increasing population and average income per capita, but also an increasing number of households were moving into higher income classes, and at the same time, there was a decline in the proportion of low-income groups. For example, the percentage of middle-income groups in Malaysia has increased from 33% to 47% during the 1990-1995 period. (EPU (1996) -7th Malaysian Plan)

these cities have emphasised public transport to a much greater extent. The motorization levels are therefore much lower in relation to their income levels. A lengthy study about these has been found in a comparative study of Asian Pacific cities done by Barter (1999). It demonstrates that policy actions can decide the fate of urban transport systems in a city. The car-oriented strategy was definitely not the inevitable result of accommodation of the External Forces that Kuala Lumpur *had* to make in the past. Ironically, even though all the (internal responses) policies adapted have shown that Kuala Lumpur *was designated* to become car-orientated and this was associated with the city's image of being modern and developed, the transport policy document outlined in the paper told a different story.

2.1.3 Kuala Lumpur's Present Transport System Represents Lack of Success of the Past (Balanced) Transport Policy

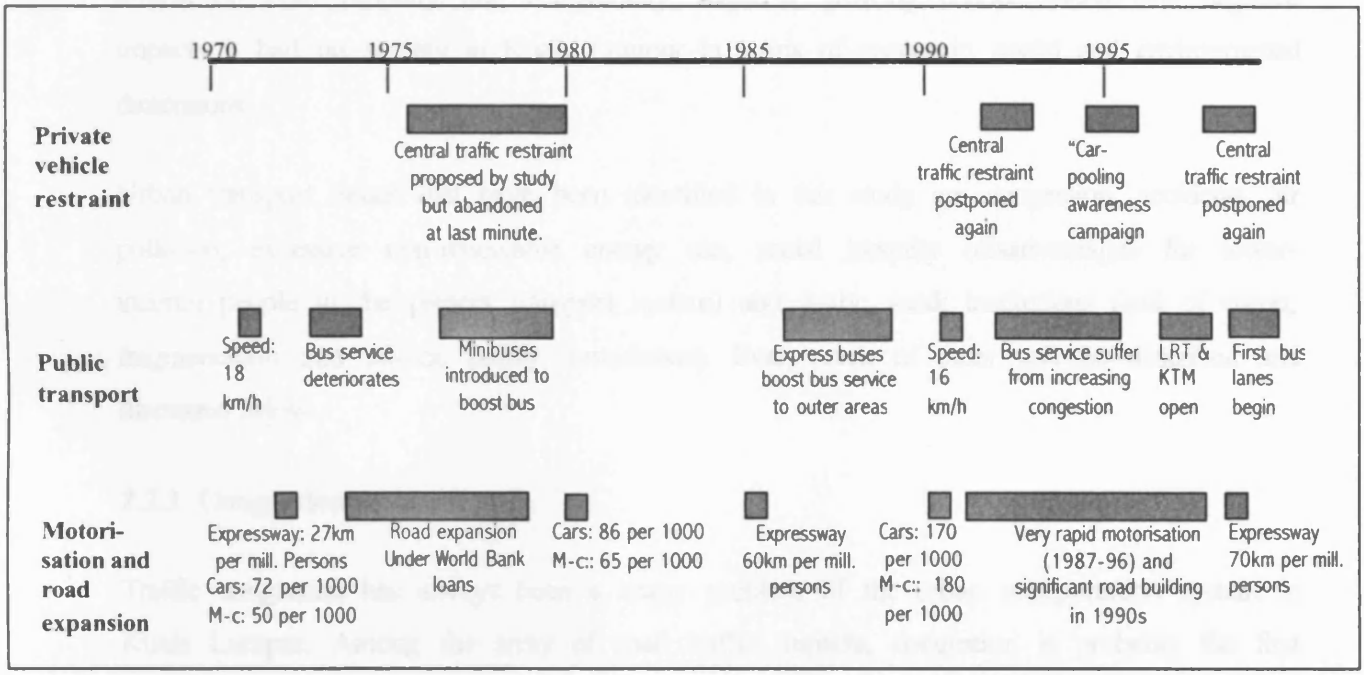
Reviews of Kuala Lumpur's transport policies since the 1970s have shown that Kuala Lumpur did indeed plan to develop a more balanced transport system, at least as revealed by statements in the policy documents. Several important plans and studies since 1970s (World Bank's Kuala Lumpur Transport Project,1975; Kuala Lumpur Structure Plan,1984; Transportation Master Plan Study (JICA), 1986; Integrated Urban Transportation Study in Kuala Lumpur (JICA),1998; have repeatedly emphasised the fact that Kuala Lumpur should provide a high-quality public transportation system, restrain car ownership and usage and provide a complete pedestrian movement system and network.

Nevertheless, the historical facts proved that the present tansport system is an unsuccessful product of the failure to implement any of these plans and policies.

Barter (1999) has compiled and summarised the key policies and events introduced in Kuala Lumpur since the 1970s. It shows that there were efforts to restrain the ownership and use of private vehicles several times in the 1970s, 1980s and 1990s, but all of them either failed to be implemented or were taken out after a number of pilot projects. Meanwhile, bus services have been boosted several times by the introduction of minibuses and extending the services of stage buses to outer areas. Again, the policies did not bring the fruitful results expected.

This part of the review reveals that the car-oriented policy mentioned earlier was not exactly a choice made by Kuala Lumpur, but it happened because it has always faced policy dilemmas, has been unable to tackle the complexity of the interrelationship between all the key factors, and has been drifting along affected by other influences. It is also obvious that ad-hoc policy measures, such as car-pooling introduced in 1995[16] and bus lanes introduced in 1997, are just insufficient to change the present situation.

Figure 2.13 Key Policies and Events in Kuala Lumpur, 1970 to the 1990s



(Source: Barter (1999))

In short, there is a lack of a *defence system* inside the transport policy field to face the ever-changing challenges coming from the External Forces. As a major component of an urban system, transport should play an active role in leading the overall physical development; or, at the minimum, stay within the goals and objectives. Apparently, Kuala Lumpur has become a victim of a lack of vision for the transport system, unclear transport goal-setting, conflicting transport policy directions and a weak planning institution (to be further discussed in Section 2.2.6 in this Chapter) so that it is unable to steer in the direction of its planned path.

[16] This idea had been quietly abandoned after a short pilot project.

2.2 Urban Transport Issues in Kuala Lumpur

This section reviews the present urban transport issues in Kuala Lumpur. It aims to identify the major transport impacts upon the society as a result of the present auto-driven situation. Literature reviews and inputs from local transport experts were the two main sources for this review.

Although the increasing growth rate of car ownership has brought about direct positive effects on both mobility and accessibility, there is growing concern about the negative impacts it had on society in Kuala Lumpur in terms of economic, social and environmental dimensions.

Urban transport issues that have been identified in this study are congestion, accidents, air pollution, excessive non-renewable energy use, social inequity (disadvantages for lower-income people in the present transport system) and lastly, weak institutions (lack of vision, fragmentation and ad-hoc policy formulation). Every each of them will be described and discussed below.

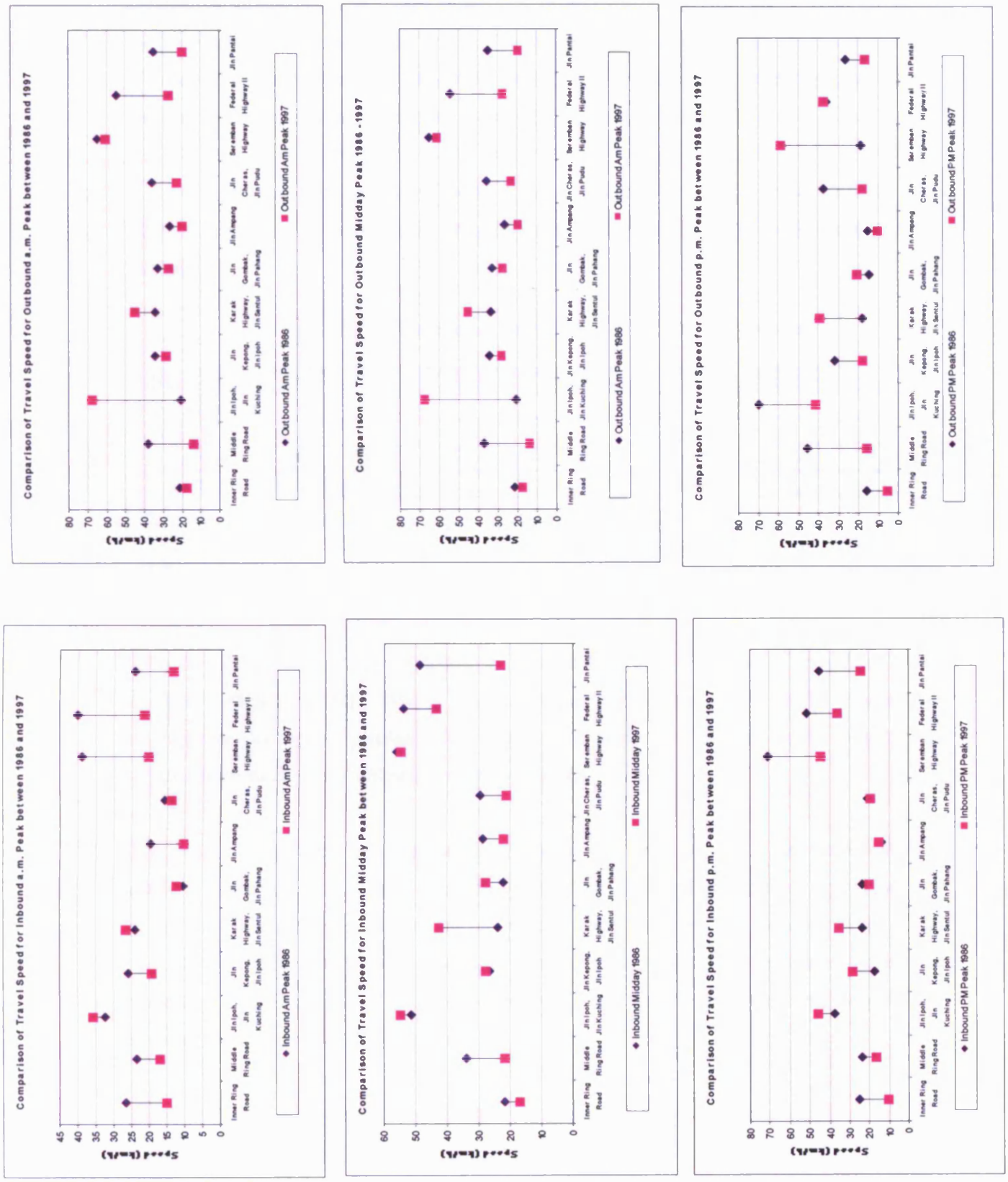
2.2.1 Congestion

Traffic congestion has always been a major problem of the urban transportation system in Kuala Lumpur. Among the array of road traffic impacts, congestion is probably the first problem that was picked up by both road users and the city hall. Indeed, all the past transport policies have focused disproportionately on this oldest and probably over-emphasised issue.

The pressure of congestion is very real and has worsened over the years. Statistics show that over the past decade, the average car's travelling speed has decreased significantly on the main routes in and around Kuala Lumpur; the area with low speeds (under 20km/h) covers the whole inner city of Kuala Lumpur[17]. Figure 2.14 on next page shows the comparison of

[17] The reader could refer to JICA Report (1998, Chapter 2) for full details of the congestion situation on every major route in Kuala Lumpur.

Figure 2.14: Comparison of Travel Speeds for 11 Major Routes in Kuala Lumpur between 1986 and 1997



average car speeds on these routes between 1986 and 1997, and these are modified from the JICA studies in 1987 and 1998. In terms of the seriousness of congestion, morning peak hour of inbound traffic is the most congested period; this is followed by evening peak hour of outbound traffic, and the average speed is between 18.70km/h and 25.6km/h.

It is very obvious that congestion levels in Kuala Lumpur are getting worse. Data in Table 2.2 give some idea of deteriorating rates of car travelling speeds at the peak hours in Kuala Lumpur.

Table 2.2 Deterioration of Car Travel Speeds in the Past Decade

Routes	Deterioration rates of travel speeds
Inner Ring Road	18% - 67%
Middle Ring Road	28% - 65%
Jln Ampang	22% - 47%
Jalan Cheras – Jalan Pudu	6% - 51%
Seremban Highway	2% - 48%
Federal Highway II	13% - 46%
Jalan Pantai	37% - 52%

(Source: Modified from JICA Studies (1987,1998))

In a 10-city regional survey conducted in April and May 1999 by Hong Kong-based Asian Market Intelligence (AMI), 39% of Kuala Lumpur respondents ranked traffic congestion as the number one social problem. This reveals that many residents in Kuala Lumpur have suffered from traffic jam problems in their everyday life.

The congestion problem in Kuala Lumpur has always been linked to car users but buses actually experience worse conditions than cars. The average bus travelling speed on most routes is lower than the average car travelling speed: it is in the range of 4.0km/h and 15km/h. The difference between cars and buses is attributable to the passenger loading and unloading time. If compared with the congestion level experienced by those travelling by car, it shows how unattractive the bus mode is.

Much of the literature has pointed out that the congestion issue in Kuala Lumpur is due to a mismatch between road capacity and the number of private vehicles. Over the years,

suggestions for private vehicle restriction and investment in public transportation have been repeatedly made (JICA, 1987; Wahab, 1991; Ab Rahman, 1993; Sadullah,1997; JICA, 1998; Barter, 1999). Local transport experts have expressed similar views; according to them, high usage of private vehicles, failure of public transport and lack of long-term strategic planning to allocate road space are the main culprits with regard to the congestion problem.

From the review of transport policies it is fair to say that government has made several attempts to curb the problem of congestion. In terms of public transport, these include the introduction of the minibus (late 1970s), upgrading of express buses (late 1980s), development of a massive rail-based project (late 1990s) and introduction of bus lanes (1997). Besides these, there was the unsuccessful pilot project for a car-pooling awareness programme (1995) and an insignificant increase in parking fees (early 1990s). Private vehicle restriction (ownership and usage) has never been implemented in Kuala Lumpur; the proposals have been rejected and delayed several times since the 1970s. In short, none of the efforts, except the rail-based project[18], brought about fruitful results by means of combating the congestion problem as in the way that had been anticipated.

The consequences of congestion in Kuala Lumpur not only jeopardize road capacity and transport mobility, they also create more pollution, increased non-renewable energy consumption, a loss of comfort and personal well-being, a reduction in income, production or leisure; these subsequently affect the whole economy, efficiency and image of Kuala Lumpur.

To solve the congestion issue, there is a need to reuse the road space efficiently and redistribute the modal split. Better traffic management, smaller vehicles, higher capacity loads for vehicles (either through private vehicle-sharing or a modal shift to public transport) and road pricing are all possible measures to achieve the efficient usage of road space. Promoting a diversity of modes and offering many creative and attractive modes, rather than

[18] The Integrated Public Transport system has yet to be completely finished. The remaining phase of the rail-based system has been stopped, an order given by new Prime Minister (Mr. Abdullah Badawi) in January 2004. The Integrated Public Transport system will be evaluated and discussed in Section 2.3 in this chapter.

concentrating on the car, is an important sustainable approach for tackling the congestion problem.

2.2.2 Road Accidents

The level of road accidents is an immense transport issue in most developing countries. While the road death rate in developed countries (with higher vehicle ownership) is declining, it is increasing in lower-income countries. As data in Table 2.3 show, the overall fatality rates per 10,000 vehicles are several times higher than in developed countries. Malaysia, though not the worst among ASEAN countries, has a fatality index of 8.4 deaths per 10,000 vehicles (Highway Planning Unit, 1998) which is considered very high by world standards. In 1990 the Government of Malaysia set up a Cabinet Committee on Road Safety with the prime objective of reducing road fatalities by 30% by the year 2000 as the medium-term mission for road safety efforts in Malaysia. The government had decided to implement continuous safety campaigns to improve the situation, and set a target of reducing the fatalities rate to 3 deaths per 10,000 vehicles by the year 2000 (Baguley and Miustafa, 1995). In 1996 the Ministry of Transport funded research on road safety in Malaysia through the Road Safety Research Centre (RSRC) of the University Putra Malaysia (refer to RSRC website http://www.eng.upm.edu.my/webrsrc/). Despite the efforts, the rate only dropped to 5.7 by the target year, while overall numbers of accidents and fatalities continued to rise due to the high growth of vehicles.

Table 2.3 Fatality Rates For Some Selected Countries

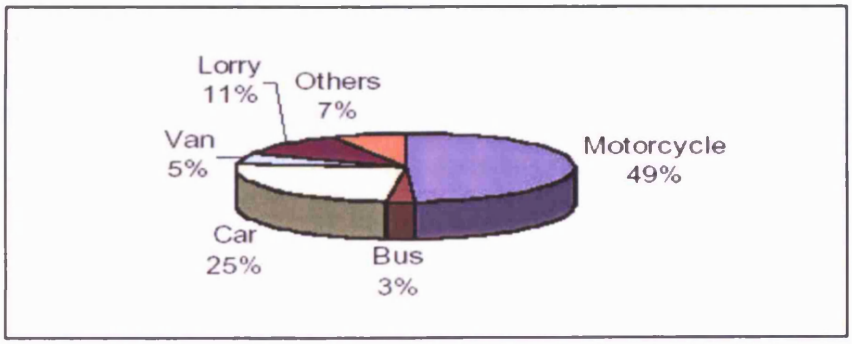
Countries	Fatalities	Registered Vehicles ('000 units)	Fatality Rate (Death/10,000 vehs.)
Indonesia	11,004	11,373	9.7
Malaysia	5,159	6,166	8.4
Thailand	9,496	11,062	8.6
Singapore	254	584	4.3
Australia	1,952	10,613	1.8
Japan	10,649	79,722	1.3
America	40,676	193,695	2.1

(Source: Highway Planning Unit, 1998)

Today, road safety has become one of the most urgent public health issues in Malaysia, as road accidents have been one of the major causes of death and injury in the country[19]. Apart from immeasurable suffering and loss of life, road accidents have caused enormous economic loss and jeopardized the efficiency of the city system. The government estimated that more than US$ 15.8 million[20] is lost each year in Malaysia due to road accidents alone; this includes the loss of productivity, medical costs, management costs and property damage (Badawi, 1999). Of the 13 states, Kuala Lumpur has the highest number of accidents per number of registered vehicles in Malaysia (Sadullah, 1997). Government has been under great pressure to curb the accident problem, and the latest development was to set a new fatality rate target of 2 deaths per 10,000 vehicles by the year 2020. (The Star Newspaper, 2002).

A unique feature of the accident situation in Malaysia and Kuala Lumpur is its highly vulnerable motorcyclists and pedestrians. The annual statistical data show that motorcyclists make up the highest proportion of those involved in accidents, as well as the number of deaths due to accidents. Accidents involving motorcycles represent about half of all accidents, as shown in Figure 2.15. The same pattern may be observed in Kuala Lumpur, in which the highest percentage of fatal accidents is for motorcyclists, followed by pedestrians (JICA, 1998).

Figure 2.15 Percentage of Accidents by Vehicle Type



(Source: JICA, 1998)

[19] According to the Perioperative Mortality Review (POMR) based on 2,092 perioperative deaths over an 18 month period, road accidents account for 79.4% (Lim, K.G., 2003)

[20] This value is equivalent to Malaysian Ringgit 6 billion. The RM$ currency is converted into US$ based on exchange rate on 21 September 2004.

In general the government has identified the human factor (negative attitude of Malaysian drivers, motorists and pedestrians) as one of the main contributory factors to the high rate of road accidents. The 'negative attitudes' refers to the habit of failing to give the correct signals when turning, speaking on headphones when driving and smoking whilst driving (Star, 2002); dangerous driving practices and motorcyclists driving very closely behind other vehicles (JICA, 1998); ignorance and carelessness in crossing roads by pedestrians (JICA, 1998). The government has made enormous efforts to initiate various awareness campaigns and enforcement operations to counter these negative habits; for example, the *Motorcyclist Safety Campaign*, *Road Safety Awareness Week, Ops Sikap*[21] (short for Operasi Sikap, or Operation for Driving Behaviour), *Ops Warta* [22] (short for Operasi Waran Tangkap, or Operation Warrants of Arrest), etc.

Despite all these attempts to improve the situation, from the transport planning point of view the researcher found that there is a serious lack of integrated urban planning strategies to tackle accident issues. The motorcycle mode is the second most dominant on the road, but its existence is largely ignored in the course of the physical planning of road space and regulations[23]. A recent comment made by Kaur and Mahdar (2003) from SIRIM has noted that the level of safety regulation in Malaysia is deemed to be inadequate for consumer safety by the regulatory infrastructure of the country. Similar concerns have been recently noted by the new Minister of Transport, who pointed out that basic road safety features have not been included in Malaysian cars (The Star, 2004). There is also no annual maintenance checking mechanism to ensure that the safety of vehicles (cars and motorcycles) is up to standard. The neglect of pedestrian safety is also apparent. According to the JICA (1998) study, pedestrians have become irritated at major intersections when they have to wait for a long time to cross the road in a poor environment caused by heavy vehicle exhaust and noise. They cross streets

[21] Refer to the concentrated campaigns to reduce road accidents.
[22] Motorists will be closely monitored to ensure compliance with traffic rules and warrants of arrest will be served on those who ignore traffic summonses
[23] This is apart from some attempts to segregate motorcycles from the main flow of traffic and a new approach to road safety auditing for all new road projects implemented since 1996, which are still in the infancy stage of implementation.

ignoring the signal lights, they wander into vehicle lanes to shorten their journey, and while at bus stops, pedestrians and passengers may overflow into the vehicle lanes.

The unfriendly environment for motorcyclists and pedestrians is very obvious on the road in Kuala Lumpur. Both road users have been discriminated against in the transport policies that are biased towards cars, which dominate the situation (see Section 2.1, the present car-orientated trend). Coincidently, in Kuala Lumpur these two groups of road users largely consist of lower-income people (motorcyclists) and the most vulnerable groups (women, children and the elderly). A recent study (Ign Hsu et al., 2003) has confirmed that the motorcycle is a popular choice of vehicle for low to middle income groups, especially in cities in Malaysia, where the car is the first choice for many if they can afford one. This situation has implicitly revealed that lower-income groups in Kuala Lumpur have suffered as a result of the car-orientated trends.

The problem of accidents is an enormous subject and the issue requires co-operation in various fields to deal with it. From the urban transport perspective, more sustainable transport policies that take into account the issues of accidents and simultaneously improve the unequal situation of different groups of road users in Kuala Lumpur have to be sought. Examples of transport policies include upgrading safety factors in vehicle technology, introducing more efficient traffic management systems, providing environmentally friendly pedestrian ways and providing safer and more affordable alternatives for lower-income groups to encourage them to shift from dangerous transport modes, etc.

2.2.3 Air Pollution

Apart from congestion and accidents, the other popularly recognised transport impact on many developing societies is the high level of pollutant emissions. In general, motor vehicles are the major source of air pollution in Malaysia; in Kuala Lumpur particularly, large numbers of vehicles account for 92 % of air pollution (ESCAP, 2003). Table 2.4 on next

page gives a brief vehicle profile of Kuala Lumpur and the respective pollutants emitted from the vehicles.

Table 2.4 Vehicles and the Pollutants in Kuala Lumpur in Nov, 2000

Type of Vehicle	Main pollutants from vehicles	Total Number	Percentage
Petrol Vehicles	CO, HC, NO_x	1.9million	87%
Diesel Vehicles	PM, NO_x, smoke	0.3million	13%
TOTAL		2.2 million	100%
Motorcycles	Main pollutants from motorcycles	Total in KL	Percentage
2-stroke engine	HC, PM	0.7 million	32%
4-stroke engine	High in NO_x but low in CO, PM & HC		

(Source: Vehicle Data from Ishak, 2001)

A study carried out by JICA (1998) in the areas of Pudu and Cheng Lock (city centre) have shown that the daily NO_2 emissions exceed the WHO guideline (0.15mg/m^3 or 73ppb), CO measured over eight hours at a busy crossing showed a value above the Malaysian recommended guidelines, levels of PM_{10} are expected to be similar. In the same study, the opinion survey by JICA revealed that approximately 80% of working persons and student respondents regard the problem of air pollution in Kuala Lumpur as serious. Another two surveys (Department of Environment, 1999) also revealed that both professionals and the public have regarded traffic pollution as environmental problem with the highest priority (see Table 2.5). According to the Department of Environment, Kuala Lumpur, 79% (the highest percentage) of complaints received pertained to air pollution, principally black smoke emissions from diesel motor vehicles, while complaints about dust and particulate matter featured prominently throughout the year.

The researcher observed that there are three factor levels that contribute to the severe air pollution from mobile sources in Kuala Lumpur. First and foremost, the high percentages of CO, HC, NO_x and PM are undoubtedly due to high usage of private vehicles in Kuala Lumpur. The present auto-oriented trend has been explained earlier in this chapter. International organisations such as ADB, UNESCAP and the World Bank have all expressed their concerns about worsening air pollution levels in the future due to this factor, as there is no sign of the trend towards vehicle ownership and use in Kuala Lumpur slowing down.

The second tier of factors refers to the unique characteristics of vehicle usage in Kuala Lumpur. Factors, such as a higher percentage of motorcycles (especially 2-stroke engines), the longer useful life of vehicles and the more intense usage of vehicles, but with lower maintenance, are intensifying the pollution levels. These vehicle characteristics are often related to the developing world, as income levels are relatively low and the regulations are also looser than in developed nations. For example, emission standards for motorcycles were set at EURO1 (only recently gazette at year 2001), which is less strict than in other Asian countries such as Singapore, India and Taiwan (which have an equally high percentage of motorcycles). There is also no periodic inspection of non-commercial vehicles[24] carried out in Malaysia (Clean Air Asia, 2002).

Table 2.5 Prioritising ('Perceived') Environmental Problems

Professionals' opinions	Opinions from the public, Kuala Lumpur
1. Air pollution problems affecting Malaysia and the globe, especially those caused by industrial emission and vehicular exhaust.	1. Traffic pollution
2. Waste management problems, especially those caused by hazardous work.	2. Litter
3. Industrial pollution of drinking water in Malaysia.	3. Water contamination of rivers and streams
4. River pollution in Malaysia, especially that caused by urban development, industry, sewage and agriculture.	4. Poor rubbish disposal/ management
5. The loss of forest habitat and bio-diversity in Malaysia and its impact to the planet.	5. Emission of greenhouse gases and smoke from factories.
6. The impact of increased CO_2 on the planet.	6. Deforestation and clearing of hilly green areas.
	7. Hazes and acid rain.
	8. Thinning of the ozone layer.
	9. Killing wildlife.
	10. Domestic energy consumption.

(Source: Department of Environment, "IMPAK" 1999)

The last factor is linked to acute congestion levels (as discussed in the previous section) in Kuala Lumpur. Emission per vehicle of most pollutants (except NO_2) is greatly increased as

[24] Periodic inspection is only imposed on commercial vehicles, which amounted to about 11% of the total vehicle population. This indicates that the vast majority of motor vehicles is still not properly regulated.

a vehicle's speed falls (slows down). The severe traffic congestion situation in Kuala Lumpur is therefore a significant factor in relation to the high pollution levels.

To curb the air pollution in Kuala Lumpur, there needs to be co-operation from various perspectives to tackle all the three tiers of factors. Cleaner engines (technology), alternative fuels, better maintenance, stricter regulations, car restrictions, the promotion of cleaner modes, reduced congestion levels, etc. are all possible measures. The present efforts are more biased towards developing emission standards and this is being done single-handedly by the Department of Environment. There is a serious lack of coordination between government institutions to study the issue as well as to propose co-operative efforts to tackle it. There is indeed much more that could be done to link all the elements together (congestion, air pollution, excessive car use, etc.) and tackle the pollution issue across a spectrum of transport policy measures.

2.2.4 Non-renewable Energy Conservation[25]

In 1980, **The National Depletion Policy** was established aimed at safeguarding the depleting oil reserves in Malaysia. In 1981 the Government adopted the **Four-Fuel Strategy,**

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[25] The issue of greenhouse gases emission is one of the most heated topics concerning sustainability discussed in multilateral activities at global level. For example, the Kyoto Protocol was promulgated and adopted by the third Conference of Parties of the UNFCCC aiming to stabilise atmospheric concentrations of GHG at safe levels within a time frame. As a result of that industrialised countries have paid great attention to the global warming issue related to the transportation system, particularly the CO_2 emission from road transport. This is because most of the industrialised countries expect the transport sector to be the most rapidly growing source of greenhouse emissions while the absolute cuts in emissions from housing and industry have been achieved (The International Panel on Climate Change (IPCC)'s second Assessment Report).

In the case of Malaysia, however, global warming issues due to the transportation system are less prominent. First of all, there is land-use change, i.e. deforestation, which catches the world's attention in relation to climate change and demands more attention instead. Furthermore, Malaysia's population is small if compared to those of China, India and Indonesia, etc., therefore, although the pace of motorization is rapid in Malaysia, her potential total contribution to global greenhouse emissions is not alarming. Survey results (Silverman, 1996; Aminuddin Hassin, 1997 and interviews from this study, 1999) showed that both professionals and the general public perceive global warming issues as low in priority compared to other environmental issues.

After the literature review and the first round of interviews with local transport experts had been carried out by the researcher, she has been convinced that action to reduce CO_2 emissions in Kuala Lumpur is better driven by considerations of energy conservation. Therefore this section of writing has been revised to change the issue of 'the global impact of CO_2 emission' to 'non-renewable energy conservation'.

complementing the National Depletion Policy, aimed at ensuring reliability and security of supply. The strategy was effectively designed to reduce the country's over-dependence on oil as the energy source. The strategy aims at a mixed supply of oil, gas, hydropower and coal for energy use. In 1999 the proportion of the four fuels in commercial energy supply was 49.8 per cent crude oil and petroleum products, 41.9 per cent gas, 3.9 per cent hydropower and 4.5 per cent coal (EPU, 2001). However, the transport sector has been and continues to be the least diversified in terms of fuel use, as it is highly oil-dependent. The unsustainable excessive use of non-renewable energies, i.e. petroleum and diesel, is another negative impact resulting from the automobile-oriented trend in the cities, and Kuala Lumpur has the highest consumption as a result of the highest private vehicle use. As shown in Table 2.6, the transport sector overtook the industrial sector in the late 1990s and has become the biggest final energy consumer in Malaysia now.

Table 2.6 Final Energy Consumption by Sector (in ktoe)

	1995	1996	1997	1998	1999
Industrial	8,060	9,443	10,106	10,121	10,277
Transport	7,827	8,951	10,201	9,793	11,393
Residential & Commercial	2,837	3,557	3,073	3,314	3,653
Non Energy	2,994	1,744	2,298	2,023	1,799
Agriculture	446	472	490	307	106
TOTAL	22,164	4,167	26,168	25,558	27,228

(Source: EPU, 2001)

As the largest portion of non-renewable fuel consumption comes from the transport sector, one or two efforts have been initiated to curb the excessive use of non-renewable energy in this field. The first effort refers to the "*Go Gas*" initiative[26]. The DOE has been encouraging the use of natural gas as an alternative fuel for the public service vehicles in urban areas where piped natural gas is available. Currently 1,540 vehicles (mostly taxis) have been

[26] In an effort to further encourage and facilitate wider usage of NGV, the Government has provided the following incentives: (i) exemption from import duty and sales tax on the conversion kits; (ii) maintaining NGV's pump price at a lower lever than for diesel (NGV – 56.5 cent/litre, Diesel –69 cent/litre); (iii) road tax reduction scheme (50% off for monogas vehicles and 25% off for bi-fuel or dual-fuel vehicles). (see Website The Ministry of Energy, Water and Communication Malaysia, website http://www.ktkm.gov.my)

converted to run on bi-fuel (petrol-natural gas) and 1,000 monogas taxis were introduced to operate within Kuala Lumpur with 15 public NGV refuelling outlets to serve these vehicles. (Aminuddin Ishak, 2001). The alternative fuel for the private vehicle market has yet to be explored, although the change of fuel use in private vehicles would be the one that would have the most significant effect on the conservation of non-renewable energy.

Another effort that was initiated by the government is the exploration of renewable energy from alternative sources. Under the EPU (2001), greater emphasis is being placed on encouraging the utilization of renewable resources, such as biomass, biogas, solar and mini-hydro, for energy generation. Renewable energy research is still in its infancy but its application to the transport sector seems to have been greatly neglected if compared to other sectors.

It is obvious that these efforts are not enough to conserve non-renewable energy in the transport sector. It raises doubts about whether the government just pays lip service to these issues rather than taking real action to achieve the objective. In addition, regarding the aim of conserving non-renewable energy, there are wide-ranging policies that could be introduced, but which have largely been ignored by the government: these include promoting non-motorised modes, ensuring better vehicle maintenance and energy-efficient engines, reducing the need to travel, etc. None of these measures has been mentioned in relation to tackling the excessive non-renewable energy use by the transport sector.

This study has picked up the issue and regards it as an important item on the agenda for achieving a sustainable transport system. On the other hand, reducing the excessive use of non-renewable energy could also simultaneously stabilise the emission of greenhouse gaseous into the atmosphere.

2.2.5 Social Inequity: the Poor and the Transport System

When this study investigated the issues of air pollution, accidents and congestion, the researcher observed that lower-income people are the ones who suffer the most from these impacts. This observation requires a further search for the links between lower-income groups and the present transport system in Kuala Lumpur.

Twenty years ago there was a study carried out by the Transport Road Research Laboratory (TRRL, 1980) to examine mobility issues in relation to the urban poor in Kuala Lumpur. The conclusion was that there were undeniable signs of poverty in Kuala Lumpur; however, Kuala Lumpur were less deprived than in many other cities of the developing world. The TRRL report found that at the upper end of the poverty range in developing countries travel problems are not very significant. This was due to the fact that the squatter areas (the living areas) are usually constructed to be self-sufficient, with shops and other basic amenities. Therefore, the poor generally have a reduced need to travel in these squatter areas. Consequently, the mobility needs of the low-income groups have not received much attention.

After two decades, although accessibility of the urban poor to basic amenities in Malaysia is not a problem[27], the low-income groups strive to increase their mobility, thus enabling them to move out of squatter areas. The lack of mobility for low-income groups imposes limits on their access to resources, information, economic opportunities, new technologies and the viability of their settlements.

The poor in Kuala Lumpur, who mostly live in self-built squatter areas in the centre of the city, have usually relied heavily on walking and cycling, but they are now increasingly reliant on motorcycles and cars. 18% of low-income groups depend on bus services. It is the only

[27] According to the 7th Malaysian Plan (EPU, 1996), in 1995, 92%, 88% and 96% of urban poor households had access to safe drinking water within 9km of health facilities and school respectively.

affordable public transport[28] for the poor. Unfortunately the bus system in Kuala Lumpur faces severe problems (JICA, 1998), such as:

- Insufficient coverage of the bus service area
- Lack of direct bus services
- Low frequency of bus services
- Overloading of buses with passengers
- Long bus travelling times and unreliability in bus operation
- Poor bus terminal facilities and inadequate location of inter-city bus terminals

With few alternatives, the poor have to strive to buy their own private vehicles by allocating a higher percentage of household income to transport. Cheaper motorcycles or second-hand cars have become the favoured modes. Vehicle ownership for those living in the squatter areas was found to be 0.61 vehicles (0.11 cars) per household (Sadullah, 1997), indicating a very high level of vehicle ownership. Together with the major factors explained in section 2.1.1, this has partly contributed to the development of a mobile society in Kuala Lumpur.

The researcher has found a complicated cause and effect relationship between lower income groups and the present transport system. They are partly contributors to the present transport problems, but they are mostly victims of the present transport impacts.

In terms of being contributors, due to tight budgets the maintenance of vehicles belonging to lower income groups is ineffectively and poorly carried out, thus exaggerating many problems on the road, such as air pollution, accidents, breakdowns and congestion, etc. In terms of being victims, for instance, it is motorcyclists and pedestrians, who are largely lower-income people, who expose themselves to the highest accident risk (Section 2.2.2). Bus users, who mostly come from lower-income groups, experience worse congestion situations than private vehicle users (Section 2.2.1), not to mention spending more time in waiting for buses and receiving poor and less frequent public transport services. These lower-

[28] The latest and future priority urban transport system in Kuala Lumpur is the rail-based system (i.e. light- rail transit, monorail, double tracked electric rail and supplementary systems). However, this new form of rail-based public transport is apparently too expensive for low-income groups to afford it, and in fact the marketing strategy of LRT is to target middle- and upper-middle income groups of people.

income road users, namely bus users, pedestrians, cyclists and motorcyclists, are also more affected by the severe conditions of air pollution in Kuala Lumpur than higher-income groups who are protected in their air-conditioned cars. Despite this clear evidence, there is still no sign of any improvement (either study or action) focusing on an appropriate transport policy for lower-income groups at the present or in the future.

It is very obvious that the present auto-oriented trend is biased towards medium- to high-income groups and has marginalised the lower-income groups. Lower-income people have to allocate a higher proportion of their income to get a minimum standard of transport to satisfy their mobility needs. Motorcycles, non-motorised modes and the only affordable form of public transport (bus) do not receive equal priority in the provision of safe and pleasant journeys. All these modes are also related to inferior images, in contrast with the superior status of the car and more expensive rail-based public transport. Transport has become a symbol of the division of society into different social classes according to the modes they use.

It is time to place social equity as one of the items on the transport agenda in Kuala Lumpur. There is a need to change the present transport system to a more balanced one; to diversify the modal split; to promote affordable public transport; to provide a safe and pleasant environment for non-motorised modes; to eliminate the inferior images of buses and to change people's perception of cars. Tackling the social inequity issue will simultaneously help to solve other transport impacts.

2.2.6 Weak Urban Transport Planning Institution

In the process of investigating the urban transport issues, the researcher has also discovered that there is no one institution which pulls all the above transport issues together, and there is a lack of integration between policies for transport, energy, environment and land use. It reveals that there is a very weak urban transport planning institution to oversee the whole

picture of the transport system, either from the perspective of objectives, issues or policies. This poses the question as to whether the necessary urban transport planning institutions exist in Malaysia and Kuala Lumpur and whether this contributes to the present urban transport problems.

From the perspectives of planning, development, management of road transport, there are altogether five different Ministries involved in one way or another in road transport in Malaysia (See Figure 2.16). By and large, these agencies are related to one another, and there is no room for a department to operate in its own cocoon. The question of 'who is doing what?' in urban transport organisations is not a new topic as regards Kuala Lumpur's transport system. Many criticisms have been made of the weak transport organisation and administration, including the duplicating nature of the roles and functions, large but inefficient staffing and unresponsive traffic enforcement. Abdullah (1995) has pointed out that the transportation problems in Kuala Lumpur are mainly attributable to institutional or organisational factors. The JICA study (1998) has also concluded that '*the monitoring and planning stages (by the public sector) of urban transport in Kuala Lumpur are considered to be insufficient*'.

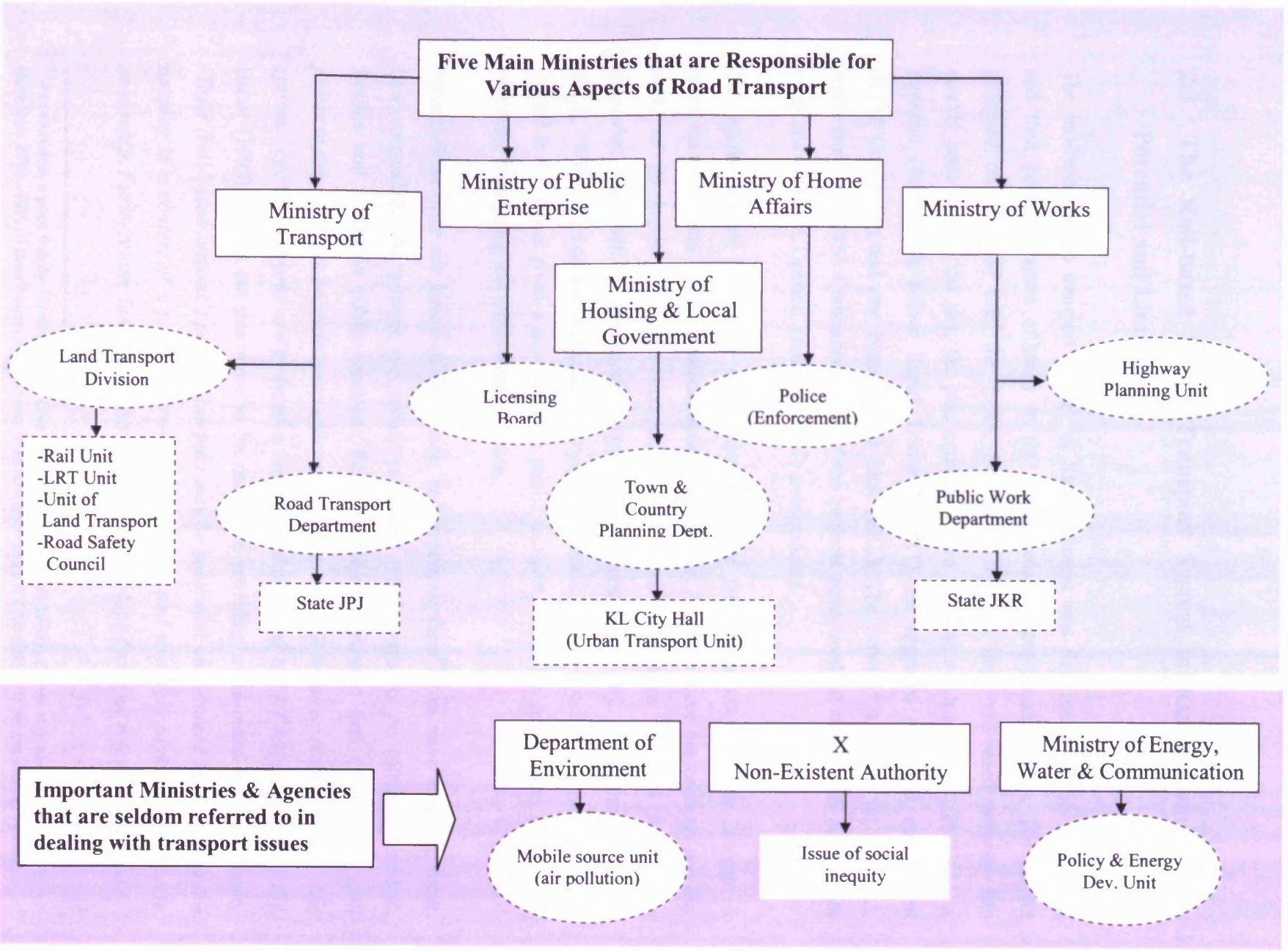
These comments mainly refer to the failures of present transport policies to tackle conventional transport issues, such as road safety and lack of a comprehensive public transport system. The institutional problem is even more prominent if an urban transport system is to be sustainable, because it should have an integrated approach to tackle multi-dimensional transport issues, including air pollution, non-renewable energy conservation, social equity, etc. As has been implied in previous sections, the transport issues have been treated in a sectoral way. Congestion in Kuala Lumpur has been the sole concern of the Urban Transport Unit, air pollution has been dealt with by the Department of Environment (Mobile Source Unit), accidents have recently been placed under the auspices of the Road and Safety Council, land use is the task of the Town and Country Planning Department, non-renewable energy conservation is the responsibility of the Ministry of Energy, and no particular institution is looking at the accessibility and affordability problems of the poor. Although these issues are interrelated, there is no sign of any plan to pull these elements

together. Transport issues have been dealt with in a sectoral manner in Malaysia and Kuala Lumpur; no doubt the present weak institutional context is one of the factors which exaggerates the transport problem there.

There is no transport vision or direction that every institute could refer to; policy objectives are defined by each institution or departments according to their functions and herefore they are varied and inconsistent. For example, environmental objectives do not exist at all in other relevant transport institutions apart from the Department of Environment. Excessive use of non-renewable energy resources is only discussed by the Ministry of Energy.

To a certain extent, transport policy messages are confused and conflicting. It is not clear as to which policy path Kuala Lumpur city will emphasise. On one hand, road building is being carried out extensively without any restriction being imposed on various planned projects. One of the missions of the Ministry of Transport is to develop road infrastructure based on a 'supply-driven' idea, and this is reflected in various road-building projects in and around Kuala Lumpur. On the other hand, there is investment in a massive rail-based public transport system, which claims that it will reduce congestion in the city. It is very clear that there is a lack of a clear and definite vision, and Kuala Lumpur is facing a policy dilemma as to which way to go.

Figure 2.16 Government Institutional and Organisational Structure Relevant to the Transport System



2.3 The Rail-based Public Transport System in Kuala Lumpur: Its Potential and Limitations

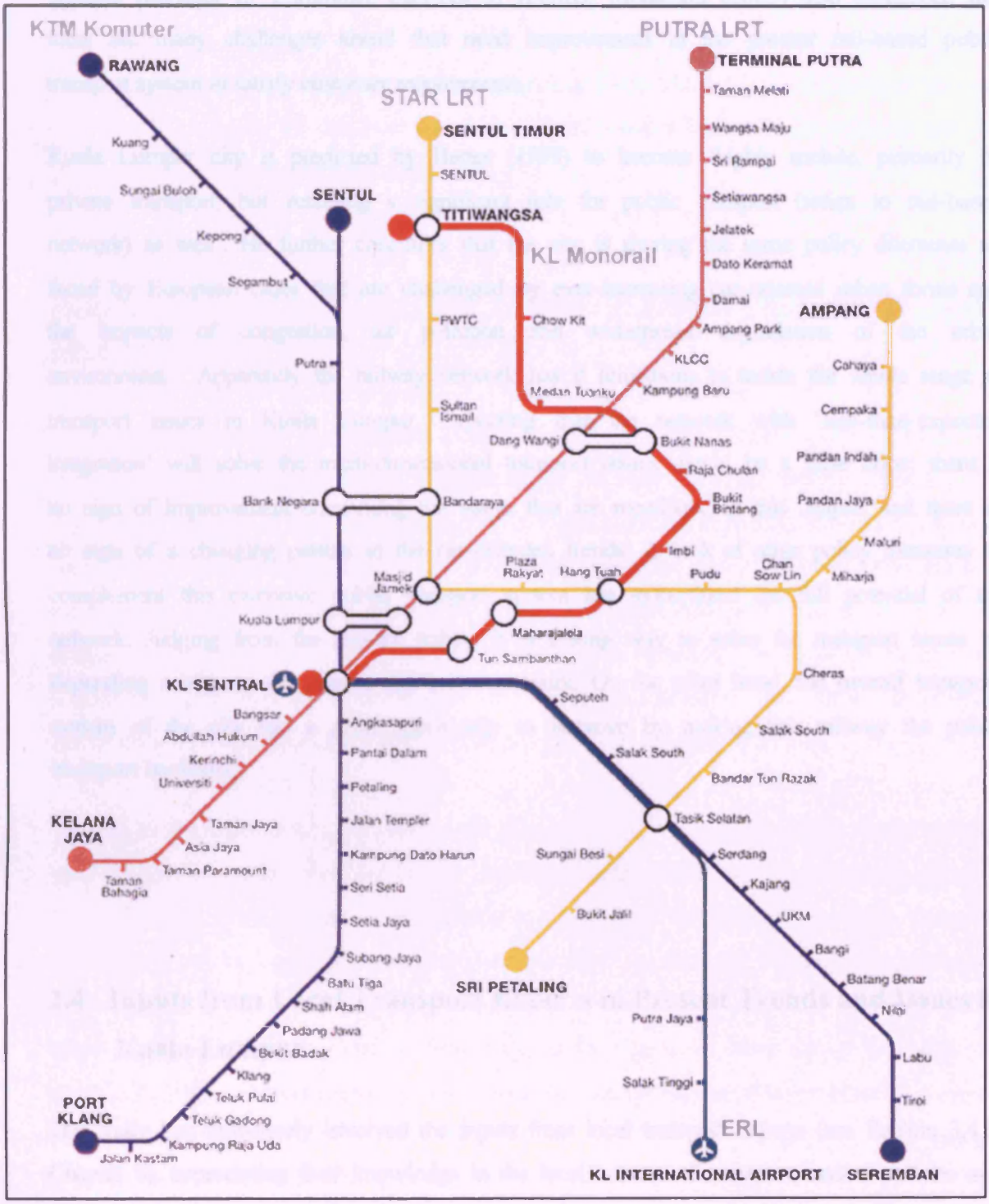
The rail-based public transport system in Kuala Lumpur was first mentioned in the 1970s, and then proposed again officially in the 1980 Kuala Lumpur Structure Plan. The project remained on the shelf until the 1990s. Starting in 1996, a large rail-based network has quickly been built in the city; the plan consists of two light-rail systems (STAR, PUTRA), a monorail (The People-Mover Rapid Transit or PRT), an upgraded electrified rail system (KTM Commuter) and one Express Rail Link (ERL). The network is shown on Map 2.3. Apart from the KTM Commuter, most of the projects have involved the private sector with variations on 'Build, Operate, Transfer' (BOT) arrangements.

The whole network is certainly a significant boost to public transport in Kuala Lumpur; it opens up a fresh era for the transport system of the city. Although there has been no specific study of its impact on Kuala Lumpur, general observations have indicated that it has somewhat held back the worsening congestion conditions of the city. As Mohamad (2003) put it, 'Without urban rail services, KL congestion would be much worse'. Another positive impact is that it has given a new image to public transport, which has managed to attract new patronage from young and white-collar workers.

Nevertheless, there are issues of integration and expensive fares[29] that raise concerns about how successfully the network can satisfy passenger' requirements for an efficient, seamless, flexible and affordable public transport. Residents have commented that, '*commuters still prefer to drive to work because many offices and homes are still far away from stations....bus system, cycling networks and pedestrian walkways should link to LRT hubs*' (Netto, 1999). Barter (1999) pointed out that more to be done than providing a rail-based system because, '*Their (rail-based systems') potential impact may be somewhat undermined because they are opening in a context of a poorly patronized bus system and relatively high private vehicle ownership. Furthermore, land-use patterns that have developed without reference to public*

[29] For example, a poor family (household income between RM 500- RM 1000) of three will need to spend more than 20% - 40% of their household income on a monthly Putra LRT fare (RM 70 per person per month).

Map 2.3 Rail-Network In and Round Kuala Lumpur



(Source: Network map available from LRT stations, Kuala Lumpur)

transport may also undermine the potential of rail systems to attract high ridership.' As a General Manager of Commuter Services in KTMB, Mohamad (2003) also concluded that there are many challenges ahead that need improvement in the present rail-based public transport system to satisfy customer requirements.

Kuala Lumpur city is predicted by Barter (1999) to become 'highly mobile, primarily by private transport, but retaining a significant role for public transport (refers to rail-based network) as well'. He further concludes that the city is sharing the same policy dilemmas as faced by European cities that are challenged by ever-increasing car-oriented urban forms and the impacts of congestion, air pollution and widespread degradation of the urban environment. Apparently the railway network has it limitations to tackle the whole range of transport issues in Kuala Lumpur. Expecting that the network with 'less-than-expected integration' will solve the multi-dimensional transport issues would be a false hope; there is no sign of improvement concerning the issues that are mentioned in this chapter and there is no sign of a changing pattern in the car-oriented trends. A lack of other policy measures to complement this extensive public transport system has jeopardized the full potential of the network. Judging from the present policy, it is a long way to solve the transport issues by depending solely on the present rail-based network. On the other hand, the overall transport system of the city has a great opportunity to improve by making this railway the public transport backbone.

2.4 Inputs from Local Transport Experts in Present Trends and Issues in Kuala Lumpur

The study has deliberately involved the inputs from local transport experts (see Section 3.4.6, Chapter 6), appreciating their knowledge in the local context of transport, issues, policies and culture. This section intends to outline their opinions in relation to the content of this chapter,

and highlight the important modifications adopted in the chapter as a result of local transport experts' views.

At the first round interview (please refer to Section 3.4.6, Chapter 3), local transport experts have helped to verify the transport issues, the trends towards unsustainable transport and the major causes and effects of these phenomena.

Opinions about Transport Issues and Problems in Kuala Lumpur and the Factors Contributing to them

Among many transport issues raised in the discussions, local transport experts had a very clear conception of the hierarchy for preference of the most pressing transport problems that ought to be tackled. Local pollution, accidents and congestion were three problems that were repeatedly emphasised. While there was a general agreement that efforts had been made to tackle them, local transport experts thought that the links between the problems and other related transport issues had barely been established and examined. Even though the past and present transport policies have focused on congestion, accidents and local air pollution problems, not a single respondent thought that they had been successfully tackled.

Related to the above issues, the road users who suffer most from these issues are pedestrians, cyclists and bus users, who also mainly consist of people from the lowest income group in Kuala Lumpur. This group of people expose themselves to pollutants and the dangerous environment in the open air and have the slowest journeys to reach their destinations. Meanwhile, they are also the major contributors to the above problems by using poorly maintained motorcycles and second-hand cars, as they have no other choice for better and more affordable transport modes. Respondents did not see any explicit government transport policy to deal with this.

Social inequality on the road has been confirmed. Local transport experts agreed that there had not been proper emphasis put on the mobility needs of the lower income group in the

policy-making process. Even though the issue of local air pollution had been highlighted, in general, the environmental dimension had been neglected and replaced by pursuing the sole objective of economic prosperity. According to the respondents, they perceived that government has paid only 'lip-service' to environmental issues.

Although the local transport experts thought that the environmental dimension is very important in achieving sustainability, surprisingly they did not agree that the global environmental impact (CO_2) should be included as an important sustainable transport issue in Kuala Lumpur. They brought forward several substantial reasons to support their standpoint. As a result of the concern raised by local transport experts, this has produced a modification of the research direction in the subsequent investigation of sustainable objectives, targets and policy measures. A more suitable objective of 'reducing energy consumption by the transport sector' has replaced the original objective of 'stabilizing the CO_2 level from the transport sector'. This is considered more appropriate for application in the local context to achieve the aim of sustainability. Consequently, the target and policy measures have been redirected to achieve efficiency of energy consumption rather than pursuing the stabilisation of CO_2 level.

Another issue emphasised by the local transport experts is the fragmentation and ad-hoc policy formulation in the city. Related to this issue is the overlapping task of the organisation of the transport sector that results from diverse roles. All of the participants, except for a few from the government sector, agreed that there is a lack of vision, unclear policy messages and even conflicting policy directions in the Kuala Lumpur land transport system. Most of them (except for those from the government sector) regarded the existing transport trends and the present structure of transport organisation as the main problem for the transport system in Kuala Lumpur.

Local transport experts helped the researcher to identify several factors that contribute to the above issues and problems, and these have been taken into account in formulating Figure 2.4 in Chapter 2, i.e. the inputs and outputs of the Kuala Lumpur transport system. The factors that contribute to the present auto-oriented trend are much more complicated and multi-faceted than the superficial argument of 'natural customer desire due to economic growth of

a nation' would indicate. Apart from the customary reasons of economic growth, increased income and need for mobility, local transport experts verified other factors that shape the present auto-driven transport pattern, such as the expansion of the national car industry, the supply-led infrastructure strategy, more dispersed land-use patterns, etc. The local transport experts also picked up policy messages and media information that have encouraged the formation of class cultural influences in Kuala Lumpur. It has become habitual behaviour and social culture for middle class people in order to own and travel by car to maintain their modern lifestyle. Putting the jigsaw of various factors together, local transport experts accepted and verified the causes and effects of the present trend as presented by the researcher.

Opinions about the Present Transport Policy and the Method of Formulating Them

Regarding the above issues and problems raised by local transport experts, none of them thought that the existing urban transport policies are the most useful. They strongly urged that a major change is needed to improve the interrelated negative impacts caused by the present car-oriented transport system.

Even though the Malaysian government has invested enormous resources in public transportation and information technology infrastructures, local transport experts did not foresee any dramatic change to the present situation that would occur in the future, namely the unsustainable auto-driven society. Regarding the future 'business-as-usual' transport scenario, participants from private transportation planning consultants were the most pessimistic group and foresaw that the urban transport issue would become even more complicated and would worsen by the year 2020.

The Expected and Unexpected Opinions from the Local Transport Experts

The researcher collected the views of local transport experts and concluded that the major findings are parallel to initial observations.

Local transport experts, as expected, raised serious concerns about the issues of accidents, air pollution and congestion, and they expressed their concerns about the complicated and interrelated transport issues, such as poor bus services, neglect of non-motorised modes and bias towards provision of a transport system (auto-orientated and the later expensive rail-based system) for the benefit of the lifestyles for middle- and higher-income groups.

There were varied opinions about motorcycle modes, some advocated the mode because it is affordable, saves road and parking space (compared to cars) and is fast to reach its destination without being delayed by congestion. Others thought that it should not be promoted for reasons of road safety, air and noise pollution. In the proposed policy packages, clean and advanced two- and three-wheelers have been advocated to fulfil the social equity objective.

The surprisingly unexpected result is the local transport experts' reaction towards the CO_2 issue, and subsequently the debate about an appropriate concept of sustainable development and sustainable transport in the local context.

Lastly, local transport experts agreed that the present policy formulation method could hardly make a dramatic change in improving the situation. They welcomed a new transport planning approach if that would result in a breakthrough.

Table 27 on the next page summarises the important modifications adopted in this chapter as a result of local transport experts' views.

Table 2.7 Important Modifications Adopted in Chapter 2 and Other Relevant Sections in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their Views	Relevant Sections and Chapters
Transport Trends		
Apart from other factors, LTEs consider policy messages and cultural influences to have taken root to form the present transport trends	Examination of its relationship with other factors that have influences upon current transport trend.	Sections 2.1.1 & 2.1.2, Chapter 2.
	Investigation of transport solutions from the same angle, i.e. using BCC as one of the main strategies in scenario building.	Section 6.2.3.2, Chapter 6.
Transport Issues		
Criticism of the idea to include global warming issue (CO_2) as one of the sustainable transport issues for Kuala Lumpur.	Revision of the research direction of this particular issue from 'the global impact of CO_2 emission' to 'non-renewable energy conservation'.	Section 2.2.4, Chapter 2.
Concerns raised about accessibility of lower income groups and the adverse impact on them from the present transport trends	Investigation of the social inequality problems, the links between the poor and transport system in Kuala Lumpur.	Section 2.2.5, Chapter 2

2.5 Conclusion

This chapter has reviewed the overall present transport trends and issues in Kuala Lumpur. In the process of identifying the causes and effects of these, local transport experts have been invited to discuss, verify and validate them.

It is a fact that Kuala Lumpur has now developed into a car-orientated city. Nevertheless, the researcher argues that this trend is not an 'unavoidable result of the development'; instead, it is related to specific social, economic and political policies. The chapter discussed the main factors (external, internal and driving forces) that contribute to today's trend. These factors are interrelated and linked together. Prominent economic policies, such as the decision to establish the national car and its subsequent effects (policy messages and culture), have

obviously overridden the past transport policy that aimed for a more balanced modal split in the city. The past transport policy did not manage to react to the external forces flexibly and has failed to produce the planned 'balanced transport system'. The failure of past transport policies is linked again to the weak planning institutions, lack of vision and sometimes conflicting goal-setting.

Transport issues which are a result of the present car-oriented trends have been highlighted and discussed. These issues also often interact with each other, but again due to weak planning institutions (also identified as one issue in this chapter), such issues have never been put together for in-depth, cross-sectoral investigation.

The chapter has also briefly discussed the recent rail-based public transport system in Kuala Lumpur. While it is a good move to boost the public transport system, there is doubt as to whether the rail-based network can solve the transport issues and change the present trend any further than has been expected by the government. There is much to do to achieve 'integration' in its own system, not to mention solving the multi-dimensional transport issues.

To break the present auto-driven trend and to tackle the transport issues, there is the need to disentangle the chains of these causes and effects, and to build up a *defence system* for the transport policy in Kuala Lumpur to face the ever-changing external forces. Looking at the present conventional transport policy formulation process, which emphasises the use of exploration-forecasting methodology[30], it is extremely difficulty to break the present trend by taking into account all these key factors. The challenge becomes hardest when the main trends and institutions themselves are indeed part of the problem causing the present transport situation in Kuala Lumpur. This prompts a search for a new approach.

In analysing these transport trends and issues, this chapter, however, has shed light on an opportunity to tackle them together as they are interrelated. A coherent policy could tackle several issues concurrently; for example, providing a good network for affordable non-motorised modes could encourage the public to use them more frequently, rely less on

[30] A comparison between forecasting and backcasting will be discussed in Chapter 3.

private vehicles, reduce air pollution, congestion and energy consumption, and at the same time increase the city's liveability and social cohesion.

This needs a totally different way of trend-breaking, inclusive analysis, holistic approaches and coherent urban transport planning methodology. In the search for an appropriate methodology to formulate Kuala Lumpur's long-term transport policy, scenario backcasting answers this requirement. Chapter Three will explain this methodology, which was used in this study.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter presents the methodology used in this study, the backcasting scenario approach.

The chapter is divided into five parts. Section 3.1 gives a brief idea of the overall methods used for viewing the future. Section 3.2 reviews the literature relevant to the backcasting scenario approach, from its original version in scenario planning to the application of the method to transportation planning. The section also discusses the unique features of backcasting scenario methodology compared to forecasting and general scenario planning, which links to the appropriateness of employing it in future studies to explore long-term sustainable transport policies for Kuala Lumpur. Section 3.3 introduces the research design used in this study, including the strategies of inquiry and using an analytical framework. Then, Section 3.4 explains the backcasting scenario of this study as a sequence of steps, which links directly to the following chapters of this thesis. The role of the expert groups in the study has been highlighted and the process of data collection is presented with much detail than other steps (refer to Section 3.4.6). Apart from this step, other steps aims to provide only an introductory conceptual idea of the methodology, as details will be explained and discussed in each of the Chapters that correspond to the respective sub-steps. Lastly, Section 3.5 summaries the relevant opinions from local transport experts towards this methodology and their capability of inputs at every methodology's stage.

3.1 Methods of Viewing the Future

Future studies are the exploration of future states or developments and the study of how these explorations can be used in planning and strategy formation. Future studies methods

are generally designed to help people better understand future possibilities in order to make better decisions; they are tools that try to manage the uncertainty of the future. Future studies methods clarify what is known, what can be known, what is the likely range of possibilities, what the most desirable possibilities are, and how today's decisions may play out in each of a variety of possible futures. Future studies may also be thought of as encompassing five stages: the first stage is to identify and monitor change; the second stage is to critique and analyse change; the third stage is to imagine alternatives; the fourth stage is to envision the preferred alternative; and the fifth and final stage is to plan and implement steps to achieve the preferred vision (World Future Society, 1999)

To serve the different purposes, which are involved in the different stages of a future study, individual projects usually focus on one or two stages and leave the rest to other projects. Therefore, in choosing which method is to be used in a particular study, the appropriateness of the choices should always depend on the purposes of the study and whether the chosen methodology would serve those purposes. For example, environmental scanning, trend analysis and emerging issues analysis are very important for identifying and monitoring change, and they may also begin to critique change. Cross-impact analysis, technology assessment and social change assessment are important for critiquing and analysing change. Scenario-planning and related methods are prominent in imagining alternatives. Visioning methods are key to envisioning preferred futures. Strategic planning, political activism and organizational development techniques are key to planning for and implementing in the future.

Table 3.1 Selected Important Methods for Future Studies and Their Key Functions

Methods	***Related to key stage of***
Trend Analysis (Forecasting)	Identifying and monitoring change
Trend Extrapolation (Forecasting)	Identifying and monitoring change
Cyclical Pattern Analysis (Forecasting)	Identifying and monitoring change
Environmental Scanning	Identifying and monitoring change
Cross-Impact Analysis	Critiquing and analysing change
Technological Forecasting	Critiquing and analysing change
Technology Assessment	Critiquing and analysing change
Scenario Planning	Imagining alternatives
Backcasting	Imagining alternatives
Visioning	Envisioning preferred futures
Delphi	Envisioning preferred futures
Precursor or Bellweather Analysis	Planning and implementing for the future
Risk Assessment	Planning and implementing for the future
Cost-Benefit Analysis	Planning and implementing for the future

(Adapted from World Future Society, 1999)

3.2 Scenario Backcasting – Some Relevant Reviews about the Method

3.2.1 Scenario-planning as an Approach to Strategic Planning

Scenario-planning as an approach to strategic planning is usually attributed to Royal Dutch Shell and its business-planning group (Zegras et al., 2004). At Shell, scenarios were a natural evolution in its strategic planning, whilst its business environment underwent rapid change. In the late 1960s and early 1970s, Shell found that forecasting no longer provided the right answers and the team worked to develop a planning approach that could better deal with uncertainty, covering a wide span of possible futures while being internally consistent. Shell's application of scenario-planning eventually enabled it to anticipate and prepare for the oil crisis of 1973 and its economic aftermath (Ringland, 1998).

After Shell's success, scenario-planning became popular in industrial strategy-planning. Today, the derivations of scenario-planning are widely applied to various fields of policy study. A wide range of purposes has been linked to the approach; examples of the application include prospects for global future economic and political development (McRae, 1995), national consensus-building and future visioning in Colombia, South Africa and Japan (Kahane, 1992) and developing a future transport scenario for Queensland, Australia (Queensland Transport and the Department of Main Roads, 2000). ICIS (2000) alone has collected about 85 scenario studies (studies carried out since 1990) that depict European and global futures. Scenarios are becoming increasingly important as tools for policy-makers (ICIS, 2000).

Scenario-planning does not claim to predict the future; rather it aims to draw attention to the major forces underlying the potential future. As Dalton (2001) put it, scenario-planning embraces a systems-thinking and strategic-planning philosophy – helping to identify forces that affect us, but which we cannot influence, and helping us to plan for a range of potential futures that the variations in those same forces imply. Explicitly, Rotmans and van Asselt (1998) have defined scenarios as '*archetypal descriptions of alternative images of the future, created from mental maps or models that reflect different perspectives on past, present and future developments*'. But scenarios are not equivalent to images of the future; they include images of the future. Images of the future are static

snapshots of future states, whereas scenarios are dynamic and consist of a logical sequence of those images of the future. Scenarios include driving forces, events and actions that lead to the future conditions as visualised in the images of the future (Rotmans et al., 2000).

As a tool to analyse the future, there are subdivisions of scenario planning. ICIS (2000) have categorised scenario-planning into: (1) Forecasting or backcasting scenario; (2) Descriptive or normative scenario; (3) Quantitative or qualitative scenario and (4) Trend or peripheral scenario. Box 3.1 below describes the differences between the subdivisions and also gives some examples for each scenario division.

Box 3.1 Subdivision of Scenario-planning

(1) Forecasting or backcasting scenario
Forecasting scenarios explore alternative developments, starting from the current situation with or without the expected/desired policy efforts. An example of such a forecasting study is 'Scenarios Europe 2010' (EC Forward Studies Unit, 1999), which presents five possible futures for Europe. Backcasting scenarios reason from a desired future situation and offer a number of different strategies to reach this situation. An example of a backcasting study is the POSSUM project (POSSUM Team, 1998) in which sustainable transport goals for the year 2020 are formulated and from which different scenarios that explore strategies to reach these goals have been designed.

(2) Descriptive or normative scenario
Descriptive scenarios sketch an ordered set of possible events irrespective of their desirability or undesirability, while normative scenarios take values and interests into account. For example, the Intergovernmental Panel on Climate Change (IPCC) study (1995) presents six descriptive emission scenarios. An example of a normative scenario study is 'The Netherlands in Threefold' (CPB, 1992), as the explicit aim of one of the scenarios, i.e. 'Balanced Growth Scenario', was to show that economic growth can be combined with environmental protection.

(3) Quantitative or qualitative scenario
Quantitative scenarios are often model-based, qualitative scenarios are based on narratives. Until now, quantitative model-based scenarios have been primarily used by the energy sector and technology-oriented communities. Modelling methods involve the use of computer models, either as a central means of exploring future consequences of sets of assumptions, or as a tool to check the consistency of the developed scenario. Narrative scenarios are usually deployed in cases where data is weak or missing. Pathways into the future are then qualitatively described

(4) Trend or peripheral scenario
Ducot and Lubben (1980) describe a trend scenario as one that represents the extrapolation of the current trends, while a peripheral scenario includes unlikely and extreme events. In this context, Schwartz (1996) states that scenarios should include surprises in order to break with old stereotypes. From this point of view trend scenarios are not real scenarios and will therefore be called trend *stories* in this study. Most recent scenario studies go beyond trend scenarios, but cannot be adequately characterised as peripheral scenarios, because quite often the anticipated changes are merely incremental. An example of a scenario study attempting to include peripheral scenarios is the Shell study (Ringland, 1998) in which two scenarios named Just Do It and Da Wo are explored.

(Source: ICIS (2000))

As this research is based on backcasting scenario methodology and is qualitative in nature, these will be discussed in Section 3.2.2. in more detail.

3.2.2. Backcasting and Forecasting, Qualitative and Quantitative.

It is useful to further explain **backcasting, forecasting, qualitative and quantitative** to avoid confusion about the combination of these words and their concepts.

Makridakis et al. (1998) in their book, 'Forecasting', have described the wide range of available forecasting methods. They divide the method into two categories: quantitative and qualitative. Quantitative methods usually use empirical data or experience and involve formal statistical methods. These methods analyse the causes of the relationships between historical data and then make assumptions about continuity into the future. This trend-based approach to future studies means that strong assumptions about continuity are made. One forecasting method that can be powerful in displaying the consequences of different actions, provided certain conditions are fulfilled, is mathematical modelling.

Qualitative forecasting methods, on the other hand, do not require the use of data in the same manner as quantitative forecasting methods. The inputs are mainly the product of intuitive thinking, judgement and accumulated knowledge. One example of qualitative forecasting is the scenario development method. Beginning with the existing situation, scenario development is a tool which visualises futures in an intuitive, extrapolative or heuristic manner in order to move towards a prediction of the future. This trend-breaking approach (which is totally different from the trend-based approach) takes a well-defined set of assumptions, then develops an imaginative conception of what the future would be like if these assumptions were true (Makridakis et al., 1998, p.651).

Like the explorative scenario, backcasting is also a trend-breaking approach to future studies; but backcasting scenario building begins with the formulation of targets, while in the case of explorative scenarios, the idea is simply to explore possible futures (Van der Heijden, 1996). Robinson (1982) has labelled goal-oriented (qualitative) forecasting as *backcasting* to indicate the unorthodox approach to anticipating and preparing for the future.

Backcasting is a means of inductive rather than deductive analysis, which firstly focuses on the range of alternative futures and their impacts, and then determines the policy measures required to achieve them. The major distinguishing characteristic of backcasting

over forecasting is a concern not with what future is *likely to happen*, but with how desirable futures *can be attained* (Robinson, 1990). It is thus explicitly normative, involving working backwards from a range of desired future terminal points to the present, in order to determine the feasible steps which need to be taken by an organisation to reach its desired future.

Therefore there are four different concepts that are attached to these combinations of words:-

- Quantitative forecasting – a trend-based approach; for example, mathematical modelling. This is commonly regarded as the conventional forecasting method.
- Qualitative forecasting – a trend-breaking approach, explorative scenario. This is usually referred to as scenario-planning, as described in Section 3.2.1 above.
- Backcasting scenario – a trend-breaking approach, goal-orientated (qualitative forecasting) scenario. Subdivision of scenario-planning.
- Quantitative scenario or qualitative scenario (as categorised in Box 3.1, quoted from ICIS (2000)). These refer to the method employed in carrying out the scenario analysis. 'Quantitative scenario' should not be confused with 'quantitative forecasting'; the former is a scenario-planning tool and trend-breaking approach but is assisted (whether partly or mainly) by quantitative methods (for example mathematical modelling), while the latter refers solely to the conventional trend-based forecasting method.

Wang and Guild (1995) compare important characteristics of (quantitative) forecasting and backcasting as follows. Rather than seeking the accuracy of a predictive forecast, as in conventional forecasting analysis, backcasts indicate the relative feasibility of and implications for different end states which a firm (or organisation) may aim to achieve. In this sense, the future becomes the cause, rather than the effect, of present planning and actions. The thought process in backcasting is akin to future-mapping, whereby a range of routes are charted into the future from the development of possible end states, and this produces the confidence of hindsight and breaks away from the right/wrong concerns of forecasting.

Table 3.2 Comparison of Forecasting with Backcasting

	Forecasting	Backcasting
Question	What future is likely to happen?	How can desirable futures be attained?
Focus	Prediction and likelihood	Feasibility and choice
Execution	Single snap-shot	On-going monitoring
Analysis	Extrapolation from historical data	Interpolation from goal-setting (futures) anchored in organisational competencies
Quality	Accuracy-dependent	Implication-oriented
Result	Convergence on the most likely future	Divergence to possible futures with respect to freedom of action
Future(s)	Preceded by present assessment	Interpreted and envisioned from present assessment

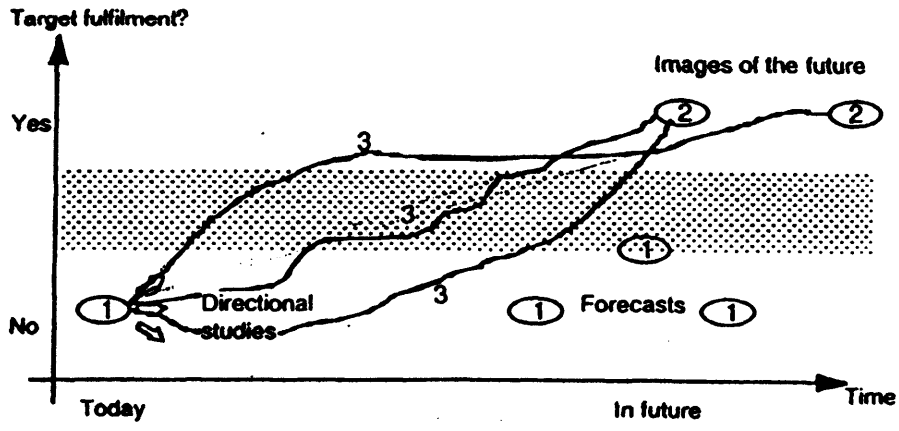
(Adapted from Wang & Guild, 1995)

The comparison clearly shows the difference between the nature of backcasting and that of forecasting analysis, which explicitly distinguishes the application of these two methodologies for different types of research studies.

Although the table above may give the impression that the two methods diverge from each other, it has to be stressed that forecasting also plays a significant part in the backcasting process. How does the forecasting method relate to backcasting? As revealed in Figure 3.1, Höjer (2000) has illustrated a clear relationship between these two methods. The graph illustrates that after defining the vision and setting a target or targets, it is compared to the forecast of a Business As Usual (BAU) case (1). If the forecast indicates that the goals will not be met, then the study will proceed to the next stage. This is where forecasting[1] plays its role in the backcasting method. Scenarios or images of the future, which fulfil the targets, are then generated and the effects of them evaluated (2), and finally the paths towards these targets are investigated (3).

[1] In this case, it could be quantitative forecasting or qualitative forecasting (explorative scenario).

Figure 3.1 Forecasting's Role in a Backcasting Exercise



The backcasting framework - Forecasts and directional studies indicate that the target will not be met (1). Therefore, scenarios that do fulfil the target are generated with the help of a suitable scenario method (2). Finally, the paths between the current situation and the scenarios are analysed, e.g. by means of different kinds of mathematical models. The shaded area in the figure represents states at which the targets may be reached. Both the scale and unit of the y-axis, target fulfilment, are explicitly normative. The source of this figure is from Höjer (2000), initially developed from Steen and Akerman.

It is clear that forecasting methods may be integrated into the backcasting scenario approach in a variety of ways. Both quantitative and qualitative forecasting (explorative scenarios) may be used to build a BAU case, and a variety of quantitative tools, such as more sophisticated modelling analysis, could be used to solidify the backcasting approach (Zegras et al., 2004)

3.2.3 Fitting Criteria for the Scenario Backcasting Method

To investigate the future in a complex and multi-faceted environment, backcasting scenario building is a promising and interesting tool.

In future option analyses, backcasting was first employed in studies of energy futures by Lovin (Robinson, 1982). It was then launched essentially as a *method* by Robinson (Dreborg, 1996). In his later article, Robinson (1990) clarified the need for backcasting methodology in the long-term exploration of possible alternative futures in various areas of human activity.

In trying to give a more profound account of the character of backcasting and to trace fundamental theoretical assumptions behind it, Dreborg (1996) regards '*a perceived societal problem of great importance, such as vast and growing impacts of transport on the environment*' as a niche for backcasting. He summarises the features of a situation in which backcasting is applicable as follows:

1. When the problem to be studied is *complex*, affecting many sectors and levels of society;
2. When there is a need for *major change*, i.e. when marginal changes within the prevailing order will not be sufficient;
3. When *dominant trends are part of the problem* – these trends are often the cornerstones of forecasts;
4. When the problem to a great extent is a matter of *externalities*, which the market cannot treat satisfactorily;
5. When the time scale is long enough to allow considerable scope for *deliberate choice*.

He concludes that the problem of how society may attain sustainability fits into this pattern.

Judging from the present complicated and interrelated transport issues in Kuala Lumpur, a major change is needed to 'break' the unsustainable trends and it is obvious that trend analysis that relies on historical facts is not suitable for formulating sustainable transport policy in the long term. The circumstances in the Kuala Lumpur transport system (complex issues, including the dominant trend of automobile use, which itself poses a threat to sustainability and the matter of externalities involved in the transport policies) all fit with Dreborg's criteria for employing backcasting scenario methodology. Most importantly, the study's objective, i.e., to find a policy path for a sustainable transport vision, needs the goal-oriented backcasting approach to lead the way towards the policy options.

3.2.4. The Application of the Scenario-planning Approach to Transportation Planning[2]

The shortcomings of traditional approaches to urban transport planning have been raised over the years. Among others, there is a generalized level of criticism of the overall acceptability of the assumptions – and the processes used for choosing and presenting those assumptions – which in the end form the most critical inputs to making any forecast (Wachs, 2001) The end result of the traditional forecasting approach, which is a single strategic plan, fails to account for unforeseen events (Zegras et al., 2004). Others criticisms relate more closely to the application of the traditional transport planning models, such as the use of modelling approaches designed for one context (i.e. a city in the industralised world) in another (i.e. a city in the developing world). Scenario-planning offers a potential platform for addressing the criticisms of traditional planning approaches. Zegras et al. (2004) have recommended that scenario-planning may be a more appropriate and more viable approach and may bring considerable value, especially in the developing world, where traditional planning approaches face many challenges and criticisms. These include the reliability of forecasts (for example, those relating to socio economic characteristics and land development patterns), the availability of data, the lack of strategic long-term perspectives, a politically insular and non-transparent process, and ideological biases towards certain solutions (Vasconcellos, 2001).

The applications of the scenario-planning approach to transportation planning could be traced back to the 1970s (Zegras et al., 2004), one conducted for the Chicago metropolitan area and one conducted for the United States Department of Transportation (Pearman, 1988). According to Pearman (1988), these early scenario-planning examples in transportation were followed by 'a steady trickle' of scenario-planning examples in transportation during the early 1980s for Sydney, Metropolitan Manila and Baltimore. In recent years, the Australian government has gradually undertaken transport-related scenario-planning, for example Transport South Australia, Main Roads Western Australia, the National Transport Planning Task Force, the Australian Road Research Board and Queensland Transport and the Department of Main Roads (Queensland Transport and the Department of Main Roads, 2000). On the European side, there are the

[2] This section was intended to focus only on the application of ***backcasting scenario*** to transportation planning. Nevertheless, the relevant studies are too few. Furthermore, this study refers to a wide range of literature on scenario-planning (rather than just backcasting scenario methodology), therefore this section includes all the relevant scenario-planning literature.

Swedish National Road Administration in co-operation with several organisations to study the future of transportation (Thord, 1993); the ECOTEC project to study transport scenarios and their implication for employment opportunities at the European level (ECOTEC, 1994); the spider methodology to integrate expert knowledge into transport scenarios in Western Europe (Nijkamp et al., 1997); the POSSUM Project (1997) to construct sustainable transport scenarios and relevant implementation issues; the Environmentally Sustainable Transport (EST) Project (OECD, 2002); the Sustainable Urban Transport (SUTRA) Project (The SUTRA Consortium, 2003); and the SCENESUSTECH project to understand the car transport systems and the sociology of embedded technologies in present and future transport scenarios (Wickham, 2002). Although the application of scenario-planning would be valuable in developing countries, the researcher is not aware of any recent examples of transportation planning incorporating the scenario-planning approach.

Of all the studies mentioned above, most have a *forecasting* character. The study by Nijkamp et al.(1998), the POSSUM team's (1998) study and the EST project (OECD, 2002) use backcasting to construct their scenarios.

3.3 The Research Method for the Study

The most suitable method employed in this study is the backcasting scenario, as it is most appropriate for the study's research objective. As a result of poor data available in Kuala Lumpur and many of the other commonly faced problems[3] in a developing country, the study was carried out qualitatively. It is an actor-oriented exercise, which involves interviews with and structured brainstorming from local transport experts. The key feature is to establish the links to and consequences of transport trends and issues for the desired future vision, then to backcast the scenarios by arranging logical sequences of policy strategies to achieve a set of defined targets.

[3] Refer to the transportation planning issues faced in developing countries that are raised by Vasconcellos (2001)

The POSSUM project is the main reference for the research methodology in this study. Despite the different scales of the two projects (POSSUM investigates policy scenario building at the European level, and this study focuses on the city level), the objectives and research directions are similar, i.e. to construct scenarios to achieve sustainable transport objectives. The EST project is the second main reference, particularly its method (structured brainstorming) of policy-packaging and the key feature of phased implementation. The SUTRA project (The SUTRA Consortium, 2003), although it is not a backcasting exercise, is referred to at the stage of designing and formulating the policy targets in this study. The project employed a scenario analysis that was embedded in a framework of indicators of sustainable urban transportation; this was helpful at the target formulation stage of this project. Other applications of transport scenario projects (as mentioned in the previous section) have been referred to in order to understand and learn about scenario-planning, as well as to widen the researcher's knowledge of alternative transport options.

To carry out a scenario backcasting exercise, Robinson (1990) has suggested a six-step method (as shown in Appendix A) But in this study a modified innovative version is employed, adapted from the POSSUM[4] Project (1998). The prominent characteristic of the modified version is to highlight the impact of certain external factors in scenario-building.

As discovered in Chapter Two, there are driving forces and external factors that are beyond the control of transport policy-makers, yet they influence or have great impacts on the conditions for policy-making. This fact was recognised in the POSSUM project (*in* their case, the external variables are factors that are outside the transport system of Europe) and the pure backcasting model has hence been modified by the addition of elements from explorative scenario methodology. This means that different external factors (in relation to the transport sector) have been chosen (the explorative element), and for each of these a 'solution' to the problem of the transport sector has been sought

[4] Policy Scenarios for Sustainable Mobility (POSSUM) is in the DG VII Strategic Transport Research programme and the overall goal is to develop a set of alternative policy scenarios to assist in the decision - making with regard to the Common Transport Policy and the Trans-European Networks development. For details, see Banister et al. (1998), Final Report of the POSSUM Project.

(the backcasting element). The solutions proposed involve trying to meet a set of targets that correspond to sustainable issues and objectives.

The resulting scenarios in the form of 'Images of the Future', combine strategic elements and external factors in a systematic way (or in the form of a matrix). Only three Images have been chosen to keep the research reasonably manageable, yet they are sufficient to reveal the differences between and changes in various transport policies for each Image. In order that the set of Images should cover a sufficiently wide range of possibilities, each one is relatively extreme, but plausible. To then bridge the present to the future, policy packages have been developed to achieve the three Images.

Hence the main synthesised components of the study consist of Targets, External Factors and Strategic Elements, Images of the Future and Policy Packages. These will be further explained later.

The methodology employed for this study has additional merit in that it allows inputs from local experts to discuss, brainstorm and visualise future Images. The local transport experts were invited to contribute input elements to the project, as well as to validate the rationales for the study. This gave opportunities for local transport experts to voice their opinions and shape the future they desire in an unprecedented way; this was also one of the motivations for this study (which was mentioned at the outset). At the same time, this exercise also had an educational purpose in that the discussions that took place for this study were able in various ways to disseminate the agenda of sustainable transport, which still very much lags behind in Kuala Lumpur.

The research method is presented in Figure 3.3 (on page 81) and each step will be explained in more detail in section 3.4. Before further exploring the analytical framework of backcasting scenario methodology, next section will briefly explain the strategies of inquiry used at the methodology's sub-level. The importance of local transport experts in this study will be highlighted and their roles will be described with more detailed.

3.3.1 Strategies of Data Enquiry

For qualitative research, there are again many tools which may be used for data collection and analysis. Qualitative research methods can provide a more in-depth understanding of 'inner experiences', 'language', 'cultural meanings' or 'forms of social interaction' than purely quantitative data can (Silverman, 2000). Table 3.3 lists some of the uses of the four main qualitative strategies, including observation, textual analysis, interviews and transcript analysis of audio or video recordings.

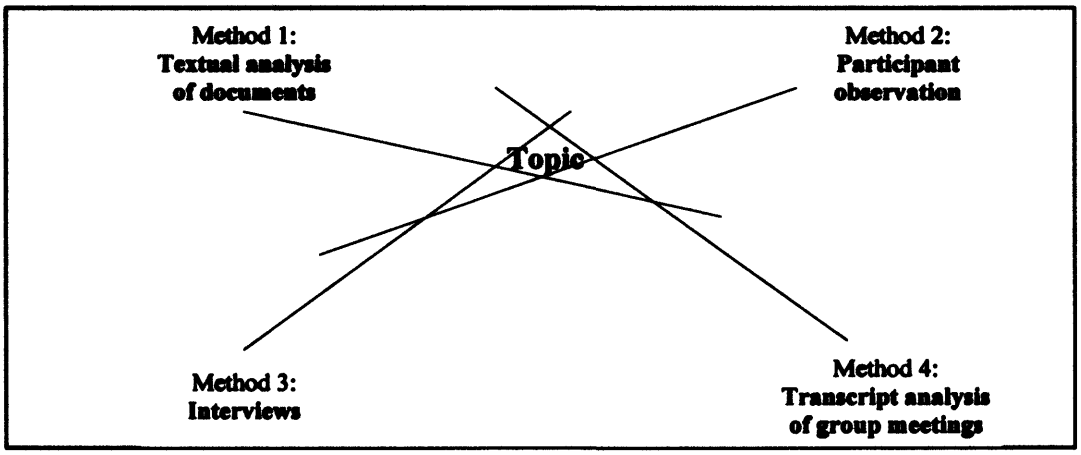
Table 3.3 Some Methods of Qualitative Research

Method	Features	Uses
Observation	Extended periods of contact	Understanding of another culture
Textual analysis	Attention to organisation and use of such material	Understanding of language and other sign systems
Interviews	Relatively unstructured and 'open-ended'	Understanding 'experience'
Audio and video recording	Precise transcripts of naturally occurring interactions	Understanding how interaction is organised

(Source: Silverman (2000, 2001))

This research employs a multiple-method approach (as illustrated in Figure 3.2 below) and a range of different source materials to help maximise understandings of the research objectives and questions. These methods include textual analysis of documents, participant observation, interviews and group meetings (workshop discussions).

Figure 3.2 Multiple-method Approach and Triangulation



(Source: Denscombe (1998)

Each method provides a particular perspective that illuminates certain aspects of reality; each of the methods also produces data, which have certain strengths and weaknesses to be faced by the researcher in terms of time, resources or access. The multiple-method approach also allows findings to be validated or questioned by comparing the data collected by different methods through a process of triangulation (Denscombe, 1998).

Even though all of these methods have been used as strategies for enquiry at every step of the sub-level of the backcasting scenario analytical framework, at certain stages some methods have been used more often than others. For example, 'textual analyses of documents', 'participant observations' and 'interview' have been used considerably more often to analyse the 'present trends and issues in Kuala Lumpur', while 'workshop discussions' played a more prominent role in the analysis of the 'Images of the Future'. Local transport experts' input, via interview and workshop discussion, play a very significant role in this study; and the process of data collection through the involvement of them will be further explained in the Section 3.4.6.

3.4 The Six Steps of Backcasting Scenario Study – Analytical Framework for Long-term Sustainable Transport Policies for Kuala Lumpur

The core idea of backcasting scenario methodology in this study will be outlined in the following paragraphs by way of a summary.

From a clear statement of the objective, i.e. to achieve a sustainable transportation system, together with the identified trends and issues in the transport system of Kuala Lumpur, policy targets have been defined. These targets have been used as part of the main frameworks for the construction of Images of the Future. The other elements or core ideas of these Images are framed by external factors (or contextual elements) and strategic elements.

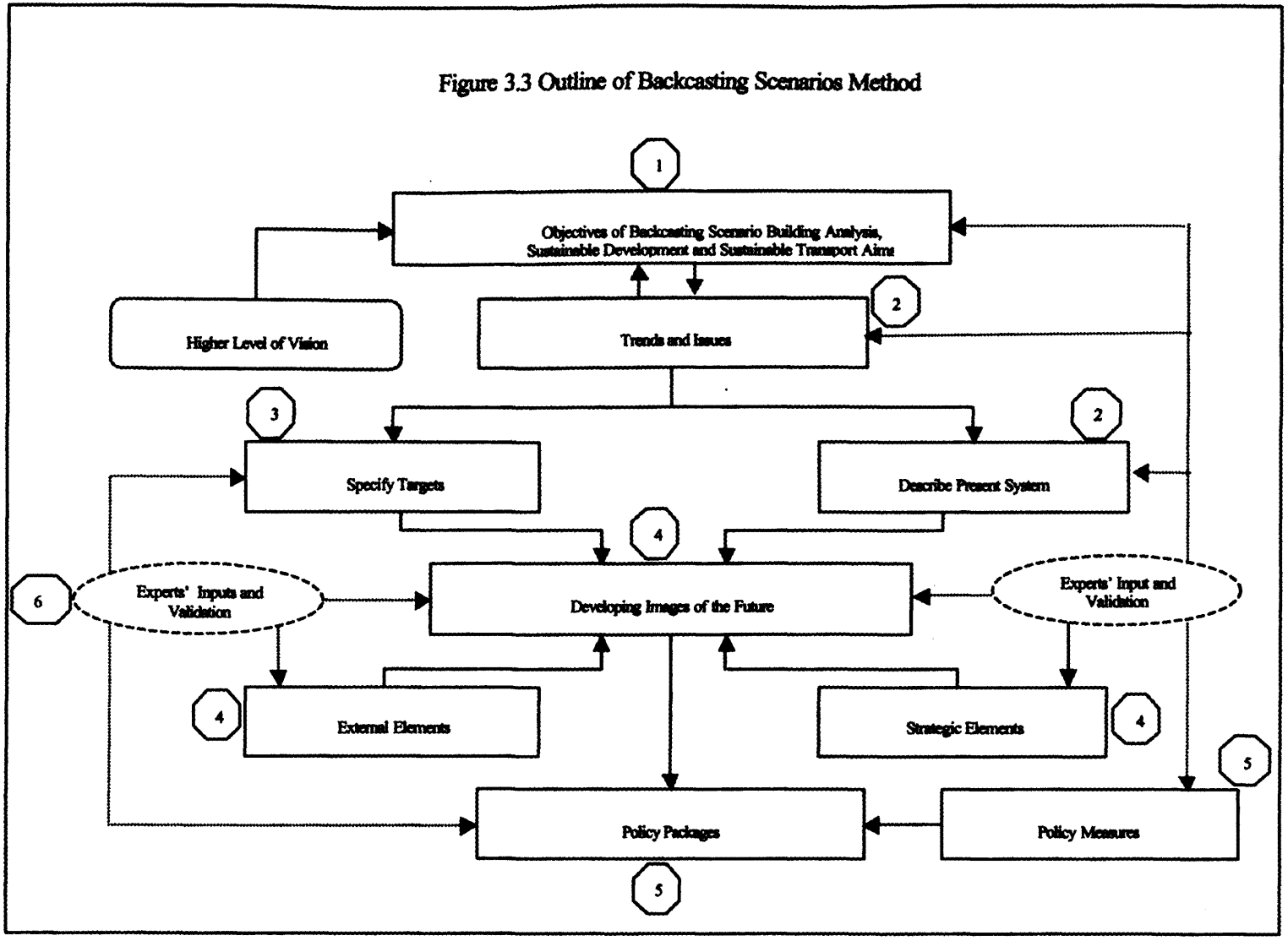
The contextual elements refer to alternative combinations of (I) the degree of interconnection and interaction in the global economy, (II) national economic growth and (III) employment structure. These elements are external factors to the scenario building process, yet they play an important role in influencing transport policy in Kuala Lumpur. The strategic elements included in the scenario building process are technology innovation, information telecommunication and changing travel behaviour.

The nine Images of the Future were constructed systematically; only three were selected for further analysis. After presenting the Images of the Future for the year 2020[5], packages of policy were developed in order to attain the targets set for the achievement of each Image. The validation process was carried out by the transport experts in the local environment of Kuala Lumpur.

In Figure 3.3, all six major steps involved in this backcasting scenario study are shown, and these will be discussed in sections 3.4.1 to 3.4.6 respectively.

[5] The temporal scope of scenario analysis (up to year 2020) will be explained in next section.

Figure 3.3 Outline of Backcasting Scenarios Method



Symbol  The 6 Steps

3.4.1 STEP 1:

Objectives of Backcasting Scenario Building Analysis, Sustainable Development and Sustainable Transport Aims

The overriding aim of this study is to find ways to develop sustainable transport in Kuala Lumpur. The objectives of the backcasting scenario method is to achieve that by pinpointing what to achieve, highlighting the alternative futures for the sustainable transport Images, and then seeking policy packages to bridge the gap between the present and the sustainable endpoint. It thus breaks the present unsustainable transport trend in Kuala Lumpur.

For the task of directing the future, the backcasting scenario has to have a clear 'sustainable transport' aim for Kuala Lumpur. The higher vision of 'sustainable development' for Kuala Lumpur and Malaysia should also be taken into account whenever relevant.

The higher and longer-term development planning in Malaysia, in terms of its objectives, is invariably related to the VISION 2020. The former Prime Minister, Dato Seri Dr. Mahathir Bin Mohamad, presented the full article, 'Malaysia: The Way Forward', in 1991 and since then it has become an important reference in every field. However, it is important to note that this study does not fit into Vision 2020 because the vision is not an explicit scenario but only outlines the important strategies for the nation to become a ***developed country*** by the year 2020. Instead, to ensure that it is consistent with Vision 2020 and will consequently increase the acceptability of any resulting transport policy recommendation, relevant and appropriate strategies have been adopted in the context of transport-planning scenario building analysis.

According to Vision 2020 (Mohamad, 1991), Malaysia does not want to become a duplicate of the existing 19 developed nations in this world but wishes to shape her own destiny. She needs to develop beyond the economic sense, covering all the political, social, spiritual, psychological and cultural dimensions. This roughly leads in the direction of the multidimensional sustainable development aims that have been adopted in this study.

In Vision 2020, the emphasis is on the importance of information technology in this information age. It states, *'the Malaysian society must be information-rich'* and *'no effort*

must be spared in the creation of an information-rich Malaysian society'. Efforts have been seen through the establishment of the National Action Plan, Multimedia Super Corridor, the concept of Electronic Government, etc. This enthusiastic top-down strategy, therefore, implies that information technology will be of far greater significance, and this is interpreted in the construction of the Images. Generally, new technology, such as telecommunication services, is considered to have resulted in significant environmental benefits through the electronic transmission of information and improved efficiency in valuable resource consumption. These are, of course, all factors critical to the achievement of sustainable development. More discussion about the influences of technology and information technology will be found in Section 6.2.3.1, Chapter 6.

Lastly, in conformity with Vision 2020, the temporal scope of scenario analysis in this study is also up to the year 2020. Whereas possibilities for significant change are much more limited in the shorter term, a longer-term future may not be seen as relevant. Hence, the medium- to long-term time span of 15-16 years is considered as an appropriately distant future for significant changes to occur in transport policy, and technical and institutional environments. It is noteworthy, however, that the year 2020 is only a tentative and intermediate date for the achievement of the sustainable development aim, as the sustainable development concept itself is a means but not an end of the vision. For the distant future, more far-reaching goals should be set[6].

At the time of writing, the term and concept of 'sustainable transport' have yet to be adopted formally in any transport policy documents, either at the national or city levels[7]. On the other hand, the brief introduction to sustainable development as outlined in the Malaysia Five Year Plan (8th Malaysian Plan, 2001-2006) has hardly mentioned the link between the concept and the transport field. In short, reference points in official documents are seriously lacking. Literature about these topics in relation to Malaysia is also very rare.

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[6]Discussion about the achievement of targets and goal setting in relation to time-scale will be further found in Section 5.4.2, Chapter 5.

[7] This refers to the mission and vision, objectives and policies outlined by the Ministry of Transport, Malaysia, Land Transport Division, Road Transport Department, Kuala Lumpur, as well as the Urban Transport Unit, Kuala Lumpur City Hall.

Motivated to fill the gap in the literature about the appropriate concepts of sustainable development and sustainable transport for Malaysia and Kuala Lumpur, as a first step, the researcher has defined what is meant by these concepts. The results of this first step of the investigation are in Chapter 4. Local transport experts have also echoed the need for locally appropriate sustainable transport concepts, aims and objectives, as they strongly believe that the idea of 'sustainability' must be differently defined for developing countries than for the developed ones. The enquiry strategy used at this stage was mostly textual analysis of documents, while the final concepts, aims and objectives were validated by local transport experts during the second period of fieldwork carried out by means of workshop discussions.

While these higher objectives indicate the direction in which the future aims should go, they mention nothing about the amount which it would be appropriate to achieve. Hence, more specific targets need to be identified. These will be discussed in Section 3.4.3.

3.4.2 STEP 2:
Trends and Issues Relating to the Present Urban Transport System

The identification of trends and issues relating to the present urban transport system in Kuala Lumpur was done firstly through observation by the researcher, and then verified via the literature review and also validated by the first fieldwork interview with local transport experts.

Trends traced back over the last two decades have been presented to give an overall picture of why and how the present urban transport characteristics have been shaped, i.e. the existence of an automobile society. One main conclusion which has been drawn from the section is that the automobile needs and urban transport issues should not be regarded as *'natural consumer desires'* or *'unavoidable outcomes of development'*. Apart from factors, such as economic growth, the rise in income, modernisation, most important driving forces of the automobile society are government policy, information and cultural influences. The bias of government in favour of the mobility advantages of medium- and higher-income groups has contributed to today's urban transport system. The investment in road building, little

attention to public transport, dispersed land use and various policy messages have encouraged people to own private vehicles. The information and mobility needs, especially of the medium- and higher-income groups, have resulted in strong cultural influences making necessary the ownership and use of private vehicles. These trends need to be reversed if the sustainable transport aim is to be achieved. As mentioned in Section 3.2, scenario backcasting methodology is appropriate when ***dominant trends are part of the problem***.

Wider sustainable transport issues were covered and were gradually reduced to a small number of prominent ones, including efficiency, accessibility, accidents, traffic congestion, urban air pollution, the mobility disadvantaged and vulnerable road users. The process of scoping was based on discussions with local experts, focusing on the real issues that were raised as the main concerns of local people.

The results of the second step of the investigation were presented in Chapter Two.

3.4.3 STEP 3: Identification of Targets

The identification of policy targets, the third step of the backcasting scenario method, is generated using multiple complementary enquiry strategies, which are divided into the two sub-steps of the 'top-down' and 'bottom-up' approaches.

As policy targets are generated to interpret the defined sustainable transport aims and, at the same time, to tackle the sustainable transport issues directly, the identification of targets in this project correspond with the findings from Steps 1 (see Chapter 4) and 2 (see Chapter 2). The top-down approach involved selecting the design framework for target generation, compiling a list of sustainability targets that are relevant to the transport sector and selecting criteria for the potential targets. The process involved an intensive literature review to help to identify potential targets. It is a systematic and deductive strategy using a combination of domain- and goal-based frameworks to establish potential indicators. The adopted process is very similar to POSSUM (Banister, 1998), EST (OECD, 2002) and the SUTRA project (The

SUTRA Consortium, 2003), where potential indicators have been identified in a structure of domain- and issue-based frameworks (see Table 3.4).

Table 3.4 Key Domains, Issues and Potential Indicators for Sustainable Mobility of the POSSUM Project

Domain	Issues	Potential Indicators
Social	Accessibility	Walking distances to local services/facilities
	Health	Reported incidences of transport-related illnesses
		Number of poor air quality days
	Safety	Road accident rates (casualties and deaths)
	Noise	Proportion of population affected by noise
	Visual Intrusion	Proportion of population affected by visual annoyance
Economic	Congestion	Road vehicle-kilometres/road length
	Building corrosion	NOx emissions
	Road and bridge damage	HGV vehicle-kilometres
Environmental	Resource depletion	Energy consumption
	Climate change	CO_2 emissions
		Loss of agricultural land
	Acidification	NOx emissions
	Air pollution	Emissions of NOx, VOCs, CO and other pollutants
	Waste generation	Vehicles scrapped related to vehicles recycled
	Water pollution	NOx emissions
	Infrastructure intrusion	Length of transport infrastructure

(Source: Banister et al. (2000))

The potential indicators link to the formation of a basic structure of targets, and further developed into a tentative target. For example, the indicator of 'fatalities rate' was linked to the basic structure of the target of 'reduction of fatality rate to x per 10,000 vehicles', and then further developed to the tentative target of 'reduce fatality rate to 1.3 per 10,000 vehicles'. A set of tentative targets then went through a verification and validation process via a comparative review with any existing targets and also discussions with local transport experts. Because targets imply concrete actions and behaviour changes by specific stakeholders, they should be the product of negotiation (Dalal-Clayton, Bass, 2002). In this study, tentative targets have been reviewed and validated by local transport experts to get the right 'feel' for them; the aim is to finalise a set of tough but realistic targets, and cover every dimension of sustainable transport. Interviews, questionnaires and workshop discussions are the main enquiry strategies used at this stage. This bottom-up approach is more inductive, and it is a knowledge-based strategy.

The results, together with a detailed process of targets design and generation, will be presented in Chapter 5.

3.4.4 STEP 4: Developing Images of the Future

The results of step 4, developing Images of the Future, are presented in Chapter 6.

With the foundation of the 'present transport system with its trends and issues' and 'sustainable transport aims, objectives and targets' validly established, the next step is to develop Images of the Future for sustainable transport by the year 2020. Images of the Future highlight the potential for and opportunities to achieve sustainable transport in different alternative futures. Three Images of the Future have been selected to describe the characteristics of society and transport by the target year 2020. They form the framework for identifying suitable policy packages to achieve the policy targets.

There are three sub-steps in the development of the final Images: firstly, constructing the Images; secondly, developing and selecting the Images; and lastly, fleshing out the selected Images. In the process of development of the Images, local transport experts have validated the rationales for construction and selection, and provided many creative ideas and raised relevant concerns at the stage of fleshing out the Images.

STEP 4a: - Constructing Images of the Future

To construct the Images of the Future, there are many tempting variables to consider, some of which have to be excluded for the purposes of focusing on and also clarifying the analyses. The construction of Images of the Future needs to be constrained by only a few variables that are highly specific and very influential with regard to the future. They are divided into two categories, external factors and strategic elements.

The external variables describe those parts of the 'world' that are not included within the backcast itself, but for which values or contexts must be specified in order for the backcast to be carried out (Robinson, 1990). In this study, external factors are the driving forces and conditions that are beyond the control of transport policy-makers but will significantly influence the industry. The selected external factors are based on criteria which will have a profound and widespread influence in the long run on patterns of economic development and employment and thus on transport. The selected external factors include assumptions about issues, such as the degree of interconnection and interaction in the global economy (globalisation, nationalisation, localisation), the level of national economic growth (low, moderate, high) and the implications of the employment structure (degree of domination by a knowledge-based workforce). Three alternative economic environments have resulted from a combination of these variables.

The strategic elements, on the other hand, are variables that are included in the scenario building process. In this study, the strategic elements are variables that have direct impacts on the transport policy-making process; the two main elements associated with each Image are assumptions about changes in *technology* and *behaviour and culture*. The interactions between these two strategic elements are explored to discover the most logical and cost-effective combinations. Three combinations of strategic elements resulted.

STEP 4b:
Developing and Selecting Images of the Future

The Images of the Future were developed from a combination of the above strategic elements operating in different alternative economic environments (external factors).

The strategic elements and alternative economic environments are arranged in two axes and form a matrix in a systematic way; nine combinations of Images of the Future result from the matrix. The table below shows an example of such an arrangement:-

Table 3.5 Example of a Matrix for Developing Images of the Future

Main Strategic Elements	*External factors*		
	Alternative Economic Environment I	Alternative Economic Environment II	Alternative Economic Environment III
Combination of Strategies I	Image I	Image II	Image III
Combination of Strategies II	Image IV	Image V	Image VI
Combination of Strategies III	Image VII	Image VIII	Image IX

Of the nine Images, only some seemed plausible or cost-effective. The selection process of the final Images (for fleshing out) involved:

1. Elimination of the incompatible Images because they either consisted of conflicting assumptions among the variables, or involved high costs for materialisation, or involved both factors.
2. Eliminating the less divergent Images because they had less potential to produce more radical policy measures.
3. Selecting easily distinguishable and interesting Images that were cost-effective (because there was compatibility and coherence between the external factors and strategic elements) and were able to inspire different policy strategies.

At the end of this step, three final Images of the Future were selected for further investigation, namely 'Image I – Foresight Vehicles', 'Image II – Extended Public Transport' and 'Image III – Information Society' (see Section 6.2.4, Chapter 6).

STEP 4c:

Fleshing Out the Three Images of the Future

This part vividly depicts the selected Images that focus on the situation at the end of the period. The skeleton Images, which have been roughly sketched out by the above major elements, need to be fleshed out for further elaboration in order to present a plausible image of the combined possible effects of the changes.

How does the future appear in the theme selected? What changes or events may be necessary to make the endpoint of the scenario plausible? Images of the Future weave pieces of the main characteristics together in the form of a narrative. Local transport experts were invited to brainstorming sessions in workshops to connect and rationalize the implications of the 'causes and effects' of various topics, such as the major driving forces, existing economic environment, opportunities, social changes, land-use patterns, travel behaviour, organisational changes and responsibilities, and any ideas or concerns that were relevant to help set out the Images in detail.

The final version of the three Images of the Future and their major advantages and concerns are presented in Section 6.3, Chapter 6.

3.4.5 STEP 5:
Developing Measures and Policy Packages

Once the Images have been developed in some detail, then how can progress be made from here to there? Step 5 looks at the paths leading to the targets and the Images of the Future of sustainable transport in Kuala Lumpur to be achieved by the year 2020. The measures and policy packages should be developed by working backwards to bridge the present and the future, which is one of the major characteristics of the backcasting methodology.

First of all, the measures were collected from a wide range of literature resources. This involved a review of different types (ten categories in total) of policy measures and their potential contribution to the achievement of the policy targets. The relevant policy measures were compiled and structured into a matrix for easier reference purposes. The policy orientations of the measures were also explored to provide more information to enable matching of the compatible Images: these included the nature of the measure, whether the measures were pull or push strategies; basic influences on changes in behaviour, whether they were *market-based/ technologically-based/ lifestyle-based* or *public policies;* the level

of public bodies that were responsible for implementing the policy measures, i.e. whether they were *global/ national/ regional* or *local;* and involvement of private bodies in successfully implementing these policy measures, i.e. whether they were *individual, neighbourhood* or *company.* The information provided insights to enable matching the measures for the development of compatible Images.

The policy measures likely to work well together were assembled into a policy package for each Image. The packaging of policy measures is for the purposes of maximising the synergetic effect, minimising any anticipated problems of implementation and improving the acceptability of the policy changes. The Images of the Future provide some basis for identifying core policies. Seeking other complementary policies that are compatible with the Images and policy targets finally established the policy packages. The result is that each of the policy packages is designed to relate to a specific Image of the Future. The policy packages were then further refined to allow plausible schematic implementation stages in the short, medium and long term. The process of policy packaging and the design of their schematic implementation tended to be intuitive, and was an iterative process to investigate the implications of the proposed policy packages for their achievement of targets and their compatibility with the Images. The sequencing of policy packages is important to ensure feasibility for implementation. Local transport experts were invited to contribute their knowledge at this stage.

The schematic implementation of policy packages was analysed to determine the achievement of the targets in the short, medium and long term. The descriptive results of Step 5 are presented in Chapter 7 and the assessment of policy packages are discussed in Chapter 8.

3.4.6 STEP 6:

Input from and Validation by Local Transport Experts

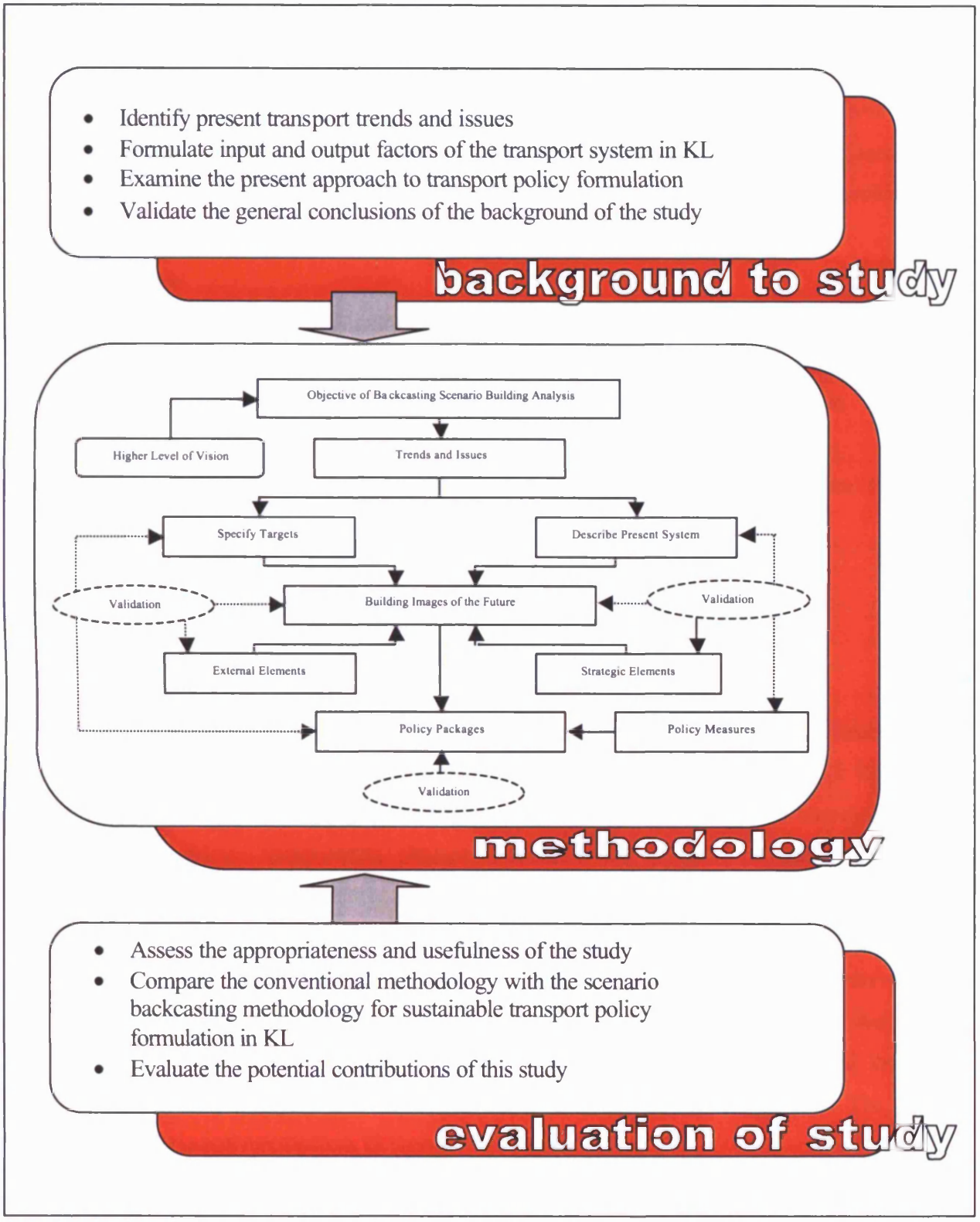
As briefly discussed at every stage above, local transport experts have been invited to contribute their valuable views in the study. The involvements of local transport experts have played major roles in the methodology and it is importance to highlight the process of data collection here.

Local transport experts participated in the interview and workshop brainstorming sessions in which their ideas were treated as valuable input elements to the study. They also validated the project by examining the rationales for each step. The inputs refer to the ideas, opinions and concerns raised by the experts, resulting from the discussions based on scenario backcasting. Validation refers to the involvement of the experts in scrutinising facts and rationales for the causes and effects or implications that relate to the project. The aspects of this project that have to be validated include almost every step of the process from the present urban transport issues and trends to the appropriateness of backcasting methodology, policy targets, Images of the Future and policy packages.

As summarised in Figure 3.4 on next page, local transport experts contribute in the three major stages in the study:

1. They helped to verify the background of the study;
2. They were an input element at every step of the methodology;
3. They validated the whole project by evaluating the study from the perspectives of appropriateness and potentiality for future application in Kuala Lumpur.

Figure 3.4 Contribution of Local Transport Experts in the Three Major Stages



To ensure that the above tasks could be carried out competently, the selection of participants in the study was based on the following criteria:

- Professions

  The candidates had to be working full-time as professional transport planners or closely involved in road transport system planning in Kuala Lumpur; for example, academics, politicians, sociologists, environmentalists or economists who were closely involved with the transportation planning process in that region.

- Expertise

  The candidates needed to have acquired a significant amount of expertise in order to make knowledgeable, professional judgements. A useful benchmark for this is the period of their professional practice and the position they held in a company or an institution.

- Interests

  The candidates had to show interest in the project and be willing to contribute in face-to-face interviews and by email communication.

Interview and Questionnaire Survey

Based on the above criteria, a first round of telephone interviews for candidate selection was made. 50 local transport experts had been contacted for a brief discussion about the project. From among them 18 local transport experts were selected to participate in interviews. These were from private transportation planning consultants and transport companies, as well as from relevant land transportation authorities. A set of questionnaires had been prepared and sent to these interviewees before the interview took place (See Appendix B). Appendix C lists the eighteen respondents in the interview. Both the questionnaire and the interview had two parts: the first part aimed to obtain responses about the background of the study, while the second part focused on scenario building components, i.e. vision, target and the policy measures needed to achieve a sustainable transport system in Kuala Lumpur. The process took two and a half months from 15 February to 30 April 1999.

Table 3.6 on the next page summaries the context of the interviews.

Table 3.6 The Context of the Interviews

(Questionnaires were used as adjuncts to interviews)

Type of Respondents, Location and Duration of Interviews	
• The interviews involved 8 interviewees from private transportation planning consultants, 6 from transport companies and 4 from the relevant land and transportation planning authorities. 18 interviewees were involved in the interviews but only 10 of them allowed the interview to be recorded. • All the interviews took places in the interviewee's office or company respectively; please refer Appendix C for interviewees' names, addresses and contact numbers. • In average, each interview took around two hours.	
Content of the Inputs	**Format**
1 Establishing the background to the study • Identifying the present trend and issues of transport system in KL • Examining the present transport policies, focus were put on the effectiveness of these policies in tackling transport issues	These topics were mostly discussed with open-ended. Interviewees were encouraged to express their own views freely. The researcher tried to have in-depth understanding about the raised issues.
2. Exploring interviewees' visions for sustainable transport in Kuala Lumpur in long term.	Open-ended discussions. Interviewees talked about the topic in his/her own way.
3 Refining Project Targets • Assessing, selecting and validating tentative targets	Structured discussions. Topics discussed were standardised, pre-specified questions. The same words used to each interviewee with questions given in the same order.
4. Exploring the importance of major policy measures held by respondents (before exposing themselves to Images) • Rating the priority of policy measures	Semi-structured discussions. Apart from rating the policy measures, issues that were spontaneously raised by the interview have been taken into account of.
Notes: • Before ending the interview sessions, the interviewees checked that major points raised by the open-ended and semi-structured discussions	

Workshop Discussion and Questionnaire Survey

Secondly, face-to-face discussions took place in Kuala Lumpur from 15 March to 10 May 2001. These were carried out in the form of workshop discussions that included an introductory presentation and a brainstorming session. The researcher presented the three Images of the Future and the associated policy packages (in the format of a summary of Chapters 5 and 6), and this was followed by a discussion session among local transport experts. At the end of the workshop discussion, they were required to assess the usefulness of

this study for future application in Kuala Lumpur. A set of questionnaires had been prepared and sent to these interviewees before the interviews took place (see Appendix D).

There were six workshops in total that consisted of 13 participants altogether (see Appendix E). Apart from a few who had participated in the first round interview, there were different participants in the workshop discussion. However, the criteria for the selection of participants were still strictly applied.

Table 3.7 below summaries the context of the workshop discussions.

Table 3.7 The Context of the Workshop Discussions

(Questionnaires were used as adjuncts to the Workshop Discussions)

Type of Respondents, Location and Duration of Interviews		
• There were 6 workshops all together. 2 sessions with private transportation planning consultants, 1 with the city hall officers, 1 with the regional planning officers and 2 with academics. All of them allowed the workshop discussions to be recorded. • All the workshops took places in the experts' office or company respectively; please refer Appendix E for their names, addresses and contact numbers. • In average, each interview took about three hours.		
1	Validation of the background to the study, other findings from the preliminary study and conclusion made from the previous interviews.	A slides presentation was shown to the respondents, then they were invited to comment and validate the results of the: • The present transport issues and trends. • Key factors that contribute to the present transport system. • A need for a trend-break scenario approach for formulating long term transport policy in Kuala Lumpur • The defined sustainable transport goal and objectives • Project targets Questionnaire was used for assisting the last two topics. Semi-structured discussions were focused on the relationships between sustainable transport objectives. Numerical rating scale was used to rate the priority of the objectives.

Table 3.7 The Context of the Workshop Discussions (continue)

Content of the Inputs		Format
2.	The building of future sustainable transport images for Kuala Lumpur • The selections of external elements and strategic elements	Workshops were carried out in a format of structured discussion. Respondents were guided by pre-specific questions, i.e. to discuss the factors that have a profound and widespread influence in the long run on the transport system in Kuala Lumpur. The discussion then focus on few key elements. To assist the discussed topic, Likert-scales rating were used in the questionnaire.
	• The proposed three Images of the Future - giving general views about the future images - refining the proposed images - assessing whether the images are distinguishable between each other - discussing about the images and the achievement of the targets	Respondents were presented with three images and the summary of their characteristics. Workshops were initially carried out in a format of open discussion; this was to explore respondents' general views towards the images. Then, the format changed to a more structured discussion, the purposes were to refine the characteristic of the images and to discuss the implications of the images. Brainstorming topics were focused on the achievement of targets. Likert-scale rating was used in the questionnaire to find out if the images were sufficiently distinguishable. Numerical rating scale was used to rate the achievement of the targets by different Images.
3.	Policy measures, policy packages and the achievement of the targets.	Respondents were encouraged to suggest and discuss policy measures in relations to each image. Guided by a thinking route outlined at Figures 8.1 and 8.2, Chapter 8, respondents were encouraged to brainstorm the ideas among themselves. Brainstorming topics were focused on the interaction betweens measures and its implications (negative and positive) towards sustainable transport objectives.
4.	Evaluation of this study	Respondents were asked about the usefulness of the methodology and the significance of the study towards the formulation of sustainable transport policy in Kuala Lumpur. Discussion focused on the comparison of this method with other conventional methods. Numerical rating scale was used in the questionnaire to evaluate the project.
Notes: • The respondents had checked major points (especially the open-ended and semi-structured discussion) before ending the workshop discussion sessions. Respondents were given time to fill in the questionnaires after the workshop. Most of them posted back the questionnaires to the researcher in the following days.		

Email Communication and On-line Discussion

There were email communications to follow up the interview discussions. This had helped to update data and information, confirm key urban transport trends and issues and refine the process of backcasting scenarios building.

Meanwhile, a new on-line discussion group about Malaysian transport issues and policy which had developed since 29 June 2000 was established. The source provided many other local transport experts' opinions about issues relevant to the study. Some of their views were taken into account in this study whenever relevant, although this was not planned at the outset of the research.

Comments On the Interview and Workshop Discussion Methods

Typically, in an open-ended interview study respondents were encouraged to offer their own opinions and assessments of particular issues, 'transport issues' for example. The one-to-one interviews that were carried out in the first period of fieldwork achieved this objective, i.e. respondents were encouraged to freely express their views about the present transport issues in Kuala Lumpur. The interviews highlighted the advantages of qualitative research in offering a 'deeper' picture of the present transport system.

The workshop discussions that were carried out in the second period of fieldwork were to encourage brainstorming among the group's members. The lateral thinking process is designed to help to break out of people's normal thinking patterns into new ways of looking at things. Workshop discussion is therefore very suitable for eliciting the respondents' ideas about Images of the Future and Policy Packages.

The interview method allows many ideas to develop when discussing a particular issue. Compared to the one-to-one interview method, workshop discussion has the advantage of

developing ideas in a more creative way. When individual members reach their limit with regard to an idea, another member's creativity and experience can take the idea to the next stage. Both methods unfortunately, faced the disadvantage of time constraint in the two periods of fieldwork, thus requiring email communication as a follow-up.

Informal on-line discussions provide numerous useful resources and have no time-constraint. However, these discussions were not structured as in the above methods. There is also the issue of selecting the 'genuine' respondents who actually fulfils the criteria set for participants. Therefore the data collection from this source is limited to the opinions from reliable sources, such as the official websites of Clean Air Asia, Sustainable Transport Action Network for Asia and the Pacific, etc.

3.5 Inputs from Local Transport Experts in the Methodology that Adopted for this Study

Except for a few local transport experts, no one had heard of nor used the backcasting scenario methodology at the time of interview. The methodology could be said to be a completely new and an unfamiliar subject to most of the respondents. All of them were enthusiastic and wanted to know more about the method, especially its application to the Kuala Lumpur case study.

On the other hand, they commented on the weaknesses of conventional forecasting methodology from their own experience as practitioners. There are too many variables and forecasting methodology has difficulty in tackling them all at the same time. The analysis becomes meaningless and is without sensible results when the relationships between variables are too complicated. Furthermore, some variables cannot be quantified or proper data have not been collected, but they do have important influence in contributing to Kuala Lumpur's transport trends and issues, e.g. the habitual behaviour and class culture that have taken root in society.

These confirm that there is a need to adopt a new approach to supplement the current transportation planning process, in which backcasting scenario methods can overcome these limitations. The visionary approach to future study could indicate a broad direction of transport policy.

The participation of local transport experts has clearly had two major functions for the study: firstly to validate the whole process of study; and, secondly as valuable input elements that contribute to the backcasting methodology. In short, local transport experts have validated all steps in the study and acted as input elements mainly at the methodology stage.

Table 3.8 Roles Played by Local Transport Experts in Every Step of the Study

Steps in the study	**Validation**	**Input Elements**
A. Background of the study		
Identify present transport trends and issues	√	
Formulate input and output factors of the transport system in KL	√	√
Examine the present approach to transport policy formulation	√	
Conclusion of the background of study	√	
B. Methodology of the study		
Concepts of sustainable development and sustainable transport in Malaysia	√	√
Sustainable transport objectives	√	√
Project's target	√	√
Image of the Future	√	√
Policy measures and policy packages	√	√
C. Evaluation of the study		
Appropriateness and usefulness of the study	√	
Compare the conventional methodology with the scenario backcasting methodology for sustainable transport policy formulation in KL	√	
The contribution of the study to future sustainable transport system in Kuala Lumpur	√	

Local transport experts did not have any problems in validating the study. The researcher found that they accomplished the task competently in every step. They confirmed the background of the study, checked the logical and rational justifications of every step in the methodology and also judged the usefulness, appropriateness and contributions of this study.

Nevertheless, as the 'input elements' in the study, they did not fully accomplish the task in the way that was expected at the outset. The role of local transport experts as 'input elements' in scenario backcasting is in the nature of the methodology in this study. They should have provided ideas, corrected the details and refined the justifications according to their technical knowledge and from their perspective of the local experiences. The capabilities and efficiency of local transport experts to carry out the tasks were varied according to the different stages of this project.

Local transport experts were most capable of making inputs to 'formulating inputs and outputs of the transport system in KL' and also 'Images of the Future', and they did these with the greatest efficiency. They are very experienced in terms of the present system and pointed out rightly and accurately why the present transport system has been behaving in such a way. They could also imagine vividly and envisage the implications of each component of the different Images of the Future.

Local transport experts made a huge contribution to 'concepts and objectives of sustainable development and sustainable transport in Malaysia'. Indeed, they voluntarily raised their concerns about these topics and required a search for a more locally approved sustainable concept and objective to apply to Kuala Lumpur. They repeatedly emphasised the need for the concept of sustainable development to be refined from the perspective of the Southern countries, and the need for objectives of sustainable transport to reflect the requirements of the local environment and its people. They also helped the researcher to sort out the priority of the transport objectives and pointed out their complementary and conflicting relationships.

Regarding the project's target, local transport experts were still capable of making inputs at this stage. They commented well about the first draft of the project targets in the first round interview. Nevertheless, they provided less constructive suggestions about the final set of project targets. Indeed, they needed continual reminders from the researcher because their comments about the targets tended to diverge from the aim of sustainability. They showed a tendency to link project targets to practicality instead.

Nevertheless, the inputs that the researcher had the greatest difficulty in obtaining from local transport experts were at the 'policy measures and policy packages' stage. The experts were able to discuss the core and main supporting policies in the Images and gave ideas at this stage, but they had lost the level of 'attention to detail' when more and more policy measures were packed together. They showed difficulty in coming up with new ideas to assist the researcher to improve the policy package. Their role at the 'policy package and targets achievement' stage was largely to check the rationality of the researcher's proposal.

In conclusion, local transport experts confirmed the background of the study, assisted in formulating the main components of methodology and assessed the usefulness of the whole project. In general, they were excited about the backcasting scenario approach, and amazed at its creative and innovative way of studying the future sustainable transport system in Kuala Lumpur. The validation findings ensure that the study is viable theoretically, workable and has been rationally carried out. Clearly, these findings validate the study as a potential new tool for future transport policy formulation at Kuala Lumpur city level in the real world.

However, some limitations arise out of weaknesses of local transport experts' inputs into the project, for example brainstorming for more creative policy measures were less actively discussed than expected. The limitations will be further discussed in Section 9.3.2, Chapter 9. Lessons have been learned from this project as to how to improve the quality of expertise inputs in backcasting scenario methodology.

3.6 CONCLUSION

In the present circumstances in which policy-makers have too great a tendency to encourage automobile-oriented trends in Kuala Lumpur, the backcasting scenario building is a way of widening their perceptions. Alternative policy options could inspire policy-makers to allow them to think imaginatively, creatively, innovatively. More importantly, the method encourages a cross-sectoral issues analysis and consideration of policy options.

In summary, the proposed analytical framework for the backcasting scenario in this chapter provides a systematic structure for:

1. Analysing the present Kuala Lumpur car-oriented trends and issues by taking into account both external driving forces and internal transport demands, thus giving a more comprehensive and realistic picture of what the real issues are and how much the present transport system has diverged from the path of sustainability.
2. Enabling large-scale change from the present trend to take place. It allows for long-term ambitious objectives and sustainable transport targets to be designed for the city, which do not seem possible by following the extrapolation trend analysis.
3. Linking the present issues, sustainable transport aims and policy targets in a clear and succinct manner. The domain and goal framework that was used in Step 3 is the most effective for ensuring coverage of the dimensions of sustainability, as well as directly linking the issues, targets and objectives.
4. Exploring and highlighting opportunities for Kuala Lumpur's future by advanced understanding of the changes in external factors.
5. Comparing alternative futures side by side. In addition, as a result of vivid depiction of the futures, it is much easier to provide easily accessible insights into packaging compatible measures for each Image
6. Providing more insights into the impacts of the Images on the future in terms of their pros and cons, policy options and other developments (e.g. who should be responsible for the changes).
7. Allowing local transport experts to contribute their inputs in order to shape the future, inspire creative ideas and also increase the mental willingness to consider a broad spectrum of options.

In short, backcasting scenario building is a pro-active tool for analysing possible future sustainable transport systems for Kuala Lumpur, it has a positive role and is prominent in exploring choices for achieving far-reaching sustainable aims in an uncertain and complex future.

CHAPTER FOUR
APPROPRIATE CONCEPTS OF SUSTAINABLE DEVELOPMENT AND SUSTAINABLE TRANSPORT FOR MALAYSIA AND KUALA LUMPUR

4.0 Introduction

The lack of an integrated transport vision and goals for Kuala Lumpur is one of the issues raised in Chapter Two. An appropriate working concept of sustainable transport goals and objectives is of clear importance for directing the future path, and it has to be specifically designed to suit the local climate of historical, political and socio-economic factors. This chapter presents a search for appropriate concepts of sustainable development and sustainable transport for Malaysia and Kuala Lumpur. The defined sustainable transport objectives provide a solid ground for judging whether the present urban transport system (as discussed in Chapter 2) in Kuala Lumpur has been moving away from sustainability.

The chapter firstly discusses the basic ideas and perspectives of sustainable development, and aims to give a general picture of the concept. To establish a working sustainability concept for this study, there has been a focus on the standpoints of the South, particularly the standpoint of Malaysia. This section will conclude with a concept of sustainable development that is appropriate for Malaysia, and it will become a reference point for this study. Next, the chapter focuses on sustainability in the transport sector; it briefly compares progress in the North and South, together with approaches, issues and challenges faced in the transport field. This provides a general understanding of the standpoint of Kuala Lumpur (as a city in a Southern country) concerning the subject of sustainable transport.

Taking into account the concept of sustainable development, the appropriate approach towards sustainable transport and also the present issues existing in the city (Section 2.2,

Chapter 2), the sustainable transport goals and objectives in Kuala Lumpur are derived. Assessing the sustainable transport goals and objectives against the raised transport issues in Chapter Two, at this point, we could appraise whether the transport system in Kuala Lumpur is becoming more or less sustainable. The chapter is followed by a discussion of how the objectives of sustainable transport may be achieved harmoniously.

Lastly, local transport experts' inputs have been summarised in Section 2.3 to highlight their opinions which has shaped the thinking of the definitions and concepts of sustainability in Kuala Lumpur.

4.1 Sustainable Development - Basic Ideas and Perspectives

The idea of sustainable development originated from the 'Limits to Growth (Meadows et al., 1972) debate, which discussed the continuing growth issue related to environmental degradation and social collapse on a global scale in the early 1970s. The first broad concept of 'sustainable development' was not publicised by the World Conservation Strategy until a decade later. It was not until 1992 when more than 150 states committed themselves to making future development sustainable at the Earth Summit (The U.N. Conference on Environment and Development, 1992)[38]. Nowadays, it has become central to thinking on environment and development. Indeed, the earliest sustainable development concept emphasised the need for economic development to be compatible with constraints set by the natural environment. Recently, it has also been stressed that economic development should be compatible with political and social institutions. A holistic concept of sustainable development, in which it is necessary to consider simultaneously economic, ecological, social and political factors, has now emerged.

Although the popular statement in Our Common Future (Brundtland Commission, 1987), *'Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs'* has been widely used, not everyone agrees with

[38] Website http://www.iisd.org/timeline/ displays the Sustainable Development Timeline in detail.

this; in fact, there is no universally accepted definition of sustainability or sustainable development (Beatley, 1995). There are so many different concepts used in connection with 'sustainable development', some of them are quoted as follow:

'The basic idea [of sustainable development] is simple in the context of natural resource (excluding exhaustible) and environment: the use made of these inputs to the development process should be sustainable through time. ..... If we now apply the idea to resources, sustainability ought to mean that a given stock of resources – trees, soil quality, water and so on – should not decline.' (Markandya and Pearce, 1988)

'....sustainable development implies using renewable natural resources in a manner which does not eliminate or degrade them, or otherwise diminish their usefulness for future generations.... Sustainable development further implies using non-renewable (exhaustible) mineral resources in a manner which does not unnecessarily preclude easy access to them by future generations..... Sustainable development also implies depleting non-renewable energy resources at a slow enough rate so as to ensure the high probability of an orderly societal transition to renewable energy sources...' (Goodland and Ledec, 1987)

'It makes no sense to talk about the sustainable use of a non-renewable resource (even with substantial recycling effort and reuse rates). Any positive rate of exploitation will eventually lead to exhaustion of finite stock
....in this [sustainable development] mode...conservation becomes the sole basis for defining a criterion with which to judge the desirability of alternative allocations of natural resources' (Turner, 1988, p.13 and p.21)

'... the concept of sustainable economic development as applied to the Third World... is therefore directly concerned with increasing the material standard of living of the poor at the "grassroots" level, which can be quantitatively measured in terms of increased food, real income, educational services, health care, sanitation... etc. and only indirectly concerned with economic growth at the aggregate, commonly national, level.' (Barbier, 1987)

One of the explanations for the above diverse definitions and concepts is due to the holistic nature of sustainable development, thus it is related to various dimensions; for example, economic and political (growth or development), philosophical (rights of life form), social (equity) and technical (technical knowledge and technological substitution) issues. Hence, each user of the term 'sustainable development' has evolved his or her own definition to suit his or her beliefs or circumstances. To resolve the confusion arising from varying definitions of sustainable development, an understanding of the different perspectives of sustainable development should be gained. Before we adopt a working definition for sustainable development for this study, we will review three major perspectives of sustainable development as follows and will relate them to Malaysia's situation:

(I) Strong vs. weak sustainability

(II) Rich vs. poor

(III) Technopositive vs. technophobic

4.1.1 Strong vs. Weak Sustainability

This particularly refers to Turner's summary of the spectrum of views of the environment (please refer to Table 4.1). It ranges from the 'cornucopian' view to the 'deep ecology' view based on four criteria, namely green label, type of economy, management strategies and ethics. The 'cornucopian' view is one which maximises the use of natural resources if that is what is required to enhance social welfare, while the 'deep ecology' view is the other way round: it advocates for minimal resource use. In between these two polarised viewpoints are two main stances: strong and weak sustainability.

Weak sustainability is a step beyond the cornucopian view in terms of natural resource use; the objective is to at least maintain, if not enhance, the total capital stock passed on to future generations. It assumes that much natural capital may be consumed provided there are sufficiently close substitutes available. It accepts that resources may be exploited because this will raise standards of welfare, especially in developing countries, and the higher living standards will then be the key to slowing population growth and limiting the environmental

Table 4.1 Strong and Weak Sustainability

Overlapping categories	**Technocentric**		**Ecocentric**	
Perspective	**Cornucopian**	**Accommodating**	**Communalist**	**Deep Ecology**
Green Labels	Resource-exploitation, growth oriented position	Resource conservationist and 'managerial' position.	Resource preservationist position	Extreme preservationist position.
Type of Economy	Anti-green economy, unfettered free markets	Green economy, green markets, guided by economic incentive instrument (EIs) (eg. pollution charges)	Deep green economy, steady-state economy regulated by macroenvironmental standards and supplemented by EIs	Very deep green economy, heavily regulated to minimise 'resource-take'
Management Strategies	Primary economic policy objective, maximise economic growth (max GNP). Taken as axiomatic that unfettered free markets in conjunction with technical progress will ensure infinite substitution possibilities capable of mitigating all 'scarcity/limit' constraints (environmental sources and sinks)	Modified economic growth (adjusted green accounting to measure GNP) Decoupling important but infinite substitution rejected. Sustainability rules: constant capital rule. Therefore some scale changes.	Zero economic growth; zero population growth Decoupling plus no increase in scale. 'Systems' perspective – 'health' of whole ecosystem very important; Gaia hypothesis and implications.	Reduced scale of economy and population Scale reduction imperative; at the extreme for some there is a literal interpretation of Gaia as a personalised agent to which moral obligations are owed
Ethics	Support for traditional ethical reasoning; rights and interests of temporary individual human beings; instrumental value (i.e. of recognised value to human beings) in nature	Extension of ethical reasoning; 'caring for other' motive – intergenerational and intragenerational equity (i.e. contemporary poor and future people); instrumental value in nature	Further extension of ethical reasoning; interests of the collective take precedence over those of the individual; primary value of ecosystems and secondary value of component functions and services.	Acceptance of bioethics (i.e. moral rights/interest conferred on all non-human species and even the abiotic parts of the environment); intrinsic value in nature (i.e. valuable in its own right regardless of human experience)
Sustainability Label	**Very Weak Sustainability**	**Weak Sustainability**	**Strong Sustainability**	**Very Strong Sustainability**

(Source: Turner (1988))

damage caused by the short-term horizons associated with extreme poverty.

Strong sustainability, on the other hand, asks for rapid changes towards more efficient and more frugal use of natural resources. It usually calls for the setting of mandatory targets for sustainability enforced by government. The intra-generational equity is the main objective based on the argument that the rich have consumed natural resources to an excessive extent. It believes that by advocating this objective and subsequently transferring the resources from the rich to the poor, it will reduce rich-country resource use, it will help to alleviate global poverty and finally, it will retard environmental degradation in poor countries. Strong sustainability assumes that higher standards of welfare based on current natural resources are indeed at the expense of future generations. In contrast with weak sustainability, advocates of strong sustainability oppose the reliance on technology substitution as a means of attaining the goal of sustainability.

4.1.2 Global Debate: Rich Vs. Poor

Another perspective from which to view sustainable development is related to the rich vs. poor debate. The global debate between rich and poor, or North and South, is not a new one. Since the 1970s, the global debate on economic issues has become increasingly polarised as a North-South debate. In 1974, the Bariloche Foundation published 'Limits to Poverty'[39] and called for growth and equity for the Third World. The North-South debate was again expressed in the same way in the dialogue which began in 1975at the Conference on International Economic Co-operation, increasingly also in international organisations such as the UN Conference on Trade and Development (UNCTAD), Rio Conference, 1992 and up to the recent Johannesburg World Summit on Sustainable Development (WSSD), 2002[40]. It is important to understand the debate and clarify the Malaysian position and perspective on sustainable development.

The North has generally worried about worsening global ecology; it is particularly concerned about energy overuse causing climate change, the coming crisis of acute water shortages and the ongoing destruction of forests. Issues like deforestation are already

[39] It was the South's response to the 'Limits to Growth' Report.
[40] For the historical development and perspective about the global debate from the South's view point, refer to http://www.southcentre.org (The South Centre)

centred on the South, and other problems will also become major threats from that part of world in the future. This is due to the fact that the South comprises three-quarters of the world's population and a large and growing share of its economic activity; high-level consumers mean a large and growing share of global resource use, waste generation and greenhouse gas emission. However, the South is less interested in environmental issues; instead they consider these as a distraction and hindrance to physical growth. At the UN's Commission on Sustainable Development (CSD, 1997), such a North-South clash of interests towards the world's environment and development problem was obvious. The South has underlined its continuing economic crises, shortage of funds and the need for aid and technology from the rich countries to help them eliminate poverty. Ecological problems certainly seem be the second priority for them.[41] It is clear that for the South the policy priority of sustainable development refers to eradication of poverty, intra-generation equity and reviving economic growth.

The middle-income countries of the South, which are doing rather well in terms of conventional economic growth, have been preoccupied with keeping up with high growth rates, and they oppose any suggestion that could suppress their industrialisation. They consider the strong sustainability concept as an inconvenience or even as a plot to prevent rivals from emerging.

This rich vs. poor debate about sustainability, basically reflects disparities in income; it is indeed highly coloured by equitable distribution issues. Rich people are accused of ignoring equity, immediate environmental and quality of life issues affecting poorer people. The Nobel economics prize-winner, Robert Solow (1996), has discussed this paradox between the fashion for advocating sustainable development in the future but lack of interest in the inequalities of today. He wrote, '*those who are so urgent about not inflicting poverty on the future have to explain why they do not attach an even higher priority to reducing poverty today*.'

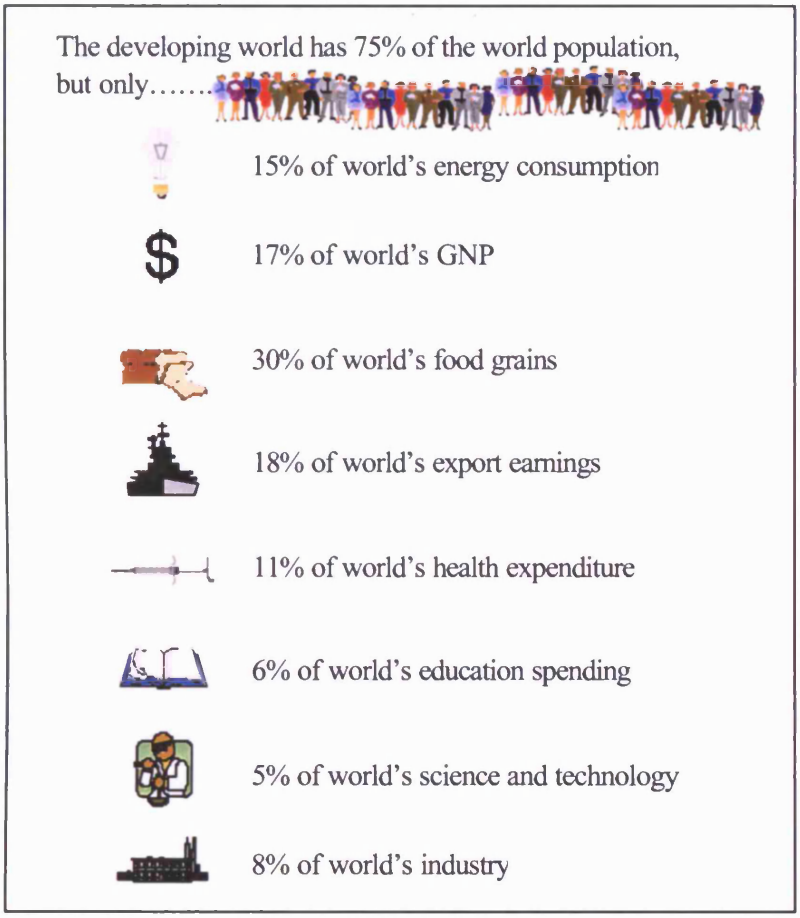
The fact underlining this argument is that the dimensions of global economic, social and environmental inequalities are stark. Figure 4.1 illustrates the development gap between

[41] Such an opinion is commonly found in local media. For example, an article in a Malaysian national newspaper, the Star, titled *Need to Break North-South Divide* (21 April 1997) has expressed a similar view.

the economically developed North and the economically developing South.

Considering this gap in various dimensions, it is not surprising that social and economic developments in Southern countries are urgently needed to deal with issues such as poverty, starvation and other social issues, while environmental or ecological sustainability have to come later in terms of priority.

Figure 4.1 North South Divide: the Distribution of Resources



(Source: UNDP, (1996))

Furthermore, the levels of resource use, waste and greenhouse gas emission per person in the South are much lower than the in North, even though the present and future potential population growth is higher. Taking into account both the advantageous technological and higher level of consumption per person factors in the North, the South has claimed that

the North should play the main role in ecological sustainability by reviewing its own lifestyle and consumption/pollution per capita, while Southern countries should be given opportunities and greater scope in terms of social, economic and technological developments. This implies that in terms of sustainable development, different concepts of sustainability are required to be adopted by Northern and Southern countries.

4.1.3 Technopositive Vs. Technophobic

Apart from the aforementioned perspectives, another approach to sustainability is from the perspective of technology, namely the technopositive vs. the technophobic.

A technopositive perspective assumes that new technologies are likely to provide the best solution to most problems. According to this school of thought, the future is rosy and bright. As Julian Simon (1996) put it,

'*All the trends of mankind's material prosperity have improved, and this will continue indefinitely, as improved technologies and new research findings open up completely new possibilities for future action.*'

He and others, such as Bailey (1993) and Avery (1995), argue that the real world is characterised by continuous feedback mechanisms and interactions and that human ingenuity holds out the promise of endless innovations. According to those who believe that *'necessity is the mother of invention'*, adverse conditions (such as shortages) have adverse consequences for society only in the short term. Since problems provide a stimulus for innovation and substitution, they believe that the situation will actually improve in the longer term.

Nonetheless, today's mainstream expert judgement does not support this optimism. The 1992 Earth Summit took the view that there are threats of serious or irreversible damage, although the environmental consequences to date cannot be unequivocally detected or assessed due to the unknown complex interaction of various factors. This school of thought deems that there are limitations to technology and substitution. For instance, it may well be that optical fibres can be substituted for copper for power and information

transmission, and that mobile phones can be substituted for telephone lines, but what would be an adequate substitute for the stratospheric ozone layer? And what could serve as a substitute for biodiversity? As by no means all problems are amenable to technological solution, it would be unwise to rely exclusively on new technology becoming available to solve all the problems. Most ecologists see technological progress and the associated breakthroughs in efficiency as a necessary but not sufficient condition for global sustainable development. They insist that the efficiency revolution must be accompanied by a change of consciousness and attitudes at the individual level.

However, many divergent views of technology are not so completely polarised, but the preference for or avoidance of technology is more closely related to other external factors such as, cost, institutional problems, technical issues, social acceptability, etc[42]. It is nonetheless worth noting that policies in certain societies (such as the USA) are likely to be more technological in character than others, and one of the reasons is the 'technopositive' culture of the society in general.

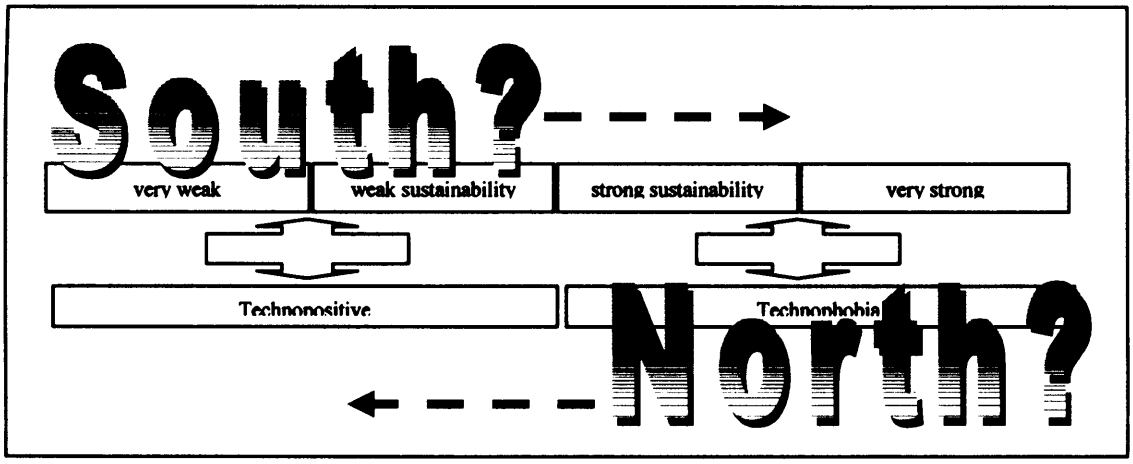
[42] Rienstra et al. (1996) discussed the fact that the introduction of new technology for sustainable transport purposes needs to consider various factors; these include economic (competitiveness, profitability and financing), spatial(appropriateness), institutional (government support, pressure from national industry and management issues), psychological (acceptance and adoption) and technical (R&D, technical inertia) factors.

4.1.4 Sustainable Development Paths Related to Different Stages of Development

From the above three perspectives of sustainable development, a spectrum of sustainability ideas or definitions may be derived from the different standpoints, that is based on weak or strong sustainability espousers, rich or poor countries, technopositive or technophobic attitudes. From the understanding of each perspective, it seems as if there are links between them. In simple terms, it can be generally stated that the weak sustainability concept is more appropriate as a goal for the South, while the strong sustainability concept is more relevant to the North.

Theoretically speaking, as the South has yet to fulfil the basic needs of its people, weak sustainability that espouses modified economic growth is more appropriate in that it allows the South to continue its socio-economic development. On the other hand, the North has achieved a certain level of socio-economic development such that it could tolerate the slower growth objective of the strong sustainability concept without risking the welfare of its people. In addition, the North has also consumed more natural resources than the South, and requires more rapid change towards efficient and frugal use of natural resources (strong sustainability). Weak sustainability also tends towards pro-technology, which is urgently needed by the South to continue its development. Figure 4.2 presents the idea of this concept in graphic form.

Figure 4.2 Relationships between Sustainability Perspectives

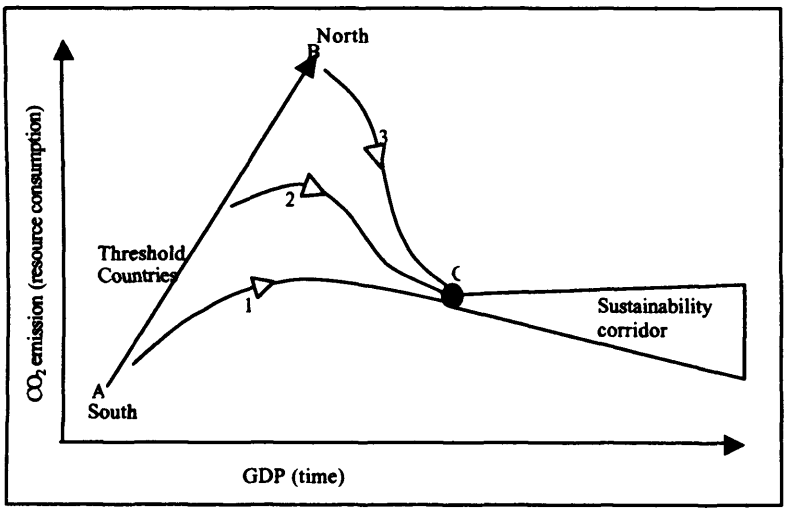


The South, including Malaysia, could easily accept this perspective, as it is coincides with its viewpoint. The South Commission (1990) has repeatedly emphasised that meeting

basic needs is the cornerstone of a sustainable strategy for development. To achieve this, it insists that it has no alternative but to pursue rapid economic growth, and hence industrialisation, as quoted here, *'The objective of people-centred development can be achieved within a rapidly expanding economy. High rates of growth are indispensable to generate the resources to satisfy basic needs and support a progressive increase in living standard.'*

However, for long-term global comprehensive sustainable development, there needs to be a means to bridge the different standpoints of the North and South. The Tate Energy Research Institute (1999) has made a detailed study of these issues and come out with a proposal to resolve the dispute between the North and South in the long term, i.e. by adopting a different development path depending on the developmental state of a given nation. The concept is presented in Figure 4.3.

Figure 4.3 Bridging the North and South: Development Path to Sustainability



(Source: INFRA AG/TERI (1997))

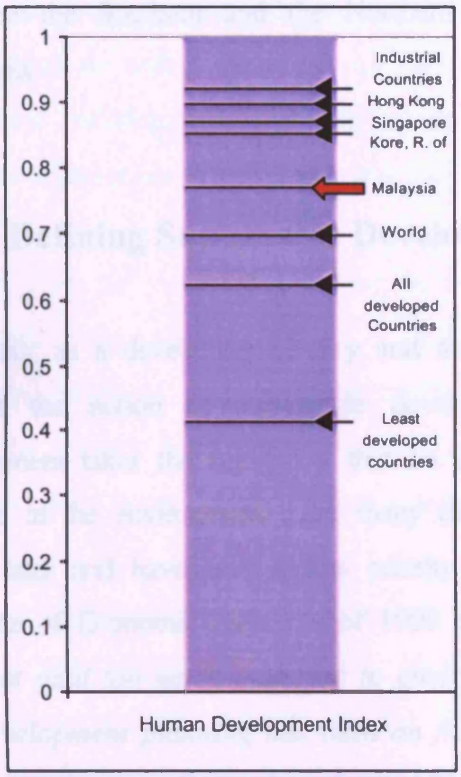
The figure shows that the North needs to move farthest down the road towards sustainable production and consumption, and must redirect its economic activity most drastically toward development path C. At the same time, the South is allowed to grow, but now also needs to redirect its technologies and economies[43]. And as time goes by, the South will

[43] For a more detailed description, refer to INFRAS AG/TERI (1997) *Long-term Carbon Emission Targets Aiming Towards Convergence*, New Delhi : Tate Energy Research Institute.

increase its development level and gradually join the North in the sustainability corridor. The sustainability concept that applies to the South would therefore transform gradually towards the stronger one. As there are different levels of development in the South, Paths A and B show the different timing for developing countries to join the sustainability corridors. Which path should Malaysia adopt?

Within the range of the South, the status of Malaysia's development is above average, although it still cannot be included in the range of Newly Industrialised Countries (NICs) such as Singapore, the state of Taiwan and Hong Kong. In terms of basic social development, Malaysia has achieved significant improvements; its Human Development Index is 0.77, which is considered to be at the top end of the Southern group and not very far from that of the NICs. Nonetheless, its GNP per capita is still a long way behind if compared to Asian NICs, it is even lower than the world average.

Figure 4.4 HDI Index



The HDI is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development:

* A long and healthy life, as measured by life expectancy at birth

* Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrolment ratio (with one-third weight)

* A decent standard of living, as measured by GDP per capita (PPP US$).

(Source : Modified from UNDP (1999))

Meanwhile, Malaysia consumption and production per capita are also much lower than those of NICs and other developed countries, even though they are a little higher than the world average. As Malaysia has a population of only 22 million and the rate of increase is slow and stable, there is less worry about immense environmental damage due to population growth factors such as in China or India. Judging from Malaysia's performance in all social, economic and environmental dimensions, it is obvious that Malaysia still needs to grow in the same way as other Southern countries, but its present stage of development has allowed it to shift attention from fulfilling the very basic needs to extending the traditional economic growth objective to wider social environmental concerns. The sustainable development path for Malaysia is definitely different from that which satisfies the generalized needs of the South.

This concentrates on fast growth to solve the core issues of poverty and huge population; it has a long way to go before it commits itself to the path of the North. A middle path in between the Southern and the Northern choices would be an appropriate alternative for Malaysia.

4.2 Defining Sustainable Development Goals for Malaysia

Malaysia, as a developing country and a member of the South, used to be very sceptical[44] 2about the notion of sustainable development advocated by the North; the Malaysian government takes the standpoint that no development can take place without some form of change in the environment. Like many developing countries, social and environmental issues arose later and have been a low priority in the development. The Report of the Malaysian Institute of Economic Research of 1990 concluded that *'the development process generally has not paid too much attention to environmental issues.'* The Report noted that *'the focus on development planning has been on formulating a plan for economic growth, mobilising the resources to achieve the growth targets and, especially over the 1970-1990 period, on equity and redistribution issues'* and that *'only with the incorporation of a chapter on environment in Fifth Malaysia Plan (1986-1990) were environmental issues given some attention.'* The nation's primary economic policy objective is strongly biased towards growth and the present situation could be labelled as 'very weak sustainability'.

Recently there has been a change of tone showing that Malaysia has become aware of and accepted the idea of sustainability (from the perspective of the South) and most importantly agreed that the reduction of environmental impacts to the minimum is necessary. In the development agenda, although economic growth is still the priority for national development, few environmental issues have been taken seriously, and sustainable development has been adopted into only one part of the development agenda (Eighth Malaysian Plan, 2001). Basically the declaration in Istanbul in 1996 acknowledged this standpoint, in which

[44] Former Prime Minister of Malaysia, Dr. Mahathir Mohammad, is an active member of the South Commission which is strongly against the idea of sustainable development that calls for environmental benefits rather than economic growth to be imposed in the Southern countries.

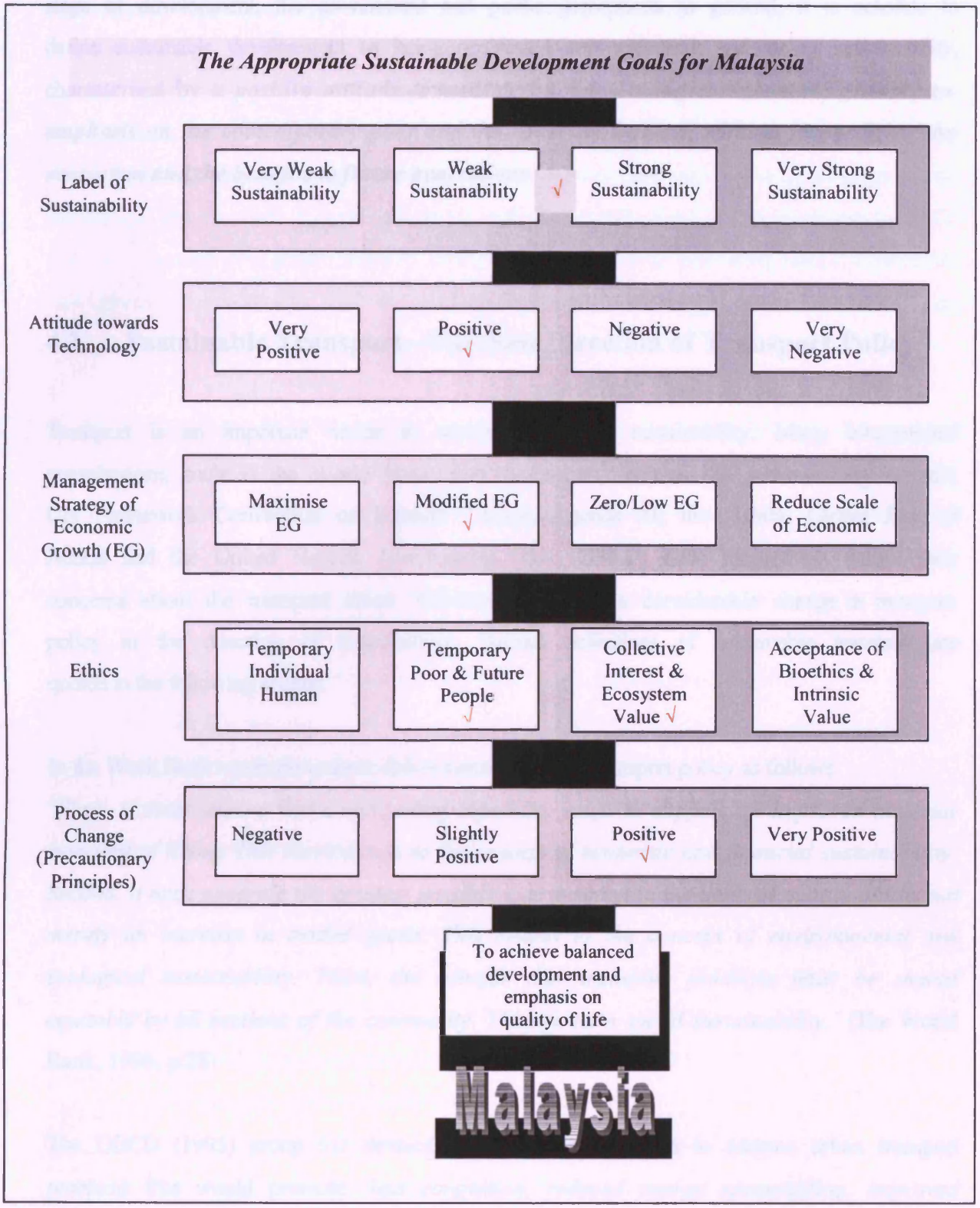
economic growth has been viewed as a component of sustainable development but ' .....*we must take these actions (sustainable pattern of production, consumption, transportation and settlement development....) in a manner consistent with the precautionary principle approach which shall be widely applied according to the capability of countries'*. In short, the idea of sustainable development has emerged very slowly in Malaysia, although the commitment from government has yet to be seen and public awareness is very low.

Judging from the standpoint of Malaysia as a Southern country, there is a very clear view that advocating strong sustainability or a deep green perspective of sustainability is unacceptable and unrealisable as well as incompatible with Malaysia's circumstances. However, to move from the present 'very weak' situation to the goal of 'weak' sustainability is almost a certainty, and it is possible to advance a step beyond that.

In terms of technology, the eagerness to accept and absorb various new technologies is very obvious, especially at the top levels of the Malaysian government. This could be seen from the various projects initiated by the Malaysian government, such as Multimedia Super Corridor, electronic government, smart card for identity and various other purposes, etc. Such an enthusiastic attitude has enormous impacts at grass-root level and the general public has also shown its acceptance and welcomes the new technological age with little hesitation. All these signs show that Malaysian society is and will continue to be technopositive rather than technophobic.

Over the next 15 years, slow and low economic growth is not a realistic target for Malaysia; to reach the level of developed nation, it has a long way to go and that needs a more positive rate of growth. Nevertheless, to adopt modified economic growth that takes into account externalities is a viable, necessary and sensible change from the present unsustainable economic growth. Social development should concentrate on the contemporary poor, but at the same time it needs to take a positive precautionary approach in order not to ignore the collective interest and ecosystem value. The policy decisions made today should not jeopardize the benefit of future generations.

Figure 4.5 Elements in the Goals of Sustainable Development in Malaysia



Taking into account the Malaysian standpoint as a member of the South Commission, its stage of development, the government and public perceptions in general, it is sensible to define sustainable development as being positioned between weak and strong sustainability, characterised by ***a positive attitude towards technology, modified economic growth, an emphasis on the contemporary poor and the collective interest, without jeopardizing the ecosystem and the benefits to future generations.***

4.3 Sustainable Transport - The New Direction of Transport Policy

Transport is an important sector in which to achieve sustainability. Many international organisations, such as the World Bank, and agreements, such as the Johannesburg Summit, UN Framework Convention on Climate Change, Agenda 21, the Habitat Global Plan of Action and the United Nations Development Plan (UNDP) have respectively raised their concerns about the transport sector. Obviously, there is a considerable change in transport policy in the direction of sustainability. Several definitions of sustainable transport are quoted in the following section.

In the Work Bank report the authors define sustainability of transport policy as follows:
'First, it must ensure that a continuing capability exists to support an improved material standard of living. This corresponds to the concept of economic and financial sustainability. Second, it must generate the greatest possible improvement in the general quality of life, not merely an increase in traded goods. This relates to the concept of environmental and ecological sustainability. Third, the benefits that transport produces must be shared equitably by all sections of the community. This we term social sustainability.' (The World Bank, 1996, p.28)

The OECD (1995) group has devised a transport policy plan to address urban transport problems that would promote *'less congestion, reduced energy consumption, improved access for those without cars, higher environmental standards and reduced overall cost'.*

In the Framework Convention on Climate Change (FCCC), *'Travel-mode switching from cars to bus or rail is promoted so as to reduce primary energy use and CO_2 purposes'.*

In the Johannesburg Plan of Implementation of the World Summit on Sustainable Development, governments are urged to *'promote an integrated approach to policy-making at the national, regional and local levels for transport services and systems to promote sustainable development, including policies and planning for land use, infrastructure, public transport systems and goods delivery networks, with a view to providing safe, a affordable and efficient transportation, increasing energy efficiency, reducing pollution, congestion and adverse health effects'.* (Johannesburg Summit, 2002)

In the Habitat Agenda - Sustainable Transport and Communication System, the transport sector has been identified as a major consumer of non-renewable energy and land and is a major contributor to pollution, congestion and accidents. Transport systems are urged to give priority to:

1. Reducing unnecessary travel through appropriate land use and communication policies.
2. Developing transport policies that emphasise mobility alternatives other than the automobile.
3. Developing alternative fuels and alternatively fuelled vehicles.
4. Improving the environmental performance of existing modes of transport.
5. Adopting appropriate pricing and other policies and regulations.

Agenda 21 also laid out several transport-specific priorities:

1. Adopt urban transport programmes favouring high-occupancy public transport and encourage non-motorised modes of transport, as appropriate.
2. Integrate land use and transportation planning to encourage development patterns that reduce transport demand.
3. Promote economic mechanisms to discourage large, fuel-consuming and polluting vehicles, and encourage the development and use of alternative fuels.

Last and not least, the United Nations Development Programme (UNDP, 1998) has related the role of transport in better addressing the goals of poverty alleviation, environmental sustainability, women's empowerment and good governance.

In short, sustainable transportation is the expression of sustainable development within the transport sector. As sustainable transport has become a definite term of reference for future transport policy, it is just a matter of time before each nation reviews its transport policies to make them consistent with this new direction. The following section reviews the progress and the challenges faced in both the developed and the developing world. This is to gain a general understanding of the different perspectives and approaches of the two worlds, before focusing back on Malaysia and the case of Kuala Lumpur.

4.3.1 Sustainable Transportation in the Developed and Developing Nations

4.3.1.1. Initiatives and the Progress towards Adopting Sustainable Transport

Since the late 1990s, due to major influences, such as the Brundtland Commission, the Rio Earth Summit, the Agenda 21 Programme and the World Summit on Sustainable Development, there has been a redirection of policies and programmes relating to sustainable transport, which have flourished in the developed nations. Sustainable transport policies have been drawn up at national level; examples of these include the UK's White Paper, 1998; Canadian Transportation Act, 2001; New Zealand's Moving Forward – Transport Package, 2002; Finland's Towards Intelligent and Sustainable Transport 2025 and many others. Cities in the developed world have also worked out their sustainable transport plans at the local level; some have set concrete transport policy targets and visions for the future, for example, the vision of Melbourne 2030 - Growing Victoria Together, the endorsement of an environmentally sustainable transportation vision by the Regional Municipality of Hamilton-Wentworth (Canada's Local Agenda 21 Model Community), adoption of LA21 (which

includes the transport sector) by cities such as York, Leeds, Norwich, Leicester, Cambridge, Reading, etc. in the UK.

Meanwhile, developing countries are also beginning to address the sustainable transport issue. However, if compared to the developed nations, progress in developing nations is much slower and less proactive; apart from a few exceptional cases, such as Bogota city, in terms of adopting and implementing the principles of sustainable transport in official documents, most of the nations and cities in developing nations have not progressed as far as developed nations.

As mentioned earlier in this chapter, with no exemption Malaysia has been slow in responding to the world trend towards sustainable development, and its concerns about sustainability in the transport sector lags behind. Considering the urgent need to address transport issues and their unsustainable trends in Kuala Lumpur (as presented in Chapter 2), it is imperative to refine a sustainable vision for the city. It is therefore very important to define appropriate sustainable transport aims and objectives for Kuala Lumpur, and they have to be defined to suit the local environment and to face the challenges of its local issues.

On the other hand, there are many emergent NGO activists that have made progress than the public sectors. These intensive initiatives come from cross-regional NGOs working hard to push governments and increase the awareness of the public in the developing world; examples of these organisations in the Asian region include CITYNET, SUTP-Asia and SUSTRAN (The Sustainable Transport Action Network for Asia & the Pacific). The principles these organisations uphold and the transport issues they discuss reflect the challenges faced by the developing nations and cities including Kuala Lumpur.

4.3.1.2 Sustainable Transport Challenges

The North-South divide and the different sustainability challenges faced by both worlds (see Section 4.1.2) are also reflected in the subjects of sustainable transport.

The most important sustainability challenges faced by developed countries are those related to consumption of non-renewable energy, the growing contribution of vehicle exhaust emissions and noise, the deterioration of environmentally friendly modes, i.e. public transport, cycling and walking, and congestion (OECD, 1995). Of those developed countries that have committed to the Kyoto Protocol, some have set concrete targets for stabilizing greenhouse gases from the transport sector and this has become one of the important agendas for achieving sustainable transport.

On the other hand, while both worlds share the same problems, such as unsustainable trends in excessive motor vehicle use, poor public transport, congestion, as well as air and noise pollution, the issue of stabilizing greenhouse gases comes second to other priorities in developing countries[45]. There are other urgent transport challenges which developing countries need to resolve more immediately than global warming issue. For example, whilst developed countries have successfully fought against road casualties and lowered levels of noxious fumes, lead and particulates from vehicles, the trends in developing countries are in the opposite direction. Moreover, there is every reason to believe that the additional transport challenges faced by developing countries regarding sustainability include poverty alleviation, women's empowerment and good governance (UNDP, 1999).

The researcher has presented the prominent challenges faced by these two worlds in table form (see Table 4.2). Obviously, if compared to developed countries, the challenges and opportunities for change towards sustainable transportation aims in developing countries are much more numerous. It is very obvious that sustainable transport in the developed world is much more focused on environmental sustainability, whilst the concerns about sustainable transport in the developing world are wider than the issue of environmental degradation; they include the social and economic dimensions. In addition, to achieve sustainability aims, developing countries also face many severe constraints such as a poorer financial situation, fewer technological improvements, weaker institutional structures, lack of professional personnel and R&D resources.

[45] Note that developing countries are not legally committed to the Kyoto Protocol and there are also no immediate restrictions under the UNFCCC.

Table 4.2 The Sustainable Urban Transport Challenges Faced by the North and the South

The North	The South
• Congestion • Road casualties • Air & water pollution • Noise and vibration • Energy consumption and global warming • Inaccessibility and car dependence • Imbalance of economic activity • High land and property prices • Decaying urban fabric • Urban sprawl and peripheral development • Barriers to changing institution and political inertia.	• Congestion (in megacities) • Road casualties • Life-threatening level of atmospheric pollution in cities • Increasing ownership and usage of motorcars and motorised two-wheelers • Institutional problems: lack of co-ordination between agencies, proper human and technical resources • Problems of having enforcement government • Uneven distribution of political power, coalition between technocracy and middle class • Negligent operation of public transportation and over-investment in roads for private transport • The travel problems of the poor and women and negligence of non-motorised transport • Poor infrastructure and traffic conditions • Lack of research and development

(Source: Adapted from ECMT-OECD (1995); World Bank (1997); Simon (1996))

development has yet to become established, it is easier to demolish the existing infrastructure and develop a better one that could fulfil the criteria of sustainability. The ownership and usage of private vehicles are still at a lower level in developing countries than in developed countries; on the other hand, usage of public transport and non-motorised vehicles is higher. This provides huge opportunities to prevent unsustainable growth in motorised activities in future as has happened in developed countries, if proper measures are started as a matter of

urgency. To achieve the sustainability aims, developing countries have to be aware of the present situation and grasp the opportunities quickly before it is too late.

The transport issues and challenges faced by Kuala Lumpur have been discussed in Chapter 2. In a way, the city has *unfortunately* progressed faster than many other developing countries and thus faces quite similar challenges to those of the Northern cities, such as high private vehicle ownership and lack of road space; yet the city still exhibits many disadvantages typical of the constraints of developing countries, such as financial, administration, R&D, etc. It is obvious that Kuala Lumpur is facing a tough challenge to tackle weaknesses found in both of the two worlds.

4.3.1.3 Studies of and Approaches to Sustainable Transport

From the literature, the studies of sustainable transport may be generalized into three categories defined by the use of approaches. These may be linked to the different challenges faced (see above); the approaches to deciding whether sustainable transport is generally different in developed and in developing countries.

Due to the attention generated by the FCCC and Kyoto Protocol, a wide range of studies about sustainable transport has focused on environmental sustainability. Related transport issues in this dimension are the dependence on finite fossil fuel sources, air pollution from transport at global, regional and local levels, and other environmental issues, such as resource uses (other than fossil fuel) and waste production, water pollution and land use. Examples of this approach regarding sustainable transport are referred in OECD-OCDE's Project on *Environmentally Sustainable Transport* (1996), in which sustainable transportation is defined as *'the one which does not endanger public health or ecosystem and meets mobility needs consistent with (a) use of renewable resources at below the rate of generation and (b) use of non-renewable resources at below the rate of development of renewable substitute'*. Massive efforts have been put into reducing the degree of unsustainability in many ways and the

weight given by the approach of this sustainable transportation study has been placed mainly on energy efficiency and the consequent issue of the impact of global warming; most of these refer to developed nations and cities.

The second type of study and approach used, perhaps more consistent with that of the Bruntland Commission, is the World Bank's study. Sustainability, whether applied to transportation or to other human activities, is seen as having three components. As quoted earlier, the first consideration is economic sustainability, which involves creating incentives for efficient response to needs. Second is environmental sustainability, which involves promoting more liveable settlements and reducing adverse external effects. Third is social sustainability, which focuses on the reduction of poverty (World Bank, 1996). This is a more comprehensive definition which includes all three economic, social and environmental dimensions in the transport sector. Although there are developed countries which adopt this approach in their transport policy, either nationally or locally, there is an impression that this type of approach usually applies to developing states, in which economic and social issues are always promoted along with environmental problems.

Last but not least, the third type of study and approach focuses on addressing *unsustainability*. Mckenzie (OECD, 1996) defined an unsustainable activity as one that cannot continue to be carried out in the way it is now without serious difficulty. In this context, two kinds of unsustainability were defined - activities that are strongly unsustainable – 'show-stoppers', and activities that are weakly unsustainable – 'nuisance problems'. Emissions and other impacts resulting in climate change and loss of soil and biodiversity were put into the former category. Most air pollution and other concerns were put into the second category. This approach could be seen as parallel to the strong and weak sustainability concepts that have been discussed in the previous section (see Section 4.1.1). In relation to this approach, it is also clear that there are different concerns for developed and developing states regarding unsustainable transport issues. For developing states, weight has been given to some of the factors described as 'weakly unsustainable'. Examples are accidents and congestion, which may never have an obviously inter-generational impact.

4.4 The Approach, Goals and Objectives of Sustainable Transport for Kuala Lumpur

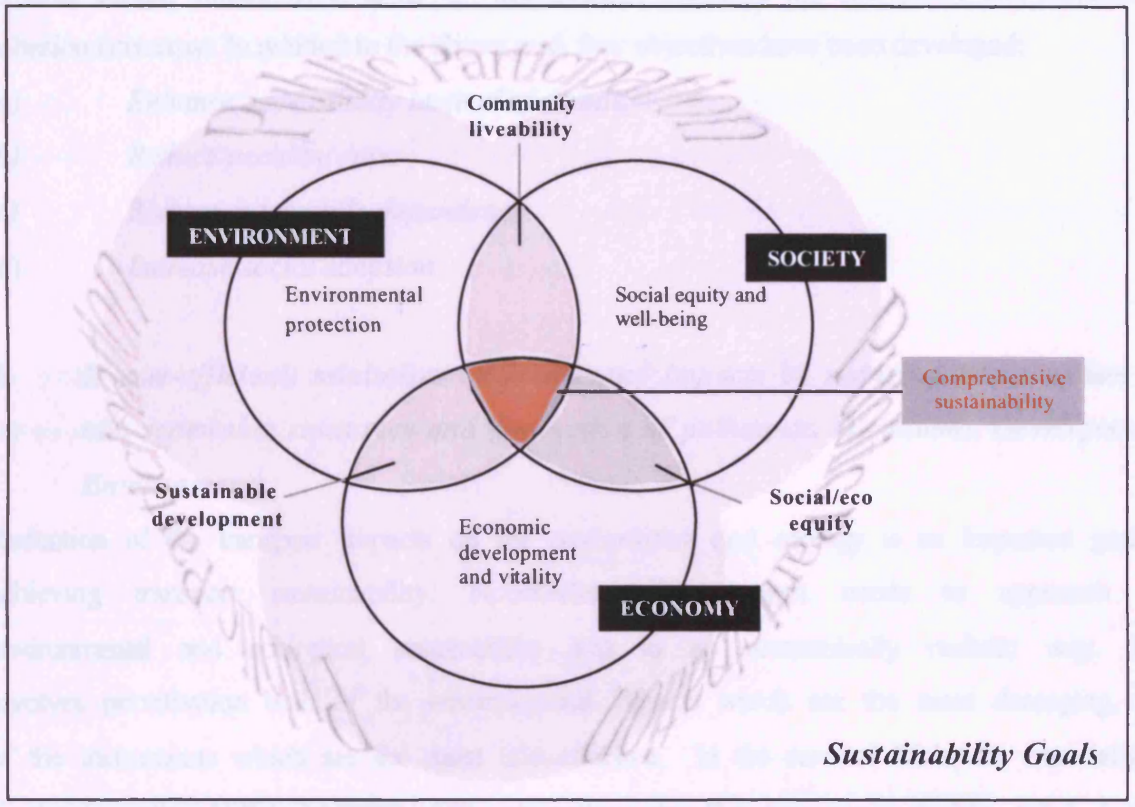
From the above discussion the World Bank approach to viewing sustainable transportation is considered more appropriate to be adopted in the Kuala Lumpur context. This is due to the inherent characteristics of the Kuala Lumpur situation, which is also in a similar position to other developing states struggling to seek balanced development in all three economic, social and environmental dimensions. This is also consistent with the priorities of the NGOs in the Asia Region, in which social and economic sustainability is very much emphasised[46] together with environmental protection.

Figure 4.6 on the next page illustrates the three dimensions in graphic form. The overlapping areas refer to the integrated and complementary goals that cover two or three domains; (i) *Community liveability* refers to environmental and social qualities that make a community a desirable place in which to live, work and visit. This includes safety and health, local environment quality, the quality of social interactions and opportunities for recreation; (ii) *Sustainable development,* in this sense, refers to a relationship between environment and development, which is pursuing a quality of life that is economically viable and ecologically sustainable; (iii) *Social and economic equity* refers to a way of distributing resources with fairness in a society. All of these have to be supported by public participation.

Translating these into the transport field, and corresponding to the sustainable transport challenges faced by Kuala Lumpur, the sustainable transport goal has been defined as ***the one that provides affordable access to all people in the community, and does so in an economically viable, environmentally sound and equitable manner.*** This goal is rather abstract and broad so, in order to keep the analysis manageable, we therefore redefine it as follows:

[46] Refer to the priority set by the CITYNET, SUTP-Asia, SUSTRAN and Clean-Air Asia.

Figure 4.6 Sustainability Goals – Three Dimensions and the Complimentary Areas



A sustainable transportation system is one that:

1. ***Allows the basic access needs of individuals and society to be met safely, and supports the liveability of the environment by increasing community cohesion. (Social equity/ Environmental)***

The concept of 'accessibility' is the ability to obtain goods, services and activities. This is actually one of the main goals of transport. Conventional transportation planning used to restrict this ability to just 'traffic' (vehicle movements) and 'mobility' (the movement of people and goods). Focusing on traffic and mobility rather than access reduces the range of possible solutions to transport problems. Indeed, concentration on the concepts of traffic and mobility could have adverse effects on 'accessibility'; for example, increased vehicular traffic could have an enormous effect on the number of accidents and amount of congestion, and could degrade the liveability of the environment. Focusing on automobile-oriented land

use can reduce access by dispersing activities and reducing travel choices. Therefore this goal requires certain conditions to apply to accessibility, and there are also safety and community cohesion concerns. In relation to the above goal, four objectives have been developed:

(a) *Enhance accessibility instead of mobility*

(b) *Reduce accident rates*

(c) *Reduce automobile dependency*

(d) *Increase social cohesion*

2. Is cost-efficient, minimises environmental impacts by reducing consumption of non-renewable resources and production of pollutants. (Economic Development/ Environment)

Reduction of the transport impacts on the environment and ecology is an important goal in achieving transport sustainability. Nonetheless, this project needs to approach the environmental and ecological sustainability aim in an economically realistic way. This involves prioritisation both of the environmental impacts which are the most damaging, and of the instruments which are the most cost-effective. In the case of Malaysia, especially in Kuala Lumpur, traffic pollution and congestion are the two most highly rated health-threatening issues. The climate change issue has a relatively lower priority in Malaysia, although it is a globally recognised sustainability objective. All three impacts resulting from transport have been taken into account in formulating the following objectives:

(a) *Reduce traffic pollution*

(b) *Reduce congestion*

(c) *Reduce energy consumption*

3. Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy. (Economic Development/Social)

With respect to economic development, transport should provide a cost-effective service and support vibrant, sustainable economic activity in a city. To do so, it should offer many choices of transport modes to suit the different needs in a society. Transportation choices (rather than just the automobile) help in creating a more robust, efficient and equitable transportation system. With respect to social equity, attention should particularly be given to

the treatment of the modes of transport on which disadvantaged groups (income and disability) are most dependent (public transport in general, and informal sector and non-motorised transport in particular). Three objectives have been identified under this goal:

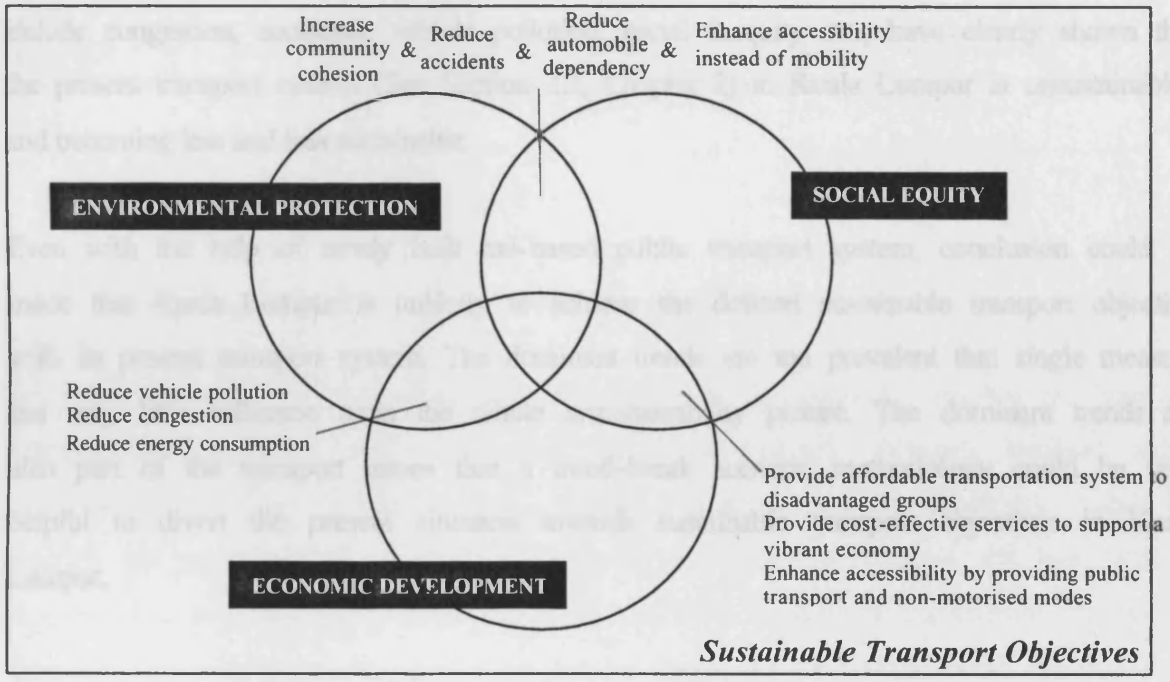
(a) Provide affordable transport to disadvantaged groups

(b) Provide cost-effective services to support a vibrant economy

(c) Enhance accessibility by providing public transport and non-motorised modes

In parallel with the above diagram for the sustainability goal, Figure 4.7 summarises the above ten sustainable transport objectives in accordance with appropriate domains.

Figure 4.7 The Ten Sustainable Transport Objectives



Important Note:

Assessing against the ten objectives above, are the present 'business-as-usual' transport trends in Kuala Lumpur becoming more or less sustainable? Will Kuala Lumpur achieve sustainable transport with its present transport system?

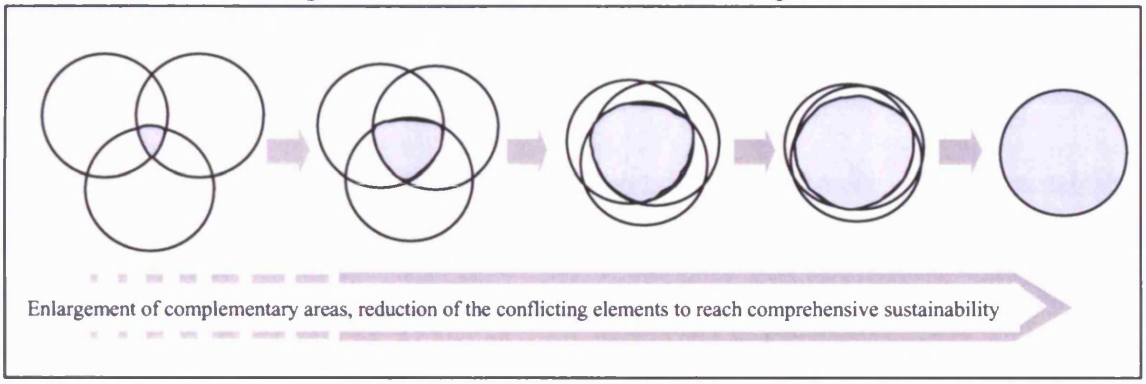
The present transport trends in Kuala Lumpur, as mentioned in Chapter 2, are becoming more and more car-orientated. Without any clear vision and proper institutional arrangement to guide the future path, the present 'business-as-usual' transport trends (increasing car use, declining public transport and non-motorised transport use – see Section 2.1, Chapter 2) are drifting away from the defined sustainable transport objectives above. The present transport trends encourage automobile dependency, have strong bias towards medium- and high-income groups and consume excessive non-renewable energy. Transport issues, which include congestion, accidents, vehicle pollution, social inequity etc., have clearly shown that the present transport system (See Section 2.2, Chapter 2) in Kuala Lumpur is unsustainable, and becoming less and less sustainable.

Even with the help of newly built rail-based public transport system, conclusion could be made that Kuala Lumpur is unlikely to achieve the defined sustainable transport objective with its present transport system. The dominant trends are too prevalent that single measure has very little influence upon the whole unsustainability picture. The dominant trends are also part of the transport issues that a trend-break scenario methodology could be very helpful to divert the present situation towards sustainable transport objectives in Kuala Lumpur.

4.4.1. The Final Aim of Sustainable Transport

Referring back to the ten sustainable transport objectives that outlined in previous section, note that although this working sustainable transport objective is defined in overlapping areas of two dimensions, the final aim of sustainable development and sustainable transport should be absolute sustainability, which works to enlarge the complementary elements of the overlapping areas, as shown in Figure 4.8.

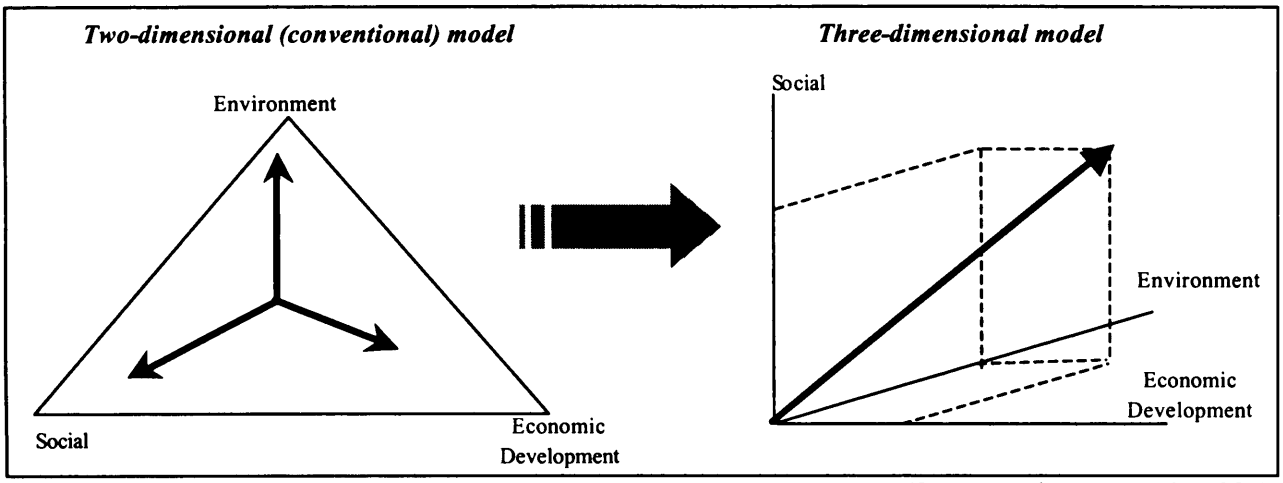
Figure 4.8 Final Aim of Sustainable Transportation



4.4.2 Complementarity and Contradiction Between Objectives

To achieve comprehensive sustainability, efforts should be made to resolve the conflicts between the objectives and to enhance the complementary elements between those objectives. In the real world, tensions between multi-dimensional objectives cannot be avoided, but comprehensive sustainability aims to find ways to achieve the least conflict possible. As can be seen in Rienstra et al.'s (1997) models in Figure 4.9, the three-dimensional model that was gradually adopted from the two-dimensional (conventional) model is an example that shows a harmonious way of achieving sustainability.

Figure 4.9 Resolving the Conflicts between Objectives by Adopting Three-dimensional Model



(Source: Rienstra et al., 1997)

Todd Litman (1999) has similarly expressed an approach which seeks absolute sustainability; he strongly advocates win-win or win-win-win transport situations (or strategies) that would reduce tensions between the economic, environmental and social objectives. Examples of win-win or win-win-win situations are given in Table 4.3 below. A good example of a win-win-win situation is to promote non-motorised modes; walking and cycling modes will upgrade the liveability of a city (thereby promoting economic growth), they are environmental friendly and socially equitable for the majority of people. The principle of finding win-win-win situations is adopted in this study as applicable to searching for sustainable transport objectives, targets or policy measures.

Table 4.3 Win-Win and Win-Win-Win Situation

	Economic	Social/Equity	Environmental	
Strategy 1	Positive	Negative	Negative	
Strategy 2	Positive	Neutral	Negative	
Strategy 3	Positive	Positive	Positive	*Win-Win-Win Situation*
Strategy 4	Positive	Negative	Positive	
Strategy 5	Positive	Neutral	Positive	*Win-Win Situation*

Note Win-Win or Win-Win-Win solutions consist of strategies that have only positive or neutral impacts on economic, social and environmental objectives.*

(Source: Table modified from Todd Litman, (1999))

4.4.3 Identifying the Complementary and Conflicting Objectives

However, it has to be stressed that not every goal can be achieved harmoniously and some of the conflicting objectives are unavoidable. It is observed that while in some respects there may be a close synergy between the dimensions, in other respects there are clearly tensions between the objectives, which require political judgments to be made. In this section, with the help of the local transport experts, the complementary and conflicting relationships between the sustainable objectives have been identified, and are presented in Table 4.4. The identification of these relationships is based solely on Kuala Lumpur's transport issues.

Identification of these help to clarify the two situations; firstly, the effects of synergy between complementary objectives can be clearly presented and the achievement of the objective may be encouraged concurrently; secondly, it highlights the difficulties faced or setbacks due to conflicting objectives, and prepares the policy-makers for setting their priorities and making sensible judgements in advance.

Table 4.4 Relationship Between Objectives: Complementary or Conflicting

Domain	**Economic / Environmental**			**Social / Environmental**				**Social / Economic**		
Objectives / Objective	Reduce congestion	Reduce energy consumption	Reduce vehicle pollution	Reduce accidents	Increase community cohesion	Enhance accessibility instead of mobility	Reduce automobile dependency	Provide cost-effective transportation	Provide affordable transportation system	Enhance public transport & non-motorised modes
Reduce congestion										
Reduce energy consumption	+									
Reduce vehicle pollution	+	+++								
Reduce accidents	?	/	+							
Increase community cohesion	/	/	/	/						
Enhance accessibility instead of mobility	+	+++	+++	xxx	+++					
Reduce automobile dependency	+++	+++	+++	xxx	+++	+++				
Provide cost-effective transportation system	+++	+++	+++	+++	/	+++	?			
Provide affordable transportation system	/	+	x	xxx	+	+++	+++	+++		
Enhance public transport & non-motorised modes	-	+++	+++	x	+++	+++	+++	+++	+++	

Indicators:-

Strongly complementary between objective +++
Strongly conflicting between objectives xxx
Uncertainty due to complicated relationship ?
Indirectly complementary or not very strongly complementary +
Indirectly conflicting or not very strongly conflicting x
Non applicable /

Table 4.4 Relationship Between Objectives: Complementary or Conflicting

Domain	**Economic / Environmental**			**Social / Environmental**				**Social / Economic**		
Objectives / Objective	Reduce congestion	Reduce energy consumption	Reduce vehicle pollution	Reduce accidents	Increase community cohesion	Enhance accessibility instead of mobility	Reduce automobile dependency	Provide cost-effective transportation	Provide affordable transportation system	Enhance public transport & non-motorised modes
Reduce congestion										
Reduce energy consumption	+									
Reduce vehicle pollution	+	+++								
Reduce accidents	?	/	+							
Increase community cohesion	/	/	/	/						
Enhance accessibility instead of mobility	+	+++	+++	xxx	+++					
Reduce automobile dependency	+++	+++	+++	xxx	+++	+++				
Provide cost-effective transportation system	+++	+++	+++	+++	/	+++	?			
Provide affordable transportation system	/	+	x	xxx	+	+++	+++	+++		
Enhance public transport & non-motorised modes	-	+++	+++	x	+++	+++	+++	+++	+++	

Indicators:-

Strongly complementary between objective +++
Strongly conflicting between objectives xxx
Uncertainty due to complicated relationship ?
Indirectly complementary or not very strongly complementary +
Indirectly conflicting or not very strongly conflicting x
Non applicable /

The very first impression from the results of comparison is that there are indeed many complementary relationships existing. First of all, there are several pairs of objectives which literally correspond with each other, although the direction of each objective is still different in a subtle way. There are:

- Objectives which *'reduce automobile dependence'* and *'enhance accessibility instead of mobility'*;
- Objectives which *'provide an affordable transport system'* and *'enhance public transport and non-motorised modes'*;
- Objectives which *'reduce energy consumption'* and *'reduce vehicle pollution'*.

The three pairs of objectives show a very straightforward complementary relationship whereby the achievement of one objective will have a strong positive effect on the other and vice versa. The benefits of such as close synergetic effect between objectives can be substantial as these complementary relationships help achieve economic, social and environmental objectives simultaneously. These findings have also been very helpful for target and policy formulation at a later stage. For example, these sustainability objectives may be able to indicate the use of just a single target and would probably allow the achievement of all by the implementation of the same policy or measure, which is a succinct yet effective application.

Other examples of strongly complementary relationships include:

- Objectives which *'reduce automobile dependence'* and *'enhance public transport and non-motorised modes'*

These two objectives have been classically described as 'carrot and stick' as the relationship between these is undoubtedly strongly complementary. In most cases, the public has indeed strongly argued that only efficient and high quality public transport and non-motorised facilities could divert them from continuing to use their automobiles.

- Objectives which *'enhance accessibility instead of mobility'* and *'enhance public transport and non-motorised modes'*

Analysis of the 'Millennium Cities Database for Sustainable Transport' proved that relatively densely populated cities where public transport is efficient, offer better accessibility than low-density cities where the automobile dominates (Vivier, 2001). Examples of higher density cities include London, Tokyo, Singapore and Hong Kong, as compared with lower density cities such as Houston and Melbourne. Although mobility provides speedy travel covering a great distance, the daily travel time is high. Conversely, good quality public transport and non-motorised modes contribute more to accessibility. It is clear that objectives designed to *'enhance accessibility instead of mobility'* and *'enhance public transport and non-motorised modes'* go hand-in-hand, complementing each other strongly.

- Objectives which *'increase community cohesion'* and *'enhance accessibility instead of mobility', 'enhance public transport and non-motorised modes', 'reduce automobile dependence'.*

In cities where the automobile dominates, city dwellers who do not have an automobile in which to travel are easily excluded from urban activities. Reducing automobile use has a positive effect on increasing community cohesion. Correspondingly, the risks of social and spatial segregation are more limited in cities where the accessibility is good, i.e. efficient and good quality public transport and non-motorised modes. The links between these four objectives are obviously strong.

- Objectives which *'reduce energy consumption'* and *'enhance public transport and non-motorised modes', 'reduce automobile dependence', 'enhance accessibility instead of mobility', 'provide cost-effective transportation'.*

Compared to the automobile, transport modes that use less energy and pollute less, such as walking and bicycling and public transport, contribute greatly to the objective to *'reduce energy consumption'.* A transport system that enhances accessibility instead of mobility is therefore more environmentally friendly from the perspective of energy saving. The weakness of energy-efficient automobiles is that their use could be easily offset by the total amount of increased automobile use. Thus *'reducing automobile dependency'* is still deemed as a vital objective for reducing energy consumption. A transportation system that *'reduces*

energy consumption' is also a *'cost-effective'* one for it diminishes the external costs placed on the environment.

In attempting to achieve sustainable transport goals, it is unfortunate that not all the objectives are complementary. The complex link between objectives and their impact on each other sometimes complicates the consequences. Referring to the table again, there are several more complex relationships existing between the objectives: -

- Objective which '*reduce congestion'* and '*reduce accident'*

As one of the causes of congestion in Kuala Lumpur is due to delay caused by accidents, a reduction in the number of accidents could speed up vehicles and reduce congestion. However, there is another angle of argument for this set of objectives, i.e. increased vehicle speed due to the *'reduced congestion'* objective is dangerous for both vehicle users and non-users, and this is in conflict with the objective to *'reduce accidents'*. Therefore the relationships between this set of objectives are less straightforward.

- "*reduce accident*" and "*enhance accessibility instead of mobility*", "*reduce mobility dependency*"

An example of contradictory objectives could be found in "*reduce accident*" and "*enhance accessibility by public transport and non-motorised modes*" and "*reduce automobile dependency*". In Kuala Lumpur, pedestrians and cyclists make up a more than proportional share of the total number of road users killed. With motorcyclists they belong to the most vulnerable group of road users. Indeed, lack of traffic safety which results in a high risk of involvement in road traffic crashes is one of the major deterrents to bicycle use on the part of a large number of people (Servaas, 2000). Promotion of walking and cycling, while reducing car usage, which is believed to be the safest transportation mode, can divert from the safety aim.

- Objectives which *'provide affordable transportation system'* and *'reduce vehicle pollution'*, *'reduce accidents'*.

The motorcycle in Malaysia is popular as an affordable form of transport, and it is of enormous importance, both as the main transport mode of the poor and as a major source of employment and income. Nonetheless, it is also environmentally very damaging (pollution) and life-threatening (accidents). Promoting motorcycle use, although achieving the objective of *'providing affordable transport to disadvantaged groups'*, is at odds with other safety and environmental objectives. To reduce the impact of these conflicting objectives, technological and behavioural policy measures have to be introduced to achieve a win-win-win situation.

When trade-off decisions have to be made, many factors are taken into consideration, depending on the nature of the issues. The difficulty of trade-off decision-making is due to its contradictory nature. In most of the cases, political judgement is more important than many other factors. Sorting out the priority of objectives is a way of reducing such conflict; yet again the hierarchical priority is very much dependent on political judgement in the real world.

4.4.4 Priority of the Objectives: Key and Secondary Elements

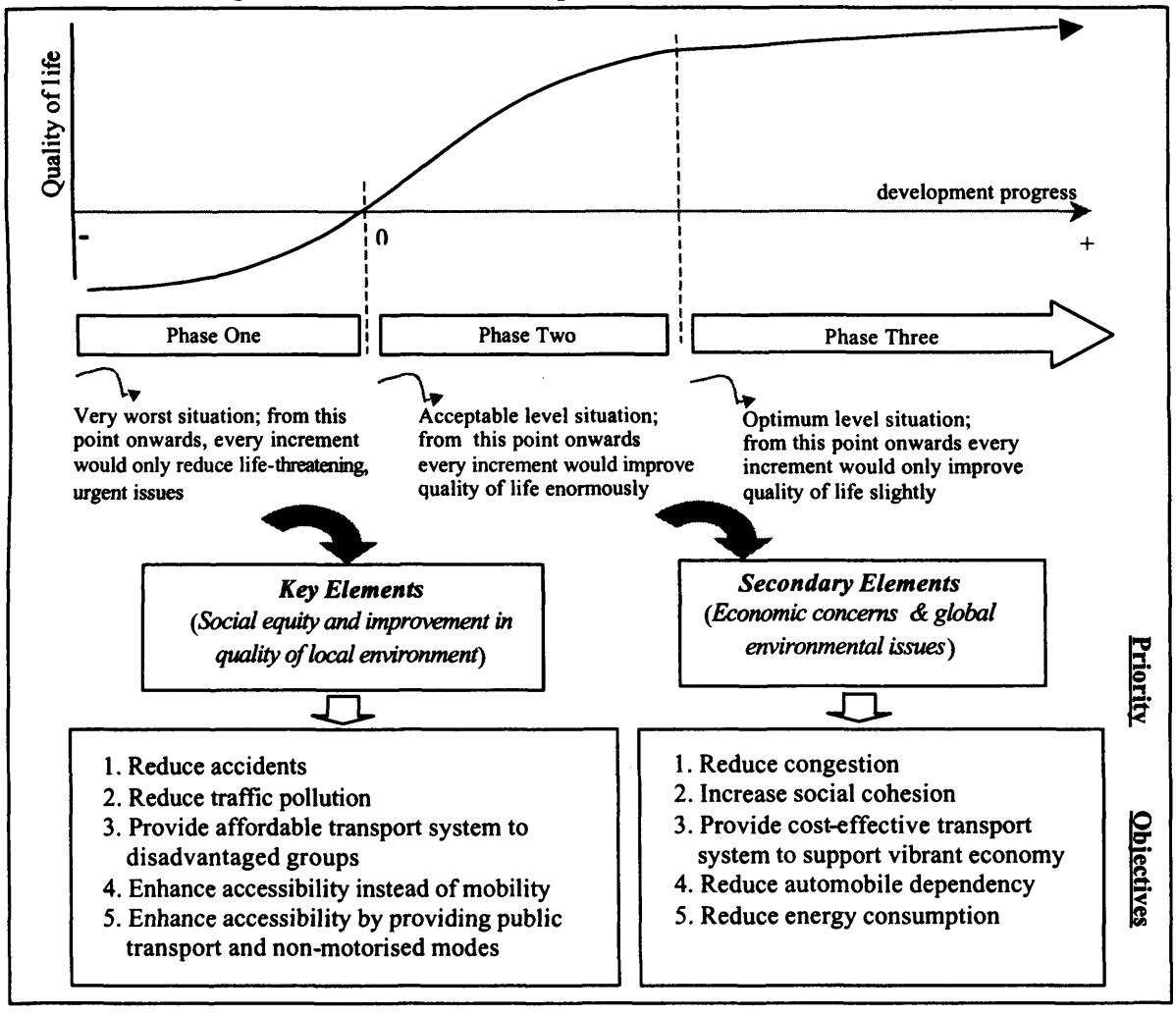
For this study, with the help of local transport experts, key and secondary elements of the objectives have been identified. Local transport experts were invited to discuss and compare the ten sustainable transport objectives by giving different weight to them. They then verified the key and secondary elements of the objectives.

The exercise has resulted in a bias towards intragenerational issues as key elements. Local transport experts have strong views about focusing on life-threatening, urgent or pressing social welfare issues as key elements. A high priority has been placed on safety issues, with the necessary emphasis being placed on the very high accident rates in Malaysia. Air pollution, which has reached an intolerable level in Kuala Lumpur, is still worsening, and

this issue has also been recognized as a key element. The third key element is the matter of accessibility for disadvantaged groups to the transport system. This mainly refers to lower-income groups, whose opportunities for employment and access to welfare are greatly reduced by inaccessibility.

The secondary elements of the objectives have been related to improvement in the quality of life. This refers to the issues that are not life-threatening and are less pressing, but which are desirable for improvement in the quality of life in general. Sustainable transport objectives listed as the secondary elements include issues to combat congestion, increase social cohesion and reduce automobile dependency and energy consumption.

Figure 4.10 Phases of Development and the Associated Priority Needed



Local transport experts almost unanimously agree about priority-setting with regard to sustainable transport objectives. Generally, local transport experts divide the phases of development into three parts: (i) phase one refers to the very worst situation; from this point onwards, every increment would merely reduce life-threatening issues or very urgent problems; (ii) phase two refers to an acceptable level situation; from this point onwards, every increment would improve the quality of life enormously; (iii) phase three refers to an optimum level situation; from this point onwards, every increment would only improve quality of life slightly. As illustrated in Figure 4.10, local transport experts have related the key elements to improvement of the phase one situation, whereby the objectives are designed to alleviate the very worst situations (phase one) related to everyday life in a society, i.e. objectives to reduce accidents, traffic pollution and improve accessibility for disadvantaged groups. The secondary elements are then designed to improve the situation from phase two to phase three thereby improving the quality of life.

The sorting out of priorities for sustainable transport objectives in relation to the phases of development is consistent with the sustainable development path suggested for Southern countries (see Section 4.1.4.) The rationale is in accordance with the typical viewpoints advocated by Southern countries, i.e. dealing with immediate threats rather than emphasising other forms of development, giving more weight to social equity and improvement in the quality of the local environment rather than global environmental issues.

This section of the discussion about priority-setting will give some insight to policy-makers if they ever face conflicting sustainable transport objectives and need to resolve the dilemma of a trade-off situation.

4.5 The Inputs from Local Transport Experts to the Definitions and Concepts of Sustainable Development and Sustainable Transport

Concepts of Sustainable Development and Sustainable Transport in Malaysia

At first round interview, it was found that local transport experts have strong views about what should be regarded as a sustainable development and subsequently sustainable transport in Malaysia and Kuala Lumpur. Labelling the original sustainability concept as 'an idea imported from Western and developed countries', local transport experts advocated a definition of appropriate concepts of sustainable development and sustainable transport that would suit the local climate of historical, political and socio-economic factors.

This led the researcher to start again and further investigate the basic concept of sustainability from the viewpoint of the North and the South. The purpose is to investigate a fair and realistic role that Malaysia can play on the world stage in global issues. Considering that the Malaysian government and the public have always held sceptical opinions about the idea of sustainability, the researcher has taken a very cautious step to define a working concept of sustainability as a reference point for this study.

The result is that the researcher has confined sustainability goals within the range of weak and strong sustainability, which are characterised by a positive attitude towards technology, modified economic growth, emphasis on the collective interest and ecosystem value and a positive attitude to precautionary principles.

Sustainable transport, as a subset of sustainable development, has also been defined in parallel with the above concept. The World Bank approach to viewing sustainable transportation has been adopted in this study, covering the goals of the three components, i.e. social, economical and environmental dimensions.

At workshop discussion sessions, local transport experts confirmed that both sustainable development and sustainable transport concepts are appropriately applied in Malaysian

circumstances, which is an achievement in itself as part of the synthesis element of this thesis.

Sustainable Transport Objectives

Sustainable transport objectives have been continually discussed as the sub-subject of sustainable transport goals. Local transport experts were presented with ten sustainable transport objectives that had been derived from the goals. They checked and confirmed the relevance of these objectives to Kuala Lumpur's sustainable transport issues. They also examined the relationship between these objectives by identifying the complementarity and contradiction between them (see Section 4.4.3, Chapter 4). Again, the task was carried out from the perspective of the local context.

When it became apparent that all dimensions cannot be achieved simultaneously in a real and practical world, local transport experts helped to sort out the hierarchy of primary and secondary objectives and associated transport issues for Kuala Lumpur (see Section 4.4.4, Chapter 4) This input helped to resolve the conflicting objectives in the study and the ensuing project's targets. At the end of the study, it was also possible to provide insights for policy-makers about the strongest and weakest points of each Image that correspond to the achievement of objectives.

Table 4.5 below summarises the important modifications adopted in this chapter as a result of local transport experts' views

Table 4.5 Important Modifications Adopted in Chapter 4 and Other Relevant Sections in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their Views	Relevant Sections and Chapters
Sustainable Transport Objectives		
Strong views about the need to define 'issues, objectives and goals' from a local perspective, e.g. - issues that are relevant to local people - design of a transport system that could benefit local residents - what do people in Kuala Lumpur want for 'sustainable development' of their city?	Search for appropriate concepts of sustainable development and sustainable transport for Kuala Lumpur and Malaysia. The need to have Chapter 4 as a reference point of the project. Prioritisation of sustainable transport objectives, with the help from LTEs Inspiration to further investigate how to converge the different concepts of sustainable development in both the developed and the developing world.	Chapter 4. Section 4.4.4, Chapter 4. Section 9.4.3 Chapter 9

4.6 Conclusion

This chapter has defined a concept of sustainable development for Malaysia, and from this it has derived the goals and objectives of sustainable transport for Kuala Lumpur.

To sum up, in defining sustainable development and sustainable transport for Malaysia and Kuala Lumpur, it seems that the North-South debate about sustainability is an important factor to be taken into account. The general viewpoint of the South, which in this case includes that of the local transport experts in Kuala Lumpur, places emphasis on the fact that (social and economic) development should be allowed to continue although this should not degrade the value of ecological development'. They have to grow quickly to reach the same developmental level as that of the Northern countries, but their development path should be

different from the one used in the past. To adopt a long-term perspective of greener and more sustainable modified growth, with the help of technological improvement, giving more concern to benefits for the contemporary poor and applying the precautionary principle of avoiding environmental degradation is an appropriate new direction for the development path.

The aim of transforming the present situation from *very weak sustainability* to *weak-strong sustainability* is further reflected in the defined goals and objectives of the transport field for Kuala Lumpur. Ten sustainable transport objectives that cover all social, economic and environmental issues and challenges have been defined consistent with the concept of sustainable development (see Figure 4.7). These objectives aim to be inclusive and holistic. They tackle the imminent threat of present problems such as accidents, pollution and contemporary poor, yet emphasize precautionary action to conserve non-renewable energy for the benefit of future generations. Other objectives aim to make positive improvements to the present system, such as encouraging community cohesion, enhancing accessibility and providing cost-effective services.

Judging the present trends and issues against these objectives lead to a conclusion that the present 'business-as-usual' transport system is moving away from the sustainable directions. Setting and achieving these objectives could lead to a dramatic improvement in the present unsustainable transport system in every dimension of development.

Nevertheless, when multi-dimensional objectives are set, unavoidable conflicts exist.

The chapter has clearly defined the main content of what constitutes sustainable development and sustainable transport for this study. Implicitly, this chapter has indicated that technological improvement is an important element to assist in the achievement of sustainability, which has major implications for constructing the Image of the Future in Chapter Six. Apart from that, it demonstrates that there are many complementary relationships between sustainability objectives, which may have synergetic effects when one objective has been achieved; this will be beneficial for selecting targets in Chapter Five and

designing policy measures in Chapter Seven. Last but not least, it also emphasises the fact that the final aim of sustainable transport is to reach absolute sustainability, where there is a win-win-win situation for every aspect. However, in the real world, when there is conflict to be resolved, setting a hierarchy of priorities is helpful[47], and the chapter gives an example of priority-setting of objectives based on the views of local transport experts.

The ten sustainable transport objectives defined in this chapter are the reference points for the following chapters on policy targets, Images of the Future and policy measures/packages.

[47] Consensus on vision and priority goals is one of the important components of mechanisms for sustainable development (Dalal-Clayton and Bass, 2002). It is also technically useful to help decision-makers to weigh the objectives in the later decision-making process, as decision-making theory (for assessing multiple and conflicting objectives) such as Multi-criteria Decision-making requires ranking of the different objectives and sub-objectives in the order of importance (Zietsman, Rilett and Kim, 2003).

CHAPTER FIVE
POLICY TARGETS

5.0 Introduction

This chapter presents the policy targets used for scenario analysis. The design and generation of policy targets is one of the major steps of scenario methodology (Figure 3.3, Chapter 3). In this study, these need to be established after gaining understanding of the present transport issues (see Chapter 2) and establishing sustainable transport goals and objectives (see Chapter 4).

Policy targets are generated in order to specify desirable aims in the future and form the basis for exploring the types of policies that might be used to reach these aims. To achieve that, policy targets actually serve several purposes simultaneously. Firstly, as sustainable objectives are rather abstract and difficult to evaluate, policy targets are set to measure and indicate the achievements of sustainability. Secondly, policy targets act as a basis for the framework on which scenario building is to focus, i.e. all Images of the Future are constructed with the aim of achieving the targets (Chapter 6). Thirdly, they are yardsticks for comparisons between the Images. Lastly, policy targets are a means of assessing the impact of policy packages (Chapter 7). To serve these multi-purpose tasks, policy targets should comprehensively cover the idea of sustainable transport, yet present it in a clear and succinct manner. Nevertheless, apart from representing how the sustainable transport objectives are underpinned, policy targets also need to be realistic and practical. It is a challenge to define policy targets that are ambitious, desirable, sufficient to make a change to the present system, yet pragmatically workable for the project.

To meet the challenge, policy targets have been carefully designed and scrutinised; this involves a top-down derivation of indicators (for the purpose of formulating targets) and

bottom-up approaches to target selection, including a comparison with official targets (if any exist) and a discussion process with local transport experts. Section 5.1 describes the process of design and generation of targets, while Section 5.2 discusses the selection of final targets, as illustrated in Figure 5.1 on the next page. Section 5.3 discusses the difficulties faced in the process of setting targets and Section 5.4 discusses some issues related to the final targets. Lastly, Section 5.5

5.1 The Process of Design and Generation of Targets

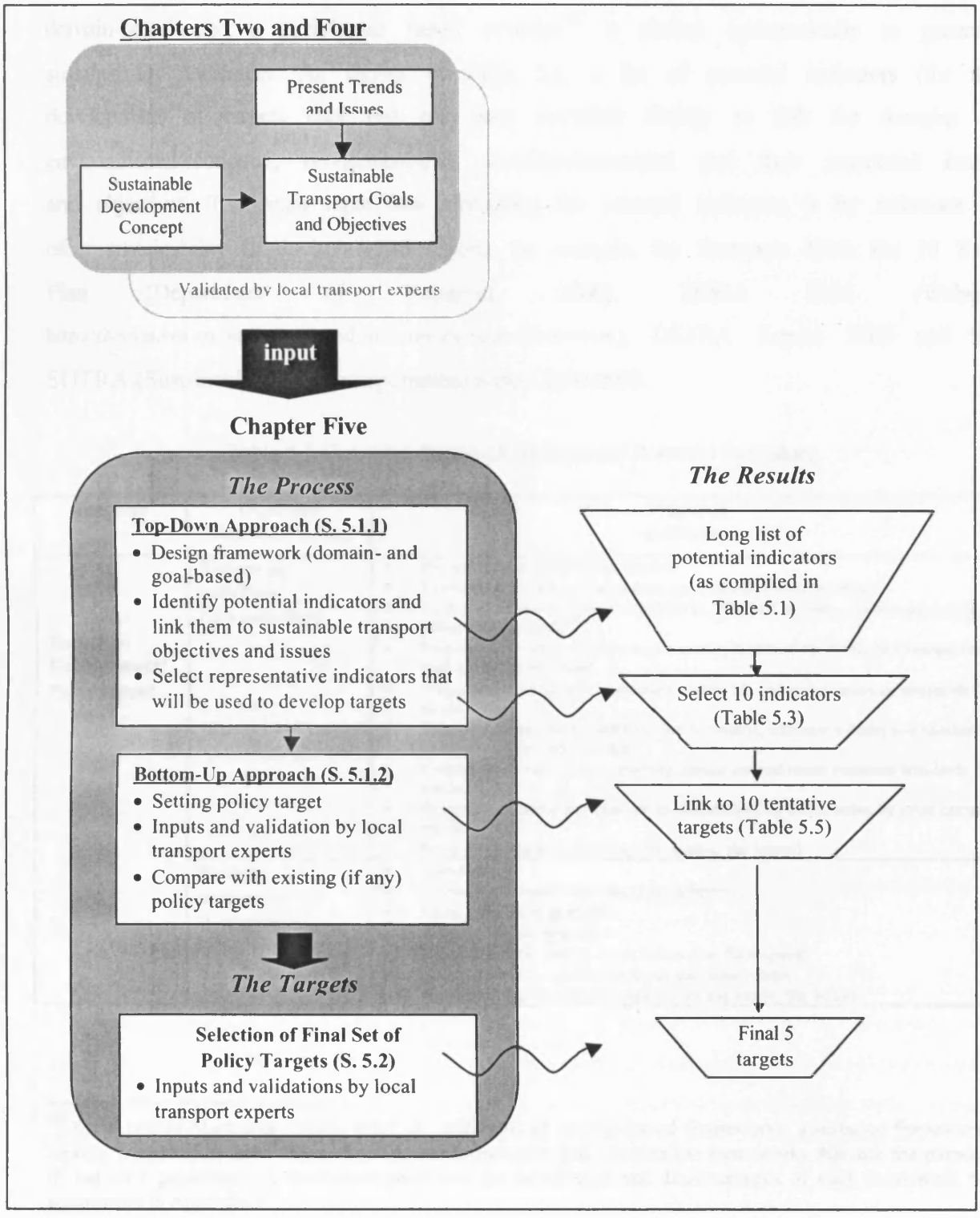
Referring to Figure 5.1 again, it is obvious that the design and generation of targets is a continuous process which develops from the previous stages of the methodology. The present issues that are identified in Chapter Two and the sustainable transport goals and objectives that are established in Chapter 4 are the major inputs into the design and generation of policy targets.

5.1.1 The Top-Down Approach

The first step in the design and generation of targets is via a scoping exercise to determine potential indicators. Indicators are an easier way to communicate sustainable development concepts. They can translate the broad and subjective sustainable transport objectives into numerical terms, descriptive measures and action-oriented signs and signals. The purpose of identifying potential indicators is to stimulate the formation of policy targets that will lead to action at a later stage. Indicators hence act as a bridge to link the sustainable transport objectives and the policy targets.

The scoping exercise is carried out in the manner of a top-down approach. It is a deductive, comprehensive, systematic strategy, in which potential targets (indicators at this stage) are

Figure 5.1 The Process of Design and Generation of Policy Targets



derived from principles, goals, sectors, issues and causal relationships. In parallel with the goal and objective formulation at the outset, a framework which is a combination of a domain-based and a goal-based based structure[48] is chosen systematically to generate sustainability indicators. As shown in Table 5.1, a list of potential indicators (for the development of targets later on) has been compiled directly to link the domains of environmental/economic, economic/social, social/environmental and their associated issues and objectives. The main input into identifying the potential indicators is by reference to other sustainability or environmental reports, for example, the Transport 2010: the 10 Year Plan (Department of Transport, 2000), TERM 2001 (Website http://themes.eea.eu.int/Sectors_and_activities/transport/indicators), DEFRA Report 2003 and the SUTRA (Sustainable Urban Transportation) project 2000-2003.

Table 5.1 Domains, Issues, Objectives and Potential Indicators

Domains	Objective (Relevant issues)	Proposed Indicators
Economic Development/ Environment	Reduce air pollution (Air pollution)	• Per capita transportation pollution • Transport emission of greenhouse gas (CO_2 and N_2O) by mode • Transport emission by pollutants (NOx, NMVOCs, PM_{10}, SOx, total ozone precursors) by mode • Proportion by which Malaysian air quality standard for PM_{10}, NO_2, benzene, ozone, lead and CO is exceeded • Proportion of vehicle fleet meeting certain air and noise emission standards (by mode) • Uptake of cleaner fuels (unleaded petrol, electric, alternative fuels) and numbers of alternatively fuelled vehicles • Proportion of vehicle fleet meeting certain air and noise emission standards (by mode) • Percentage of population exposed to and annoyed by traffic noise, by noise category and by mode. • Mode split (the less polluting the modes, the better)
	Reduce congestion (Congestion)	• Speed limit • Average commuter trip time (low is better) • Total time spent in traffic • Average vehicle hours lost • Changes in total vehicle hours below free flow speed. • Level of service – public transport and slow modes • Mode split (the higher the capacity of the mode, the better)

[48] According to MacLaren (1996), there are selections of domain-based frameworks, goal-based frameworks, sectoral frameworks, issue frameworks, causal frameworks and combination frameworks that suit the purposes of indicator generation. A brief description and the advantages and disadvantages of each framework are summarized in Appendix F.

Domains	Objective (Relevant issues)	Proposed Indicators
Economic Development/ Environment	Reduce energy consumption (Excessive use of non- renewable energy)	• Transport final energy consumption, primary energy consumption and total share by mode and by fuel. • Overall energy efficiency for passenger transport (per passenger –km and per tonne-km & by mode) • Per capita transportation energy consumption • Occupancy rates of passenger vehicles • Average age of the vehicle fleet • Use of cleaner fuels (unleaded petrol; electric engines) • Number of alternatively fuelled vehicles • Ratio of fuel-efficient/fuel-inefficient vehicles • Percentage of city fleet converted to reduced emission fuels • Mode split (the higher the usage of efficiency modes, the better)
Economic Development /Social Equity	Provide affordable transport to disadvantaged groups (Problem of accessibility by the poor)	• Expenditure on personal mobility per person by income group • Subsidies • Average proportion of household expenditure devoted to transportation, including direct expenditure on vehicles and fares and indirect expenditures, such as residential parking and taxes spent on transportation facilities • Affordability of public transit service by lower income residents (fares as a proportion of lowest quintile income). • Mode split (the more affordable, the better)
	Provide cost-effective services to support a vibrant economy (Economic loss due to other transport issues e.g. congestion, accident, air pollution, etc.)	• Total amount of external costs by transport mode (passenger); average external cost per p-km and t-km by transport mode • Implementation of internalization instrument (i.e. economic policy tools) • Fuel prices and taxes and other charges (e.g. parking, congestion, etc.) • Investments in transport infrastructure/capita and by mode • Subsidies • Proportion of transportation-related costs paid by public funding. • Medical costs attributed to transportation (including care of injured people and pollution-related diseases). • Taxes devoted to transport • Mode split (the more cost effective the modes, the better)
	Enhance accessibility by public transport and non-motorised modes (Poor public transport and unfriendly environment for non-motorised modes)	• Pedestrian-friendly streets • Ratio of bicycle paths to streets • Percentage of street miles designated as bicycle route miles • Total length of bicycle routes • Quality of pedestrian and bicycle environment. • Quality of public transit service, including number of service hours, service frequency, average speed relative to automobile traffic speeds, safety, comfort (including number of standees during peak periods, number of bus shelters and other waiting facilities), availability of information, and integration with other modes. • Mode split (the more non-motorised and public transport modes, the better)
Social equity/ Environment	Reduce accident rate	• Number of transport accidents (fatalities and injuries) • Per capita motor vehicle accidents and fatalities • Appropriate speed limits • Movement restrictions • Mode split (the more lower risk modes, the better)
	Reduce automobile dependency	• Passenger transport (by mode and purpose) (vehicle kilometre, total passengers, total passenger-km, passenger-km per capita, passenger-km per GDP) • Mode split – the proportion of travellers who use each transportation mode (the fewer automobiles, the better) • Mode shift – the number or proportion of automobile trips shifted to other modes.

Domains	Objective (Relevant issues)	Proposed Indicators
Social equity/ Environment	Enhance accessibility instead of mobility	• Passenger transport (by mode and purpose) (vehicle kilometre, total passengers, total passenger-km, passenger-km per capita, passenger-km per GDP) • Regional access to markets: the ease (time and money) of reaching economically important assets (e.g. consumers, jobs) by various modes • Access to basic services (average passenger journey time and length per mode), purpose (commuting, shopping, leisure) and location (urban/ rural) • Access to transport services, e.g. (i) vehicle ownership and number of motor vehicles per household; (ii) percentage of persons in a location having access to a public transport node within 500 metres. • Opportunity for tele-access • Availability of land use and other non-transport policies for accessibility objective. • Ability of non-drivers to reach employment centres and services • Average number of major services (grocery, library, school, playing fields, etc.) within walking distance of residents, or average walking distance between residences and public services, such as schools and retail centres. • Land-use mix (proximity of residential, commercial and employment land uses), more is better. • Quality of delivery services (such as by food stores). • Quality of mobility services for residents with special mobility needs.
	Increased social cohesion (Social exclusion and the divided social classes by vehicle use)	• Fragmentation of habitats • Land taken by transport infrastructure by mode • Segregation • Ability of non-drivers to reach employment centres and services • Land use mix (proximity of residential, commercial and employment land uses), more is better.

Source: Adapted from Transport 2010, TERM 2001, DEFRA Report 2003 & SUTRA project 2000-2003)

This long list is compiled to gather the relevant indicators that are related to sustainable transport issues and objectives. Based on this list, the next task is to select a set of representative indicators for developing policy targets. The general rules of good indicator characteristics are comprehensibility, comparability, simplicity, validity, sensitivity and availability of affordable data. For this study, apart from the above general criteria, the relevance to sustainability goals is the important factor. Also, in relation to sustainability, a set of more specific criteria has been applied for the purposes of the selection process; this includes the characteristics of integrating, forward-looking, distributing and developing with input from multiple stakeholders in the community (MacLaren, 1996). These criteria are explained in more detail in Table 5.2. Nevertheless, in the process of selection, it is almost impossible to develop individual sustainability indicators that possess all of the above criteria. Efforts just have to be made to ensure that all of these criteria have been represented in the final set of selected sustainability indicators.

The selection process is not a one-step procedure but a sequential one. Some indicators could be easily omitted due to the general evaluation criteria of scientific validity, representativeness, responsiveness, data accuracy and availability. In the case of Kuala Lumpur, there is a serious lack of data available and thus many relevant indicators could not be applied in the study. Last but not least, the selected potential indicators should be capable of linking and representing sustainable transport objectives accordingly.

Table 5.2 Criteria for Selecting Sustainable Indicators for Developing Targets

Integrating Sustainability indicators are integrating in the sense that they attempt to portray linkages between the economic, environmental and social dimensions of sustainability. *Accident rate* is one example of an integrating indicator in the sense that it measures both economic stress and social stress. ***Forward-Looking*** Sustainability indicators need to be forward-looking as they are to be used in measuring progress towards achieving intergenerational equity. One simple example of a forward-looking indicator is a 'trend indicator', which describes historical trends and provides indirect information about future sustainability. The forward-looking indicators could be more proactive in relation to future decision-making when they are linked to reference points that define intermediate or final steps in the move towards meeting sustainability goals. Targets and thresholds are the two main types of reference points; for example, *50% reduction of atmospheric pollution by the year 2020 from the 1998 level.* ***Distributing*** Sustainability indicators must be able to measure intergenerational and intragenerational equity. Typically, spatially aggregated indicators fail to account for distributive effects. An example is GNP, which may increase even though economic conditions for many groups or different regions in the country are declining. Disaggregating certain indicators for a community by such factors as age, gender, and location can help to overcome this problem. An example of this distributional indicator in the transport planning field is *'less than 15% of household expenditure would be spent on transportation costs by lower income group'.* ***Multiple-Stakeholder Inputs*** Since sustainability is such a value-laden and context-sensitive concept, inputs from a broad range of stakeholders to develop its indicators are sensible and necessary. The process of participation by multiple-stakeholders could be accomplished by assigning significant responsibility for selecting sustainability indicators to a broadly based, multi-stakeholder group, or by consulting in some other way with multiple stakeholders from the earliest stages of indicator development.

(Source: Adapted from MacLaren,1996)

Table 5.3 lists the ten potential indicators selected for target formulation at a later stage. The links between the indicators and sustainable transport objectives are also shown in the table; most of the indicators can measure more than one objective either directly or indirectly. For example, 'pollution level' will directly measure how far the objective could be achieved, and

it will also indirectly indicate the cost-effectiveness of a transport system to support the vibrant economy of a city. On the other hand, most of he sustainable transport objectives are linked to more than one indicator. For example, the objective of 'reduce traffic pollution' is directly linked to 'pollution level' and also to 'total vehicle ownership and mileage'. This implies that a more succinct and shorter list of targets could be established at the next stage.

Table 5.3 Ten Potential Indicators Selected for Target Formulation

Combination of Domain-based and Goal-based Framework		Proposed Potential Indicators For Target Formulation
Economic Development/ Environment	Reduce traffic pollution	1. Pollution level
	Reduce congestion	2. Level of services for vehicle flow
	Reduce energy consumption	3. Total vehicle ownership and mileage
Economic Development/ Social Equity	Provide affordable transport to disadvantaged groups	4. Proportion of household expenditure devoted to transport
	Provide cost-effective services to support a vibrant economy	5. Investment in transport infrastructure
	Enhance accessibility by public transport and non-motorised modes	6. Quality of public transport and non-motorised modes
Social equity/ Environment	Enhance accessibility instead of mobility	7. Land-use mix and concentration in city centre
	Reduce accident rate	8. Accident and fatalities rate
	Reduce automobile dependency	9. Diversity of modal split
	Increase social cohesion	10. Land-take by road infrastructure

(Symbols : ← indicators directly relate to sustainable transport objectives
<- - - - - indicators that indirectly relate to sustainable transport objectives

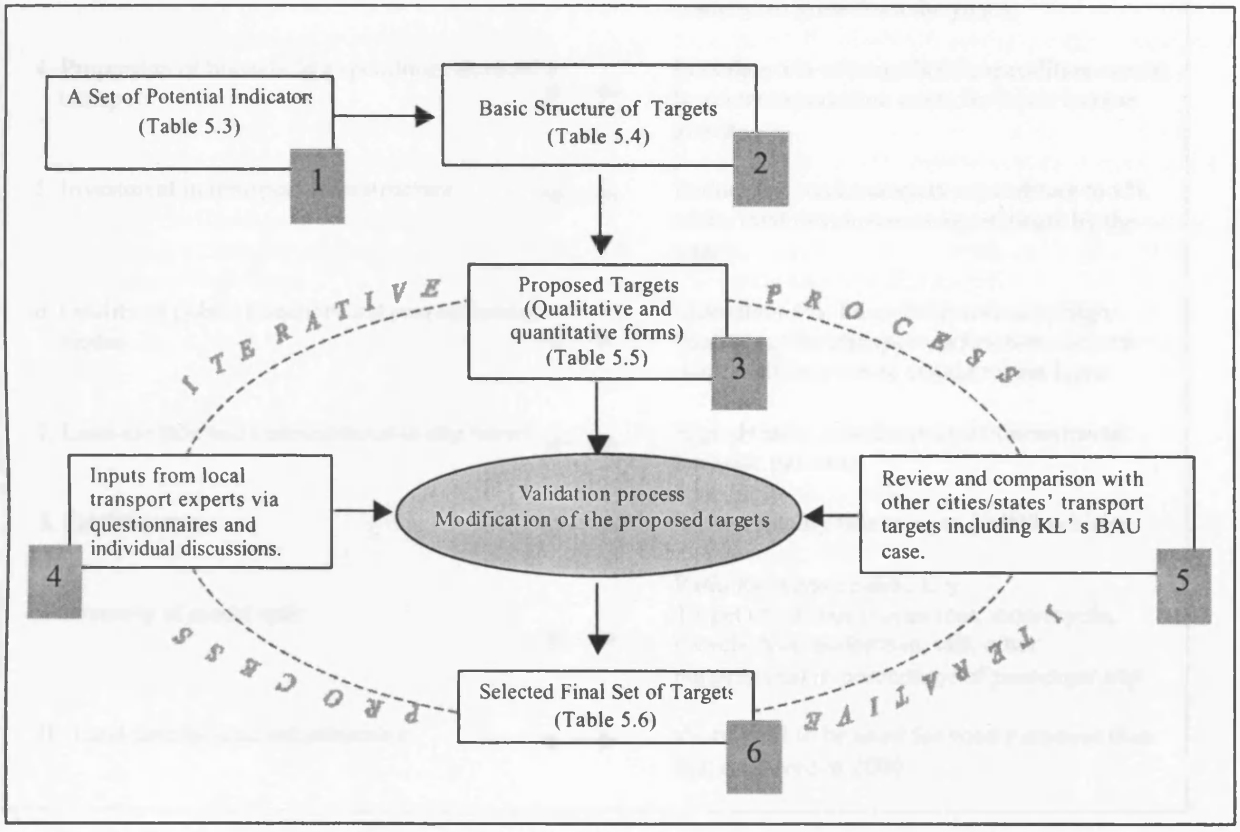
5.1.2 The Bottom-Up Approach

Up to this stage, ten potential indicators have been selected using the 'top-down' process, which is characterised by a systematic and deductive strategy using a combination of domain-based and goals-based frameworks to establish the indicators. From this point onwards, the identification of a comprehensive set of targets for this project is derived from a 'bottom-up' approach. Contrary to the 'top-down' process, the 'bottom-up' approach is an

inductive, knowledge-based strategy involving a review of existing targets for sustainable transport and also intensive input from local transport experts.

Figure 5.2 outlines the 'bottom-up' process of establishing the final set of targets. It starts by linking the ten potential indicators derived from the 'top-down' approach (Step 1) to form the basic structures for the proposed targets (Step 2). Based on the target structure, ten tentative parallel targets are proposed by the researcher (Step 3). This is done in a deductive and

Figure 5.2 Process of Target Generation from the Ten Potential Indicators



knowledge-based way, mainly taking into account the understanding of present sustainable transport trends and issues in Kuala Lumpur, official and unofficial targets in the city, and the belief of to what extent a change needs to be made in order to achieve sustainable transport. The basic structure of targets is presented in Table 5.4 and the ten tentative targets are presented in Table 5.5.

Table 5.4 Potential Indicators and Basic Structure of Targets

Proposed Potential Indicators For Targets	*Links to*	Formulating Basic Structure of Targets
1. Pollution level (CO, NOx)	↔	x% reduction of CO emission from y level by the year z x% reduction of NOx emission from y level by the year z
2. Level of services for vehicle flow	↔	Relief from traffic congestion to the Level of Service (LOS) to reach x or above
3. Total vehicle ownership and mileage	↔	Total vehicle ownership and mileage will not continue to grow from the year x.
4. Proportion of household expenditure devoted to transport	↔	Less than x% of household expenditure would be on transportation costs for lower income groups.
5. Investment in transport infrastructure	↔	Reduce the road transport expenditure to x% of the total development expenditure by the year y.
6. Quality of public transport and non-motorised modes	↔	More than x% household access to high-quality public transport and non-motorised modes within y metre distance from home
7. Land-use mix and concentration in city centre	↔	High-density, mixed-use and concentrated land-use patterns
8. Fatalities rate	↔	Reduce fatality rate to x per 10,000 vehicles
9. Diversity of modal split	↔	Ratio for private/public x: y Target of various modes (car, motorcycle, bicycle, bus, pedestrian, rail, other paratransits) in percentage of passenger trip
10. Land-take by road infrastructure	↔	x% of land to be used for road purposes than that approved in 2000

Table 5.5 Proposed Tentative Targets

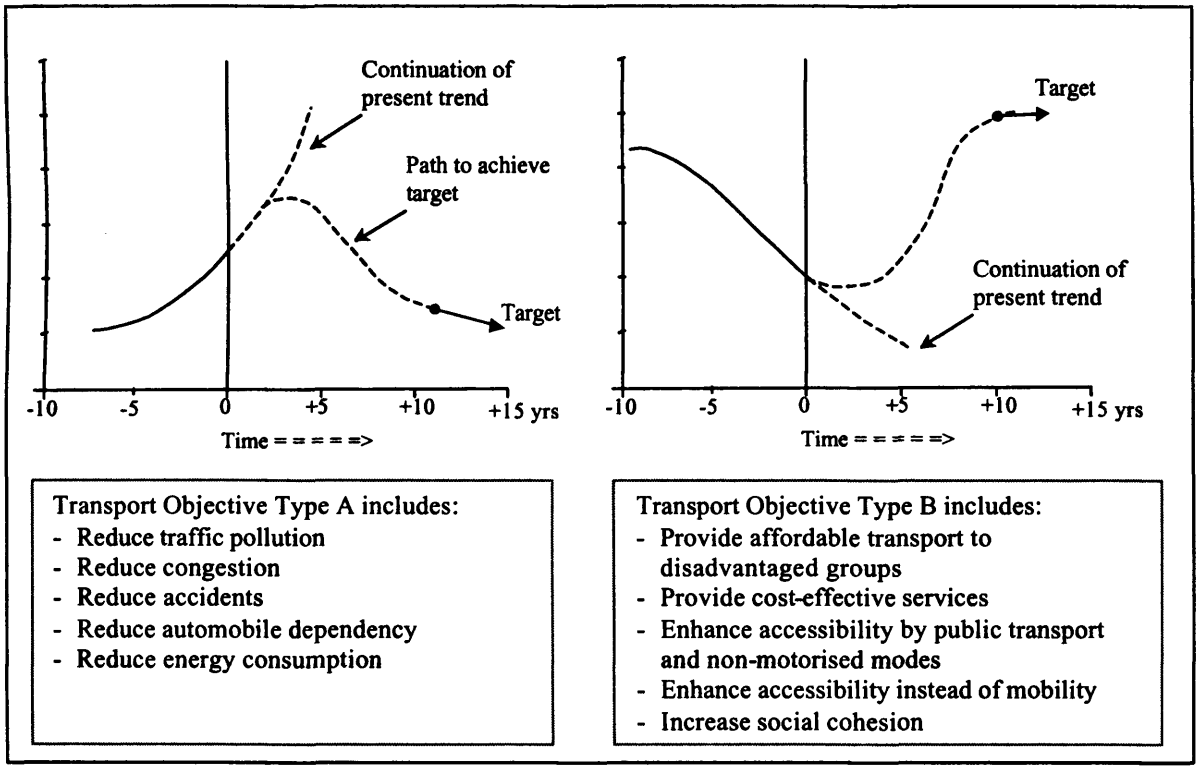
Basic Structure of Targets	*to*	Proposed Tentative Targets
x% reduction of CO emission from y level by the year z x% reduction of NOx emission from y level by the year z	↔	75% reduction of CO emission from 1998 level by the year 2020 75% reduction of NOx emission from 1998 level by the year 2020
Relief from traffic congestion to the Level of Service (LOS) to reach x or above	↔	Relief from traffic congestion to the Level of Service (LOS) to reach C-B
Total vehicle ownership and mileage will not continue to grow from the year x.	↔	Total vehicle ownership and mileage will not continue to grow from the year 2000
Less than x% of household expenditure would be on transportation costs for lower income groups.	↔	Less than 15% of household expenditure would be on transportation costs for lower income groups.
Reduce the road transport expenditure to x% of the total development expenditure by the year y.	↔	Reduce the road transport expenditure to 7.5% of the total development expenditure by the year 2020.
More than x% household access to high-quality public transport and non-motorised modes within y metre distance from home.	↔	More than 50% household access to high-quality public transport and non-motorised modes within 200 metres distance from home.
High-density, mixed-use and concentrated land-use patterns	↔	High-density, mixed-use and concentrated land-use patterns
Reduce fatality rate to x per 10,000 vehicles	↔	Reduce fatality rate to 1.3 per 10,000 vehicles
Ratio for private/public x: y Target of various modes (car, motorcycle, bicycle, bus,pedestrian, rail, other paratransits) in percentage of passenger trips	↔	Ratio for private/public 30: 70 Target of various modes in % of passenger trips will be discussed with local transport experts after confirming the above ratio
x% of land to be used for road purposes than that approved in the year y	↔	No further land to be used for road purposes than that approved in the year 2000

The proposed tentative targets were presented to local transport experts for discussion and validation. The spirit of the 'bottom-up' approach is to scrutinise, modify, refine, and then include the final selection of the targets through an intensified process in Steps 4 and 5, whereby local transport experts play an important role in contributing their knowledge. In general, there are two types of target graphs in relation to the transport objectives. The main task of local transport experts is to validate sensible and achievable targets in the time-frame provided in order to make significant changes to the present system, i.e. to break the continuation of the present trends and reverse the paths towards sustainability, as shown in

Figure 5.3. Local transport experts were asked if they agreed with the proposed targets, or whether modifications needed to be made. They were invited to comment on whether the proposed targets were suitable for the local context, or whether the targets were too tough, sufficient or too soft to achieve sustainable transport objectives (see Appendix B, Section C).

The whole process of target selection is an iterative one. In the process of discussion with local transport experts, reviews and comparisons with current transport issues, and other cities' and states' transport targets have been referred to (whenever relevant). In the discussion, the review and comparison with the targets of other cities/states, including KL' s BAU case, have helped local transport experts to gain a sense of understanding and the confidence to set the policy targets for the project.

Figure 5.3 Two Types of Target Graphs to Achieve Sustainable Transport Objectives



Enormous amounts of time and effort (i.e. first round interviews, second round workshop discussion and follow-up email communications) were taken for the two-way communication

about final targets selection between the researcher and local transport experts, in order to set ambitious and desirable, yet practical and workable, targets to achieve sustainable transport objectives. To sum up, five proposed targets were discarded while another five targets were selected. Section 5.2 below summarises the rationales for the selections.

5.2 Selecting Key Policy Targets

As the result of the validation process, the final targets have been modified and selected, as presented in Table 5.6 below. The right-hand column shows the final five key targets and the left-hand column refers to the ones that were left out.

Table 5.6 The Discarded and Selected Policy Targets

✗ The Discarded Targets	√ The Selected Final Targets
Total vehicle ownership and mileage will not continue to grow from the year 2000	**Ratio Private:Public modes 45:55 (For diversity of modal split, refer to the paragraphs below)**
Reduce the road transport expenditure to 7.5% of the total development expenditure by the year 2020	**Less than 15% of household expenditure would be on transportation costs for lower income groups.**
Relief from traffic congestion to the Level of Service (LOS) to reach C-B	**Reduce fatality rate to 1.3 per 10,000 vehicles 75% reduction of total road accidents from 1998 level by the year 2020.**
High-density, mixed-use and concentrated land-use patterns	**75% reduction of CO & NOx emission from 1998 level by the year 2020**
No further land to be used for road purposes than that approved in the year 2000	**More than 50% household access to high quality of public transport and non-motorised modes within 200 metre distance from home.**

5.2.1 Summaries of the Rationales for the Discarded Targets

a. Total Vehicle Ownership and Mileage

The initial attempt was to form the following target: *'vehicle ownership and total mileage will not continue to grow from the year 2000'*. Local transport experts thought that the target

was simply too tough. It was also debated whether an increase in 'total vehicle ownership and mileage' meant transport was moving towards or away from sustainability. Local transport experts argued that an increase in total vehicle ownership and mileage has been proved to increase quality of life, especially in the outer city areas, where accessibility to public transport is not well served.

A few suggested that a modified target of *'total vehicles that enter the city will not continue to grow from the year 2000'* would be better. However, apart from the comment that this was still 'too tough to achieve', many commented on it as being too rigorous and too rigid for the purpose of designing policy instruments. It was thought that such a target was not in conformity with the idea of 'promoting creative policy choices' in the backcasting methodology. With the help of advanced technology, more small and fuel-efficient vehicles may be another option for sustainable transport and the target is not helpful for this policy path.

The final conclusion was to discard the target from the project time-frame. Even the modified target was considered unrealistic and impossible to achieve by the year 2020.

(Comment by the researcher:
The target is an integrating and forward-looking target that is capable of achieving many sustainable transport objectives clearly and concurrently, such as reduction of accidents, reduction of air pollution, reduction of congestion, and conservation of non-renewable energy. In this exercise, the opinions of local transport experts have been respected and so it was discarded from the final list; but it should be reconsidered as one of the final targets whenever the timing is suitable.)

b. Investment in transport infrastructure

This target was also thrown out by local transport experts based on the reason that 'reducing the investment in transport infrastructure does not necessarily improve the cost-effectiveness,

and increasing investment in it does not necessarily trigger socio-economic growth'. Therefore it was considered a poor target for sustainability analysis. Moreover, the general view was that the government should not reduce its expenditure on transport infrastructure, the concern being that the burden would shift to the end-users instead. Many also thought that at this conceptual scenarios stage comparison of investment in transport infrastructure from the point of view of various policy measures would be difficult to make.

c. Level of Services for vehicle flow (private and public transport)

Level of Services (L.O.S.) is an indicator for measuring the performance of traffic on the roads; it is related to evaluation of congestion levels by measuring the traffic flow. This indicator/target has finally been discarded due to the nature of its measurement; it is regarded as a poor sustainability indicator/target. Together with vehicle delay, traffic speeds and vehicle mileage, such performance indicators based on traffic flow assume that improving transportation requires increasing vehicle travel and speed. This inherently favours faster modes, longer-distance trips and more dispersed land use, which are against the principles of sustainable transport. For example, this perspective assumes that a 50-mile automobile commute provides more value to society than a 10-mile transit commute, which provides more benefit than a 5-mile bicycle or a 1-mile walking trip. (Victoria Transport Policy Institute, 2002)

d. Land-use mix and concentration in city centre

The target *'to increase high-density, mix-use and concentrated land-use patterns'* received rather negative responses from local transport experts in Kuala Lumpur, particularly from those who come from government agencies. The target itself seems possible and useful, but due to the fact that it is contradictory to Kuala Lumpur's present and future plan for dispersed land-use patterns, local transport experts preferred to discard it as a policy target. For the purpose of accommodating the present and official planned land-use patterns, local transport

experts would like to see alternative designs for creative land use and transport policies to achieve sustainability, rather than limiting the policy path to one direction only.

The argument behind the rationale for discarding the target is based on the disparity of opinions about land-use patterns and sustainability. In the academic literature, many experts conclude that sustainable transportation requires higher-density land-use patterns that accommodate alternative modes, and that cities with high-density neighbourhoods developed around passenger rail transit systems form the most sustainable model for urban areas. Others argue that high-density development imposes costs; that most households will not willingly choose to live in high-density, transit-oriented cities; and that a low-density, automobile-oriented land-use pattern is not necessarily more energy-intensive than higher-density, transit-oriented cities. These views appear in the works of Newman and Kenworthy (1998) who favour high-density and compact cities, while Gordon and Richardon (1997) hold the opposite opinion.

The target has been discarded mainly to give more room for options to design different policy paths at the next stage rather than accommodating the present official plan for Kuala Lumpur.

e. Land-take by road infrastructure

The following target, 'no further land to be used for road purposes than that approved in 2000' was thought to be too tough and unrealistic by most of the local transport experts. One respondent suggested changing the target to 'nothing in excess of a certain percentage of land is to be used for road purposes'. The latter seems to be a possible target. Nonetheless, further discussion with the experts revealed that the 'modal split' target could achieve similar policy assessment, and therefore this 'land-take' target should be discarded to avoid the exercise being repeated unnecessarily.

5.2.2. Selection and Modification of the Final Policy Targets

As a result of the discussions with local transport experts, this section summarised the refinements and modifications of the proposed targets accordingly. The final five policy targets and the links to the sustainable transport domains and objectives are presented in Table 5.7 below.

Table 5.7 The Final Policy Targets and the Links to Domains and Objectives

Combination of Domain-based and Goal-based Framework		Policy Targets
Economic Development/ Environment	Reduce traffic pollution	**75% reduction of CO & NOx emission from 1998 level by the year 2020**
	Reduce congestion	
	Reduce energy consumption	**Less than 15% of household expenditure would be on transportation costs for lower income groups.**
Economic Development/ Social Equity	Provide affordable transport to disadvantaged groups	
	Provide cost-effective services to support a vibrant economy	
	Enhance accessibility by public transport and non-motorised modes	**More than 50% household access to high-quality public transport and non-motorised modes within 200 metre distance from home.**
Social equity/ Environment	Enhance accessibility instead of mobility	
	Reduce accident rate	**Reduce fatality rate to 1.3 per 10,000 vehicles 75% reduction of total road accidents from 1998 level by the year 2020.**
	Reduce automobile dependency	
	Increase social cohesion	***Ratio Private: Public modes 45:55**

(Symbol: ←——— indicators directly related to sustainable transport objectives
←- - - - - - indicators indirectly related to sustainable transport objectives

*Ratio modal split of public: private is further refined into a more detailed diversity of % of passenger trips for each mode as:

Diversity of modal split

car	motorcycle	bicycle	pedestrian	rail	bus	other paratransit (taxi/ carshare/jitney etc.)
35	10	6	22	5	20	2

- ***Air Pollution***

A target for two of the pollutants has been proposed related to local pollution issues; there is the '75% reduction of atmospheric pollution (CO and NO_x) by the year 2020 from 1998 level'

The local pollution target received enormous attention as the issue was considered a serious one. The BAU case suggests that the pollution level will be higher in 2020 than the 1998 level by about 30%, which is intolerable (JICA, 1998). A respondent emphasised that, 'if we could achieve the (local) pollution target, we will have achieved 90% of the sustainable transport aim!' A few of them considered lowering the target to a '50% reduction', being concerned the '75% reduction' would be too tough. However, after lengthy discussion, most of them agreed that the '75% reduction' was necessary. If necessary, according to them, rigorous measures would have to be enforced to achieve the target for sustainable transport; '50% reduction' would not be sufficient to achieve the objective.

The ambitious target of a '75% reduction from the 1998 level' was regarded as achievable because currently there are so few measures tackling the air pollution issue. Room for improvement is huge and measures are potentially available and relatively easy to implement. Local transport experts agreed that with such measures as cleaner fuels, more efficient and well-maintained engines, tighter regulations and enormous efforts to shift the modal split from more polluted modes to less polluted modes, the target is a sensible one.

- ***Proportion of Household Expenditure Devoted to Transport***

Social equity objectives have been completely ignored in assessing Kuala Lumpur's transport system. The official data that is available for reference is only the 'average percentage of household expenditure on transport and travel in Peninsular Malaysia, i.e. 19% for the year 2000' (Department of Statistics, 2003; Website http://www.statistics.gov.my/). In circumstances in which there are no other official data for local transport experts to use for comparison in order to set the target for '*proportion of lower income household expenditure devoted to transport*', the introduction of a social indicator was discussed at length by local transport experts.

Respondents agreed with the qualitative target, 'accessibility for the poor', but initially could not be sure whether it was a measurable target for the purposes of policy assessment; this is mainly due to unfamiliarity with the subject under discussion.

Finally, the quantitative target, 'less than 15% of household expenditure would be spent on transportation costs for lower income groups' was agreed with respect to the social equity objective. Considering the present indicator of an average household expenditure level of 19%, local transport experts felt that a target of less than 15% was a reasonable one; it should also be sufficient for objective attainment and policy assessment.

This target has implications for many transport policies, such as encouraging more easily accessed land-use patterns, promoting walking and cycling, providing cheaper public transport and other creative economical alternative modes of transport. Another major implication for policies is tax, subsidy and various discounted fares in the transport system that could assist in achieving the target.

This target possesses several important sustainability characteristics – it is distributive in nature, forward-looking and integrates the social and economic dimensions. By introducing this new target for the transport system in Kuala Lumpur there is a fresh effort to include lower income people when considering the design of transport policy measures, thereby achieving the social equity objective of the sustainability aim.

- ***Quality of Public Transport and Non-Motorised Modes***

The review of sustainable transport objectives has decided that 'high-quality and user-friendly public transport and non-motorised modes' should be set as a target in itself. Discussion with local people has concluded that whichever mainstream development programmes exist in the future, the quality of public transport and non-motorised modes should be maintained to a certain standard in order to serve people in Kuala Lumpur effectively and efficiently. At present, as most responses pointed out, policy statements do

not explicitly recognise the importance of accessibility to public transport and non-motorised modes by diverse user groups, not to mention the disadvantaged ones.

The provision of high-quality and user-friendly public transport and non-motorised modes is very important to serve the social/economic sustainability objectives. The challenge is to improve public transport and non-motorised modes in Kuala Lumpur to a level of reliable service, which, while affordable by the majority, is not associated with low status in society. Many local transport experts actually believed that high-quality and user-friendly *public transport* and *non-motorised modes* are a prerequisite for achieving the sustainable transportation aim.

At present, the JICA study (1998) has identified the fact that there is insufficient coverage by the bus service of some areas of Kuala Lumpur; suburban areas and newly developed areas particularly suffer from poor bus services. There was a similar finding for railway transport, in which JICA stated that the coverage of rail-based transport is still limited, and there are also insufficient feeder services to support the rail-based transport system (JICA 1998). The proposed target of 'more than 50% household access to high-quality public transport and non-motorised modes within a 200 metre distance from home' was hence received well by all local transport experts.

There was a suggestion to break up every single type of indicator for public transport and non-motorised modes but the attempts failed, because this would be unrealistic and difficult to measure in the conceptual scenario analysis. Flexibility of policy design might also be affected if rigid and detailed targets were to be set at this stage.

- ***Diversity of Modal Split***

According to the JICA study (1998), if there were no other policy imposed on the Kuala Lumpur scenario except the completion of the existing planned rail system, the Business-As-

Usual case would predict an increase in modal share for the car and a decrease for other transport modes. The predicted modal split in the year 2020 will be car 69.9%; motorcycle 13.8%; bus 12.6%; rail 3.8%. The modal share ratio for private/public will be 84:16. This is an indicator of the continuing unsustainable present trend of 61:39.

From the questionnaire survey and workshop discussion, there was agreement that a shift in proportion of modal share from private vehicle to public transport needs to be accomplished to achieve sustainable transport. Nonetheless, most of them disagreed with the proposed target of 'ratio for private vehicle (car and motorcycle)/public transport (other modes) for 2020 to be 30:70', considering that the target is too tough to be achieved. According to the local transport experts, a shift of 31% of private vehicles from the level of 1997, or a shift of 54% private vehicles, if compared to the BAU case, is almost impossible, even if drastic measures were applied. Further discussion settled the target at a 'modal share ratio private/public of 45:55', i.e. a shift of 16% private vehicle to public transport (and other modes) from the 1997 level, or a shift of 39% private vehicles to public transport (and other modes) if compared to the BAU case for the year 2020. Local transport experts felt comfortable about this target finally.

Corresponding with the above agreed modal share target, the modal split target has also been established. Nearly all of the local transport experts deemed that a greater diversity of modal split should be established than that at present to provide more choice of transport modes to achieve sustainability purposes. Walking and cycling trips are especially important and should be included in the modal split. These trips are present in the existing transport system but are neglected in the modal split up to this point. Apart from walking and cycling, another category added to the present modal split is 'other modes of paratransit', for example, taxi, car-renting, jitney, etc. These three categories will help to shift the modal share from cars and motorcycles.

In the course of setting the target of modal split for the year 2020, there was, however, a difficult and lengthy process of discussion by local transport experts. The general rule of thumb is to promote sustainable modes, i.e. greater capacity, energy efficient, less polluting,

more affordable and lower risk modes of transport. On the whole, public transport and non-motorised modes of transport are more sustainable than private vehicles. Nevertheless, there are still several considerations that need to be taken into account; for example, the increase in the modal share of the motorcycle increases the degree of accessibility in the transport system, especially for the lower-income groups, but at the same time there will be greater safety and environmental problems; similarly, an increase in the pedestrian and cycling share is environmentally friendly and affordable, but these are also high-risk transport modes in terms of safety. Therefore a detailed examination of the roles played by transport modes in achieving sustainable transport objectives was conducted before setting the target.

While it was almost unanimously agreed that there should be a balanced and diverse modal split target for Kuala Lumpur, one surprising result was the attention paid to the motorcycle. Many local transport experts gave much weight to the mode as it is regarded as an affordable and convenient mode for achieving the social economic sustainability objective. Passenger trips by motorcycle have been restricted less than those by car in the targets. While passenger trips by means of walking and buses have been hugely emphasised, there has been an allocations 2% of passenger trips by other paratransits to encourage more creative alternative transport modes than the conventional one. The final target of modal split and its comparison with the BAU case are presented in Table 5.8.

Table 5.8 Comparison of Modal Share (Passenger Trips) for the BAU case and Target

Modes	BAU case	Changes from BAU	*Target*
Car	69.9%	*Decrease of 34.9%*	35.0%
Motorcycle	13.8%	*Decrease of 3.8%*	10.0%
Bicycle	0.0%	*Increase of 6.0%*	6.0%
Pedestrian	0.0%	*Increase of 22.0%*	22.0%
Rail	3.8%	*Increase of 1.2%*	5.0%
Bus	12.6%	*Increase of 7.4%*	20.0%
Other paratransit (taxi/ car-renting /jitney, etc.)	0.0%	*Increase of 2.0%*	2.0%

While it is very difficult to analyse policy measures to the detailed level of each passenger trip by transport modes at the later stage (a few respondents did question if these detailed

targets should be established), the targets for this diversified modal split will indicate a clear direction towards sustainability.

- ***Accidents and Fatalities***

Safety objectives have always been a key concern in the Kuala Lumpur transportation system. Great efforts have been made to reduce the accident and fatality rates but they are still unacceptably high at the present (5.17 per 10,000 vehicles). According to the Business-As-Usual scenario, the fatality rate will continue to increase in the future. In the workshop discussion and from the questionnaire survey, the majority of the respondents agreed wholeheartedly with the target *'to reduce the fatality rate to 1.3 per 10,000 vehicles'*, which is to reduce fatalities caused by road traffic accidents by 75% by the year 2020.

The target was initially proposed as 'accident rate per 10,000 vehicles', but it has been withdrawn because the present statistic was condemned as highly inaccurate (Barter, 2000) and comparisons are difficult to make. This is because motorists do not have to report crashes to the police if there are no serious injuries. Most small crashes are actually dealt with privately between the parties involved. The fatality rate per vehicle is claimed to be more relevant since it highlights the serious impacts of crashes.

Another dispute which occurred is about the unit of this target, i.e. 'per 10,000 vehicles'. From this perspective, road risks will be reduced and the objective of traffic safety will be a success if the *'fatality rate has been reduced to 1.3 per 10,000 vehicles'*. However, this indicator has been criticised as incapable of giving a complete and accurate picture of the safety issue. This is because the increase in safety may be largely offset by increased vehicle ownership, even if the target were to be achieved. A similar argument has been applied to the mileage-based crash rate analysis. To counteract the above technical problem of measurement, it has been suggested that there should be the addition of another relevant target of *'75% reduction of total road accident from the 1998 level by the year 2020'*. It is believed that both targets together will have implications for policy measures thereby ensuring the achievement of the road safety objective.

5.3 Difficulties Faced in the Process of the Design and Selection of Policy Targets

In the process of design and selection of policy targets, there are several difficulties faced by the researchers and local transport experts in setting challenging yet practical yardsticks to measure the achievement of sustainable transport objectives. These problems will be discussed below.

5.3.1 Dilemma between Setting Desirable or Practical Targets

As sustainable transport itself is a progressing concept, a means rather than the end in itself, it is very difficult to pin down exact ways to measure it.

In the process of setting targets, there were constant dilemmas faced by the researcher and local transport experts when deciding on appropriate measures for the targets, i.e. between what was desirable and what was practical. At target has to be sufficiently challenging but at the same time workable. In the process of target-setting, local transport experts showed a tendency to select targets pragmatically and to set them practically. This is understandable as it is an enormous commitment to take up a target, and failure to achieve it could easily lead to the failure of a plan or strategy. Unattained targets are common in Malaysian transport planning history. Overseas experiences also do not differ. For example, the target for modal split of private: public transport has been set at 60:40 since 1980 in Kuala Lumpur, but it has never been achieved. The failure to achieve the target would inevitably give an impression of the failure of policies and plans. This subsequently poses a difficulty for planners setting targets at the outset.

In this research, local transport experts were guided in setting policy targets in a more challenging way in order to push for more drastic changes to the present unsustainable transport system. However, there are also compromises to be made in respecting the local

knowledge of transport experts in Kuala Lumpur, such as discarding the target for total vehicle ownership and total mileage and modifying the modal split target.

The issue of achievement of targets and objectives will be further discussed in Section 5.4.1.

5.3.2 Compromising on Second Best Targets Due to Aggregation Difficulty and Unavailability of Data

To some degree, the targets are best developed through increased disaggregation, for example, by type of location, age group and trip purpose. Indeed, the significance of sustainability indicators is that in many ways they are about disaggregation, about revealing overlooked details in recognizing the complexity of a system. Nonetheless, the more disaggregated the data are, the more difficult it is to obtain the data. It is costly and time-consuming to collect disaggregated data, and it is even more difficult to obtain consistency when comparisons need to be made between disaggregated data (past and present or regionally and nationally). In the Malaysian and Kuala Lumpur cases, many data simply do not exist at the disaggregated level most of the time. The researcher and local transport experts faced huge difficulties in accessing the right type of data (for example, the historical data of household expenditure on transport by lower income groups) for comparison purposes. The aggregation target, on the other hand, would be too vague and less appropriate. In the process of design and generation of policy targets, the researcher and local transport experts faced some difficulties when looking for the best targets available as a result of this weakness. Nonetheless, when there is no perfect target to opt for, the second-best alternatives must be used, as this is better than no target at all. Accurate and consistent data collection related to important transport indicators in Kuala Lumpur and Malaysia should be regarded as an urgent task by transport authorities.

5.3.3 Overeagerness to Achieve Targets rather than to Develop Policy Measures

One of the roles of policy targets is to focus the attention on the link between the future state of development, policy generation and policy implementation processes. Similarly, the targets will give an indication of how far an image or policy measure has succeeded. However, as its inherent value is indeed influenced by the achievement of an image and policy measures, it sometimes occurs that achievement of targets becomes more important than the policy itself. In pursuing the accomplishment of an objective, the transport target has sometimes becomes the pivotal goal for local transport experts.

In the process of setting a target, local transport experts have repeatedly emphasised that certain targets should not be included in the final list, as they were afraid that such targets could not be achieved. Achievement of targets is unfortunately only one aspect of the whole perspective in the final analysis of policy implementation; it gives an indication of either how positive or negative a policy path has been, but it can never capture the overall complexity. Therefore, sole concentration on achievement of targets in one way or another misses the point. The significance of targets is that although they should be taken seriously, they cannot replace the importance of a policy. Biased attention to achievement of targets may lead to the exclusion of some useful policy measures that would not help to achieve the targets. For example, car-sharing is a policy that will contribute towards sustainability although the measure itself does not help to achieve the target of ratio of private: public transport.

5.4 Discussion about the Final Policy Targets

5.4.1 Policy Targets to Measure and Indicate the Sustainable Transport Objectives

As mentioned at the outset of this chapter, one of the major tasks of policy targets is to measure and indicate ten sustainable transport objectives. Can the final selected targets accomplish the task?

The five policy targets link directly to the objectives of *reducing accidents; reducing traffic pollution; providing affordable transport for disadvantaged groups; enhancing accessibility by public transport and non-motorised modes and reducing automobile dependency*[49]. They also link indirectly to other transport objectives (see Table 5.7). Judging from the linkages between the final policy targets and transport objectives, it is fair to say that the policy targets are multi-faceted and they cover the three domains of bi-dimensional sustainability aims and the ten sustainable transport objectives. Working towards the targets, therefore, indicates the right direction towards achieving sustainable transport.

However, one should be cautious about *perceiving the achievement of a target* as being equivalent to *achieving sustainable transport objectives.* It has to be noted that a *target* represents a much narrower perspective of a broad *objective* (for the purpose of measurement). Therefore, in the discussion of whether or not a sustainable transport objective could be achieved, apart from target itself, wider implications have to be considered.

On the other hand, one should also be cautious about having the perception of *not achieving target* as being equivalent to *not achieving sustainable transport objectives.* People tend to feel that tension occurs (see Section 5.3.1) when there is a gap between some desirable (ideal) state of affairs and the actual stage (performance) of the system – that is, when targets are not reached. Indeed, the proposition that targets for sustainable transport should be 'achievable' is a contentious one (Black et al., 2001). In a dynamic system such as transport, given changes in technology, scientific knowledge, community aspirations and behaviour, Black et al. (2001) argue that there is little sense in having a 'realizable' target (other than political expedience) without resort to its revision. It is more important to view urban sustainability from the perspective of relative performance associated with different Images.

[49] Coincidentally, the objectives that are directly linked by the final policy targets also appear to be the 'key element' objectives (see Figure 4.10), which the local transport experts had prioritised in Chapter 4. It is worth noting that, subconsciously, local transport experts have consistently expressed their views about the same areas of concern throughout the process of formulation of sustainability goals, objectives and targets.

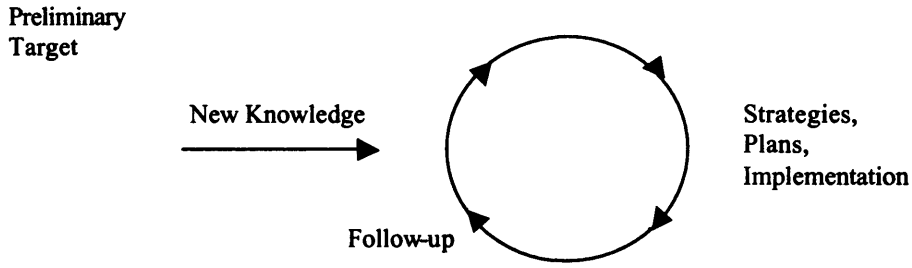
In short, if the selected targets were to be achieved, they would make a huge improvement in the present transport system. Even if the targets could not be achieved fully by the target year, any improvement would be meaningful as it would show that efforts were being made in the direction of the path towards sustainability.

5.4.2 Targets and Time-scale

Indeed, as mentioned before, the targets are so challenging (tough) that it is rather doubtful that they could be achieved according to the time-scale set in this project. One of the reasons for setting the year 2020 as the reference year for the project is to conform to the time limit of a higher vision (Vision 2020, which envisages Malaysia becoming a developed nation). As Malaysians have been exposed to Vision 2020 throughout the last decade, it is much easier to discuss future development with local transport experts using the same temporal scale, so that they may imagine changes (e.g. technological improvements and changes in social structure) according to their familiar future time-span. However, the period up to the year 2020 is certainly a short period of time for certain changes to happen; for example, technological changes (e.g. alternative fuel vehicles) may need far more time to be able to reach the mature level required by the city's market.

Therefore, the setting of a target for the chosen year 2020 should be seen as tentative and may be subject to change. As Black et al. (2001) state, targets that remain constant and inflexible over a long period of time are unlikely for a transport system. The Commission Expert Group for Transport and Environment (2000) stresses that the process of setting policy targets and measuring targets should be an interactive one, in which new knowledge will be taken into consideration after the implementation of strategies and plans. This raises the important issue of *intermediate targets,* which need to be established to indicate a suitable route towards the long-term targets. As Figure 5.4 illustrates, intermediate target-setting is basic to the circular process of identification, monitoring and modification of action programmes.

Figure 5.4 Use of Intermediate Targets as a Basis for Action Programmes



(Source: Commission Expert Group for Transport and Environment (2000))

In this project, it has to be noted that the final targets identified for the year 2020 should be treated as intermediate targets for the very long-term sustainability aims. Targets are in need of monitoring and revision where appropriate. For example, it may be that there will be an earlier breakthrough in technological improvement (say, full-cell vehicles), thus the vision and target would have to be revised accordingly.

5.4.3 Interim Targets within the Project's Timescale

On the other hand, from the present to the reference year, there is also a need to identify interim targets in the short term, for example, interim targets for the years 2008 and 2014. Sustainability requires deliberate attempts to bring about long-term change in a step-by-step manner, and the lack of interim targets sometimes makes it impossible to assess the progress towards final goals.

A clear set of interim targets is therefore necessary to judge whether the policies are beginning to deliver the anticipated positive changes. Interim targets allow follow-up and new findings from the process of monitoring to lead to a modification of the targets, and also to provide solid evidence for 'revision' (as discussed in Section 5.4.1 above) if necessary.

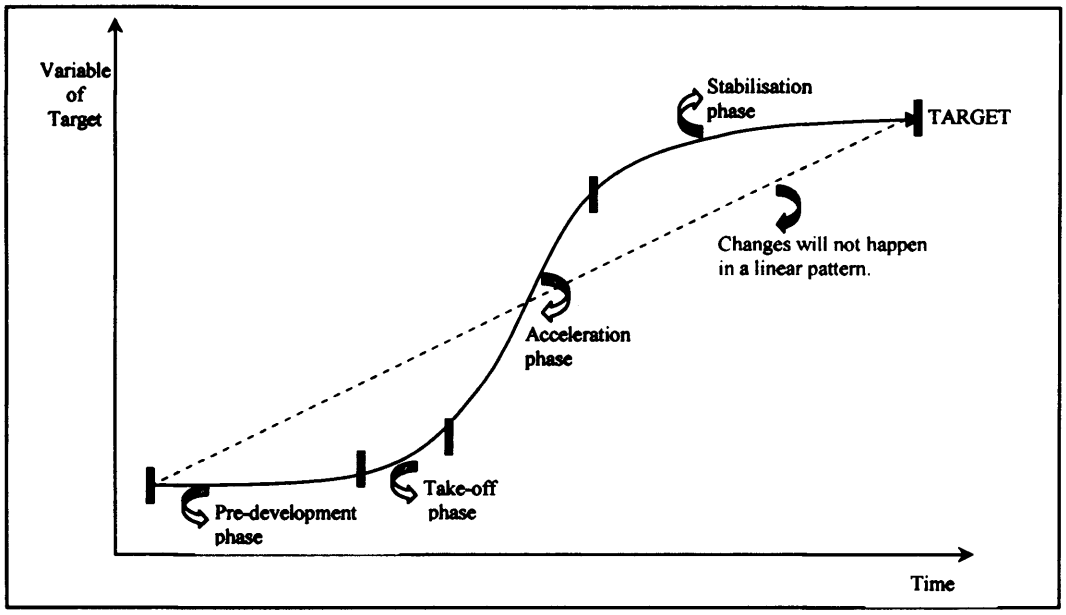
Table 5.9 below presents the interim targets based on the assumption of changes in parallel with linear characteristics.

Table 5.9 Interim Targets According to Linear Pattern

Interim Target I		Interim Target II		Final Target	
2008		2014		2020	
18.75% reduction of CO & NOx emission from 1998 level by the year 2020		46.87% reduction of CO & NOx emission from 1998 level by the year 2020		75% reduction of CO & NOx emission from 1998 level by the year 2020	
Less than 26.25% of household expenditure would be on transportation costs by lower income groups		Less than 20.62% of household expenditure would be on transportation costs by lower income groups		Less than 15% of household expenditure would be on transportation costs by lower income groups.	
More than 12.5% household access to high-quality public transport and non-motorised modes within 200 metre distance from home.		More than 31.25% household access to high-quality public transport and non-motorised modes within 200 metre distance from home.		More than 50% household access to high-quality public transport and non-motorised modes within 200 metre distance from home.	
Reduce fatality rate to 1.3 per 10,000 vehicles		Reduce fatality rate to 1.3 per 10,000 vehicles		Reduce fatality rate to 1.3 per 10,000 vehicles	
18.75% reduction of total road accidents from 1998 level by the year 2020		46.875% reduction of total road accidents from 1998 level by the year 2020		75% reduction of total road accidents from 1998 level by the year 2020.	
Ratio Private: Public 57:43		Ratio Private: Public 51:49		Ratio Private: Public 45:55	
Car	40.9	Car	37.9	Car	35
Motorcycle	16.0	Motorcycle	13.0	Motorcycle	10
Bicycle	5.6	Bicycle	5.8	Bicycle	6
Pedestrian	19.3	Pedestrian	20.6	Pedestrian	22
Rail	2.1	Rail	3.5	Rail	5
Bus	15.2	Bus	17.6	Bus	50
Others	0.8	Others	1.4	Others	2

However, the process of change in a transition (towards sustainability) is non-linear. Kemp and Rotmans (2002) have provided a detailed discussion of a logical pattern of changes towards sustainability. As shown in Figure 5.5., they state that slow change is usually followed by rapid change when policy measures reinforce each other; this in turn is followed by slow change at the stabilisation stage.

Figure 5.5 Different Rates of Change at Various Phases in order to Achieve a Target



(Modified from Kemp and Rotmans (2002))

Apart from that, it is necessary also to be aware that changes will vary depending on the different policy paths adopted. Some policy measures will provide a quick fix to the problem and changes may happen in a very short period of time (shorter pre-development phase and steeper slope in take-off phase), for example car restriction schemes and stricter regulation in order to reduce air pollution levels. Others may need a longer period of time to have an impact on the same problem, for example land-use planning. As shown in Figure 5.6 on next page, there are many different paths towards the targets.

Therefore, when progress is interpreted against an interim target, it has to be treated with caution. For example, a policy path that employs land-use planning as its main strategy may fail to achieve the linear-pattern interim target in the short term, but that should not be

Figure 5.5 Different Rates of Change at Various Phases in order to Achieve a Target

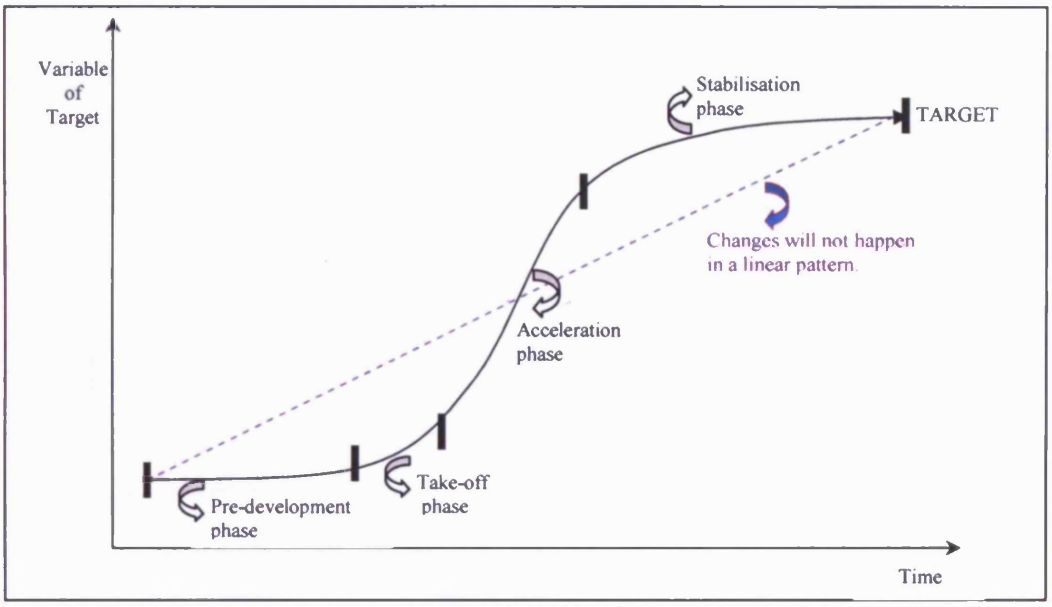


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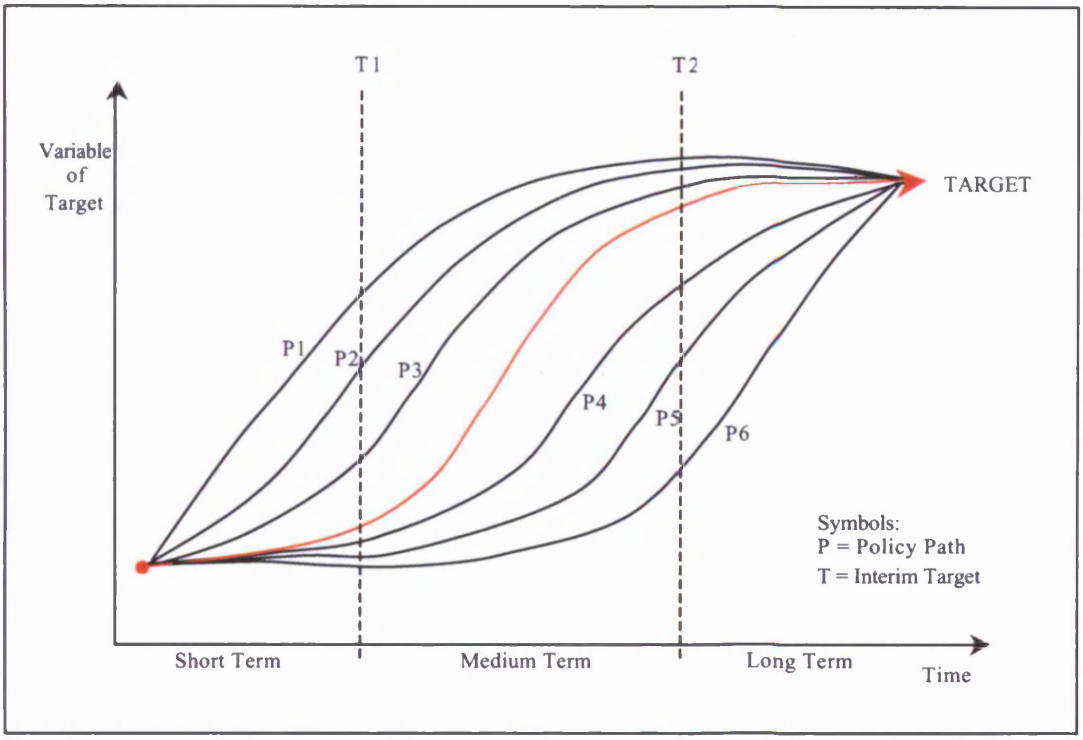
Figure 5.6 Examples of Other Policy Paths towards Achievement of Targets



interpreted as failure of the policy. The strength and effect of the policy will only be obvious in the long term, which is due to the inherent characteristic of land-use planning (e.g. this may be represented by curve P6 in Figure 5.6). Policy-makers have to relate the rate of changes to their selected policy path. They also need to realise that even though changes will not happen in the short term, it is important to make efforts *now* to facilitate the changes in the long term.

Alternatively, the appearance of failure to achieve interim targets may be avoided by setting different interim targets according to the different policy paths. In the real-world, it would be very useful to analyse the interim targets in much greater detail. It is particularly worthwhile to do so after the selection of an Image has been made and its policy package established (see Chapters 6 and 7). This step is, however, not included in this project, as the research will concluded by presenting three alternatives for the future (rather than selecting one to be adopted as the official version of the future image for Kuala Lumpur).

5.5 The Inputs from Local Transport Experts at the Targets Selection and Modification

Local transport experts did not have input into the framework of design and generation of targets, but they were closely involved in the selection and modification of the project targets throughout the process.

The aim was to develop a set of optimum targets that would be able to achieve the sustainable transportation objectives that had been outlined before. To carry out the task, local transport experts assessed, discussed and validated tentative targets that were presented to them. They evaluated the appropriateness of target-setting (either too tough, not tough enough or sufficient); they also discarded the unsuitable targets and refine those that were selected ones (see Section 5.2, Chapter 5).

There was no formal format to enable the discussion to come up with the final set of targets. Nevertheless, the researcher observed that there was a common way of thinking for local transport experts in carrying out the task of target selection. Generally, they were used to considering a particular suggested target and comparing it to the 'business as usual' trend, and this was followed by a comparison with the level of success in other cities in the world. They then brought back the discussion to the context of the local environment. For the last step, the judgements were mainly based on their comprehension of Kuala Lumpur's transport situation.

The process of thinking and discussion seemed sensible and logical, as it provided a systematic channel to carry through the discussion without much difficulty. However, in the process of the discussion the researcher found that many comments about the targets given by the experts were not ambitious enough to achieve sustainability. It was difficult to persuade them to formulate the target according to their 'wishes' for sustainability. It seemed that they felt more comfortable with a '*practical*' target than a '*desirable*' one. On many occasions, they expressed the feeling that they do not have the confidence to set a target equivalent to that for developed countries, let alone setting stricter targets. It is helpful to

present examples of success stories from developing countries, such as the Bus Rapid Transit System (BRT) in Bogotá, to local transport experts to overcome the issue of confidence in this aspect.

On a few occasions, the discussion about target-setting had diverted from the underlying sustainability aim. This happened in particular when the discussion dealt with *strict* targets, such as proposals regarding overall traffic growth and ownership, land for road building purposes and modal split. The researcher had to repeatedly remind the local transport experts that they should focus on the need to achieve sustainable transportation, rather than the practical issues of difficulties they faced in the real world.

These imperfect inputs from local transport experts resulted in some limitations to the study and these will be further commented on in Sections 9.3.2., Chapter 9.

All in all, local transport experts still managed to contribute a significant input into the search for and refinement of the final set of targets. At the same time, they validated the selection of project targets.

Table below summarises the important modifications adopted in this chapter as a result of local transport experts' views.

Table 5.10 Important Modifications Adopted at Chapter 5 and Other Relevant Sections in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their View	Relevant Sections and Chapters
Involvement in the whole process of selection and modification of the policy targets. Discussion of the roles of each transport mode in Kuala Lumpur: - private vehicles are important for accessibility purpose. Their adverse impacts may be eliminated by other means, i.e. better management, technological improvement, etc.	Decision about the discarded and the selected targets. Modification of the setting of the final targets. Setting target for modal split and aggregation of each travel mode. - much more realistic about targets for private vehicles. -	Section 5.2, Chapter 5. Section 5.2.2 (Diversity of modal split) Chapter 5.

Table 5.10 Important Modifications Adopted at Chapter 5 and Other Relevant Sections in this Thesis as a Result of Local Transport Experts' Views (continued)

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their View	Relevant Sections and Chapters
- debate about the role of the motorcycle. It is an affordable mode, but it brings many negative impacts, such as accidents and pollution. Could technology help to eliminate the impacts?	- targets for motorcycles have been set a bit higher than expected, for the social equity objective.	Section 5.2.2 (Diversity of modal split) Chapter 5.
- Little further investment expected on more rail development apart from the present planned rail-based project in 20 years time	- target of rail mode has been set according to present rail development, i.e. 5% of total travel trips by the year 2020	
- emphasis on buses and walking	- targets for buses and walking have been set a bit higher than expected.	
Generally, LTEs show great interest and confidence in technological improvement of transport modes, including cars, motorcycles and other creative alternative forms of transport. They were also interested in finding other travel means, such as new forms of transport ownership (private and public).	This set the tone for technological improvement of vehicles in Images. For example, the Foresight Vehicles in Image I, the Community Plan and Vehicle Clubs in Image II and Image III etc.	Policy packages in Chapter 7.

5.6 Conclusion

This chapter has identified policy targets for sustainable transport for this project. The whole process of target design, generation and selection begins with a scoping exercise. It then justifies the target identification process from the early stage with a 'top-down' approach for selecting indicators to the later stage of a 'bottom-up' approach to provide measures. Although the chapter has explained the process in a systematic way by describing it step by step, the procedure involved was indeed an iterative one, in which every comment and input either from literature or a respondent has been reviewed and examined in an iterative process.

For environmental targets, there is an objective scientific basis for setting targets or limits, such as the level of pollution having an effect on health. Science can at least define a gradient along which the appropriate limit for environmental quality can be set. However, on the social and economic side, limits or targets are much more value-laden and thus targets cannot be absolute but must be relative to each society's concepts, goals and values. They can only be decided within a country or culture, and preferably on the basis of wide consultation and participation. Local transports experts have played a prominent role in this respect.

In designing and generating targets, it was a challenging process to find the best ones. Targets that can fulfil all criteria are very limited. When the ideal targets are not realistic, alternatives have to be sought as second-best. As it was not possible to develop an individual target that possessed all criteria, they should be represented by a combination of a given set of targets and should cover the economic, social and environmental domains. The achievement of these targets is believed to lead directly towards sustainable transport in Kuala Lumpur. Interpretations of achievement of targets have been discussed, and the relationship between interim targets/final targets in relation to time-scale is highlighted. The targets established in this chapter are regarded as one of the major inputs for scenario building of Images of the Future and policy measures and packages in Chapters 6 and 7.

CHAPTER SIX
DEVELOPING IMAGES OF THE FUTURE

6.0 Introduction

This chapter presents the Images of the Future for the transport system in Kuala Lumpur for the year 2020. As emphasised by Robinson (1990), *the scenario analysis is the heart of the backcasting study;* this is where the normative content of the study finds full expression, as attempts are made to develop alternative future (Images of the Future) that link present conditions to the goals and targets. Three Images of the Future have been selected combining external factors or contextual elements (outside the scenario-building process) and strategic elements (included in the scenario-building process) to present visions of the future (the year 2020). This chapter explains the process of scenario construction and the details of each Image. The involvement of local transport experts in establishing the images will be explained in the last section of this chapter.

6.1 What is an Image of the Future?

The leading ideas in backcasting studies are the provision of interesting Images of the Future and the highlighting of strategic choices. But what is an Image of the Future?

First of all, the future cannot be predicted in a scientific sense; only different scenarios of the future can be drawn (Topp, 2002). As is further quoted in Topp's paper, '*we know some aspects of the future or at least we can assume them with a certain probability, but we principally cannot know what we will know in the future, otherwise we would know it already today*'. In a scenario building exercise, the future is not given but is constructed in the Images of the Future. Images of the Future depict the different future scenarios by clarifying alternatives, assumptions and probabilities, and by taking into account the plausible

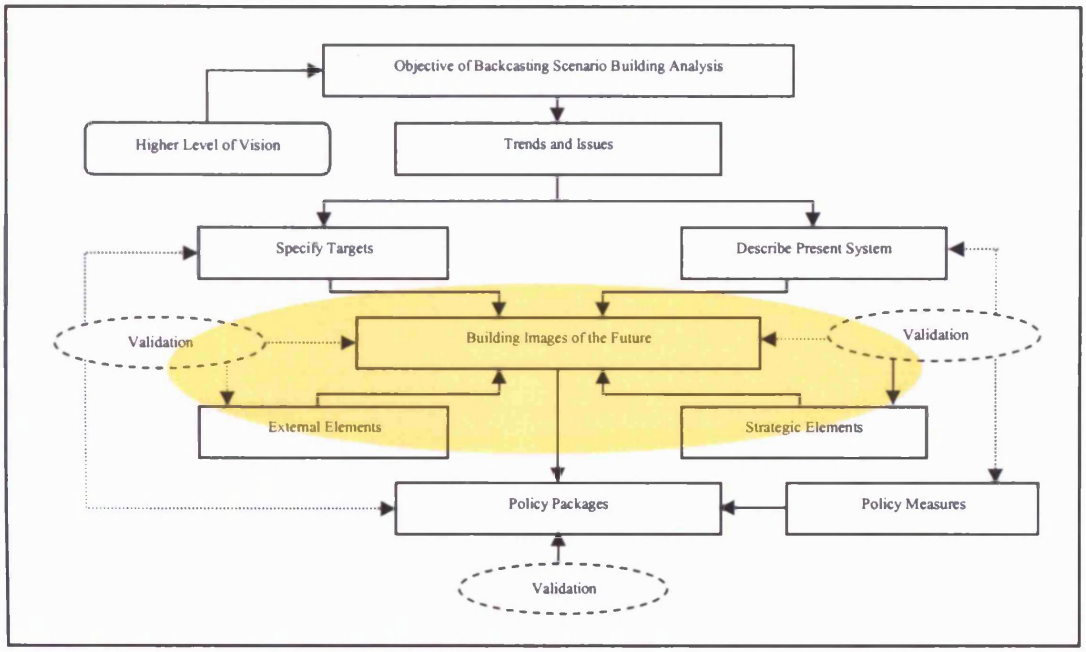
influential factors relating to both external and internal elements. These may be social, economic, political, environmental, scientific, technological, etc. By making different assumptions about these key influences, different 'stories' are formulated about how they interact. The Images of the Future are effectively these stories.

The purpose served by attempting to foresee the distant future and the value of describing a transportation system in 20 years is to ***illustrate the possible futures.*** Images of the Future can '*take the human mind out beyond the boundaries of currently constituted reality – beyond trends, forecasts and the like – and feed our capacities for speculation, imagination and social innovation*' (Slaughter, 1996). It has the potential to generating awareness of factors and impacts, which may not have been identified through formal forecasting methods. Having vividly represented the Images of the Future, these futures may easily be related to what has been discovered about the present situation, and may also inspire the imagination of various policy options in relation to these futures. Most importantly, the Images of the Future may be used to test strategies and targets to be achieved. For example, use the strategy that is the most robust as the preferred or most logical in each image; and, decide which image is the most environmentally friendly. Images of the Future hence provide new insights and display options that would not have been found with other future studies methods (Höjer, 2000).

6.2 The Process of Constructing Images of the Future

Referring to Figure 6.1 below, the construction of Images of the Future is at the centre of scenario building, as indicated by the symbol .

Figure 6.1 Outline of Backcasting Scenarios Method



As the figure shows, there are four major components which constitute the basic input into building the Images of the Future. The first component, the present system, has been presented in Chapter 2; the second component, the policy targets, is referred to in Chapter 5. These first and second components represent the starting and the end reference points for the transport system in Kuala Lumpur. Images of the Future aim to achieve the targets and make significant changes to the present unsustainable transport system. With these two reference points in mind, the alternative options have been constructed using the two other elements – the external elements and strategic elements in the framework.

As explained in Section 3.4.4, Chapter 3, the external variables in this project refer to driving forces and conditions that are beyond the control of transport policy-makers but will

influence the industry significantly, while strategic elements are variables that have direct impacts on the transport policy-making process

Having identified the external elements and strategic elements, Section 6.2.4 will discuss the development of Images of the Future by combining the elements, and the process of selecting the Images.

Local transport experts were invited to make their contributions to the whole process of constructing the Images of the Future. They were involved in commenting on the external and strategic elements, the process of selecting the Images and the fleshing out of the final ones that were chosen (see Section 8.3.2.4, Chapter 8).

6.2.1 External Elements

One of the purposes of scenario-planning is the highlighting of large-scale forces that control the direction taken by the future, so that if this does occur, the planners and decision-makers will at least recognise what is happening. In this project, these forces are referred to as external elements, and it is important to make them visible.

Like many countries in the world, but particularly developing countries (i.e. Malaysia), the economic environment is always the main factor that influences the pace of development, together with various national policies. Experience from past years suggests that the demand and supply structure of transportation and technological changes are highly attributable to economic trends. Many of the past trends reveal that individuals are also influenced in everyday life as higher incomes have led to increased vehicle ownership, rising consumption of transport goods, and the construction of new infrastructure (which in turn, has encouraged the generation of additional traffic). It is believed that the economic environment has had a profound and widespread influence in the long run on the transport system. Hence in this project a range of economic environments are explored in the course of building the Images of the Future.

6.2.1.1 Globalisation, Localisation and Nationalisation

To formulate the future economic environment, the first element is the **degree of interconnection and interaction of the global economy and industrial strategies.** This refers to the concepts of globalisation and localisation, the major industrial trends in the global economy. The prevalence of either industrial strategy in the future with the different levels of technological change will have a strong impact on economic and employment structures and consequently transport investment, as well as the travel demand in Malaysia. Three assumptions about these global economic trends have been identified as follows:

- ***The case of a prevailing industrial globalisation economic trend.***

Under the Fordist global economy system, Malaysia's economy was primarily relegated to the periphery of the world system. In future, in order to grasp the opportunities afforded by the same globalisation trend, Malaysia may continue to play its role as a recipient of multi-national corporations (MNC), with their advantageous business environments – stable and pro-business government, low-cost natural resources, relatively low wages and increasingly affluent consumers. In meeting the competitive challenge from low-wage costs in other developing countries, Malaysia will encourage manufacturing investment to shift from labour-intensive to capital-intensive and technology-intensive industries, to train more semi-skilled and skilled workers, and to move into the semi-periphery of the world market.

In terms of the transport system, major international vehicle manufacturers will have a huge influence on local markets by introducing their advanced vehicle technologies. General industries will be more market-oriented than regulated.

- ***The case of a prevailing localised information economic trend.***

In contrast to the above case, a localised economic trend is a transition from the global economy to one that is based on knowledge and information. The latter trend, indeed, presents numerous opportunities for developing countries that are willing to address them strategically. As suggested by Perez (1983), the shift to an information economy will open up new 'windows of opportunity' for latecomers. This is partly because the new technologies allow 'leapfrogging' for those countries not held back by the inertia of the previous industrial structure.

Malaysia, in its quest to move onto the world economic stage, will adjust to the reality of the new era and the way in which information and communication technology (ICT) is changing the world. Indeed, at present the National IT Agenda (NITA) and the Multimedia Super Corridor (MSC) have been designed to explore and exploit the potential of ICT to create a society that is 'knowledge-savvy' (Badawi, 2000). If the trend towards a localised information economy prevails, and Malaysia tries to develop in this direction in order to become a core world player, then the whole structure of society will change in numerous ways. E-commerce opens up opportunities for involvement in the global economy, trade will increase, employment creation will shift to knowledge-based industries and research and development (R&D), but at the same time the earlier technical labour from the industrial economy will no longer be required. (Cogburn, 1998).

Contrary to *market principles* in the globalisation trend, localisation emphasises the intervention of government to guide the orientations of general industries. Everyday life will also change in the context of this economic trend. In Kuala Lumpur's case, this will mean a major change from a car-dominated city to local alternative means of transport, complemented by the advanced information and communication technologies.

- ***The case of a prevailing nationalised (select and pick) economic trend.***

In between the two extremes of globalisation and localised economic trends, there is another option – the nationalised economic trend. In this case, the federal government intervenes in

the market to a certain extent. The Malaysian government would carefully select certain industries to remain in or be added to the Malaysian and Kuala Lumpur markets, while others would be regulated for the sake of local benefit.

A nationalised economy provides a platform to receive the mixed effects of globalisation and localisation, from the point of view of economic and employment structures. On one hand, skilled and semi-skilled workers are trained to fulfil the demands of the global manufacturers; on the other hand, knowledged-based employment will also be increasingly required as the local information economy flourishes.

The Malaysian government will invest enormously in the local information and telecommunications industry, especially in Kuala Lumpur and its surroundings. Certain lifestyle changes due to its impacts will be observed, although it will certainly not be as dramatic as in the localised economic trend.

It is sensible to predict that local vehicle manufacturers will be protected and rigorous restrictions in the form of taxes will be imposed on foreign vehicle manufactures. National cars and motorcycles will continue to dominate the local market. The local vehicle market in Malaysia is less influenced by the other major international vehicle manufacturers. In parallel with this observation, any technological improvement to curb adverse environmental impacts will depend greatly on the research and development (R&D) in local vehicle manufacturing.

6.2.1.2 Economic Growth

The second external element is economic growth[50]. The average level of income per person in Malaysia indicated by GNI per capita[51] has a direct impact on household affordability,

[50] Modified economic growth, which takes into account the environmental impacts, is a better expression for sustainable development (as defined in Chapter 2) and was initially considered for use as an external element in this project. However, at the time this project was carried out, the indicator for green GNP (Gross National Product) was still under intensive research and is yet to be established for usage in any national statistics, not to mention the Malaysia statistics. Therefore the GNI (Gross National Income) per capita (adopted by the World Bank in 2004) is used, rather than green GNP. In the future, this external element should be replaced by

consumer choices and spending patterns. This external element therefore has a huge influence on the feasibility of transport policy as well as personal transportation choices.

Considering that a developing country needs strong economic growth in order to progress quickly in the direction of development, all three cases identified in this project would have relatively strong growth for the next two decades, i.e. a GNI per capita per annum growth of 4%, 6% and 8%. Nevertheless, a strong growth in GNI per capita cannot reflect the whole quality of life of the country, as it does not always lead to improvements in environmental conditions, human welfare or the social quality of life. It also does not reflect the distribution of national wealth. Hence, it should not be confused with the overall aim of sustainable development. The three cases shown here reflect several economic aspects (government and household spending affordability) of alternative futures and some concern is raised with regard to their consequences.

- ***The case of high economic growth (8% of GNI per capita per annum)***

In this case, the rise in income among Malaysians will increase enormously, living standards will also increase with more leisure time and greater purchasing power. The same increases in the spending power of the government will increase infrastructure development and other facilities. Education, learning and research and development will be very much emphasised to maintain the pace of development. On the other hand, the rapid growth may also place severe strain on the environmental dimension. The rapidly growing economy may also present a high risk of an economic crisis like the problem faced by Malaysia from 1997 to 1999. Government needs to take extra care to monitor the issue of economic stability and the extra pressure on the deteriorating environment.

- ***The case of moderate economic growth (6% of GNI per capita per annum)***

More measured but still substantial moderate economic growth will equally benefit society and government in relation to the various aspects described above, but at a modest pace.

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modified economic growth in which the indicator for green GNP will be well-established as the measurement of national progress.

[51] This indicator GNI per capita is adopted in line with the new terminology used by the World Bank to replace GNP per capital. For further information about this indicator, please refer to website http://www.worldbank.org/data/databytopic/

Malaysia will follow the new technology and information trend, but the possibility of leapfrogging over richer industrial economies will not be as strong. Environmental pressure will not be avoided in this case, but the adverse impacts due to economic growth are much more under control. Fewer gigantic or mega-projects will be undertaken. People will spend with more prudence.

- ***The case of low economic growth (4% of GNI per capita per annum)***

Emphasis in this case will be placed on slow, stable and sustainable economic growth over a long period. As the growth rate will be much slower, it gives more time and space to adjust to the progress of development in harmony with the environmental dimension. Quality of life will improve as people change their lifestyle. Generally, people will consume with much more prudence and less extravagance than in the above two cases. Government will also adopt a similar attitude towards infrastructure development. The concern raised about this aspect is that wealth creation will not fast enough for the benefit of the whole spectrum of society. The inequality of wealth distribution does exist and the lowest income groups cannot benefit as much as in the above two cases.

6.1.2.3 Employment Structure

The last element that has been taken into consideration is employment structure. In future, this will again be changed as industrial and economic development is transformed in Malaysia. Employment structure is highly sensitive in its response to global economic trends and industrial strategies. In Malaysia, trends and efforts have been observed to be moving in the direction of capital-intensive instead of labour-intensive industries. Ambitious plans have also been seen in Vision 2020 to transform society into a knowledge-based one, in which research and development (R&D) will be strongly emphasised. In addition to ensuring that the professional labour force possesses not only the required knowledge and skills, efforts will also be made with respect to discipline, high moral value, good work ethics and other positive values. Three cases have been identified to discover to what degree the employment structure will change in twenty years' time:-

- ***The case of a dominant technically based employment structure (70:30 technically based: knowledge-based)***

In this case, semi-skilled and skilled workers will comprise a huge proportion of the labour force. The majority of society has received technical and vocational education, providing a sufficient pool of skilled labour. Skills training programmes will be intense in order to produce an adequate supply of workers. Generally, in terms of social dynamics, there are no dramatic changes from today's pattern to be expected.

- ***The case of a dominant knowledge-based employment structure (30:70 technically based: knowledge-based)***

In this case, knowledgeable, highly skilled and computer literate manpower will comprise the majority of the work force. To meet the need for this knowledge-based manpower, tertiary education will be expanded both in terms of physical facilities and enrolments. R&D will be strengthened, especially in information technology and related subjects. It is believed that a predominantly knowledge-based employment structure will have huge impacts on social dynamics, including demographic issues (e.g. more women in the workforce, more patterns of home-based working) and issues of values and lifestyle.

- ***The case of a balanced structure (50:50 technically based: knowledge-based)***

In this case, there is a balanced structure between skilled and knowledge-based employers. This would be a transitional period between the two cases.

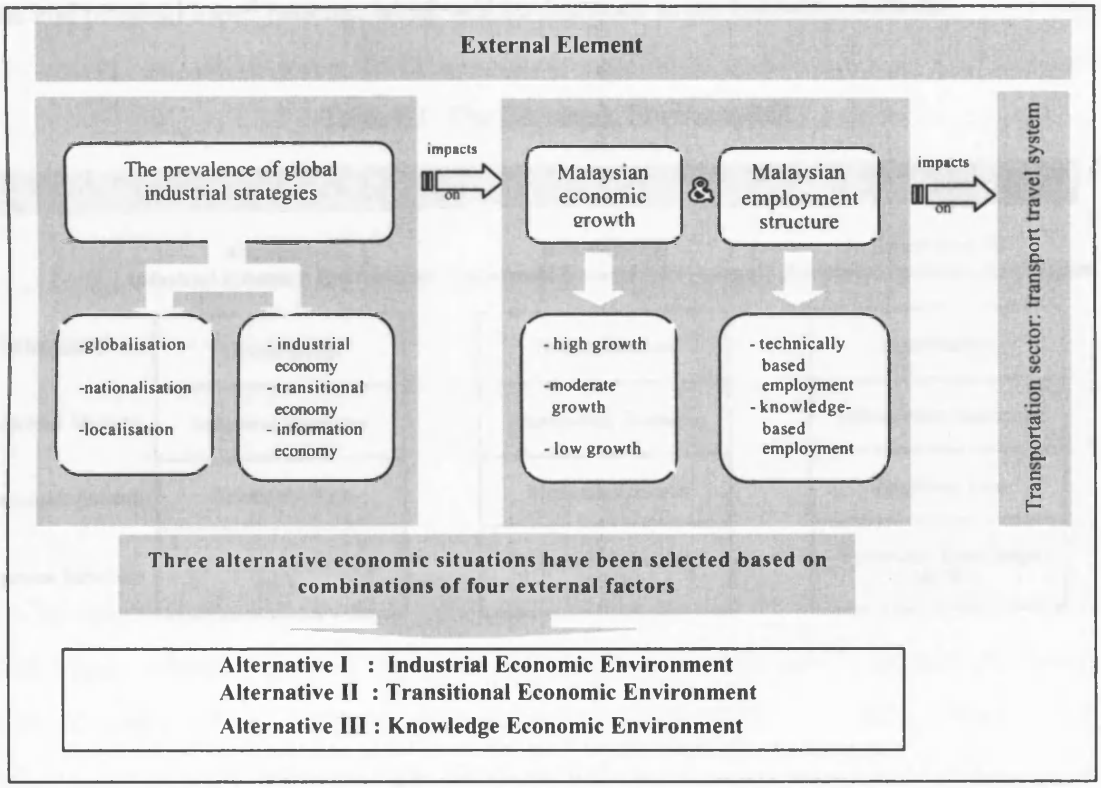
6.2.2 Degree of Interconnection and Interaction of the Global Economy, National Economic Growth and Employment Structure

Figure 6.2 summarises the three external elements and their relationship in a graphic form. It is a *simplified* version of how the transport sector would be influenced by these three external elements. It has been called a *simplified* version because, in reality, there are indeed many complex and interlinked relationships between the transport sector and the external elements.

However, only the core ideas are adopted in this study for the purpose of succinct analysis. The main aspects of the rationale behind this graphic representation are:

- At a higher level, not only will global industrial strategies directly affect the products and services in a country via imports and technology exchange, they will also have significant impacts on national economic growth and the employment structure. Kuala Lumpur, as the economic and commercial hub of Malaysia, will certainly react sensitively towards the impacts of global industrial trends.
- At a regional and city level, the transportation sector as a sub-sector of the urban system, is hugely shaped by the function and operation of the main system. For example, travel patterns refer to the movements of people and goods in daily life, which is mainly reflected by the employment structure.

Figure 6.2 The External Elements



As described above, economic and social structures will be hugely influenced by the degree of fundamental transformations in the global economy, degree of national economic growth,

as well as the employment structure. Successful handling of the transport issues and policy development will very much depend on the implications of a situation combining these three external factors, in which they are highly interconnected with each other. It is our aim to portray the alternative context in relation to these external elements for the Images of the Future to take place. To do so, the researcher has devised three likely economic environments:-

1. Alternative I: Industrial Economic Environment
2. Alternative II: Transitional Economic Environment
3. Alternative III: Knowledge Economic Environment

The features of these three alternative economic environments are presented in Table 6.1. A more detailed description focuses on trends and forces from macro- and micro- economic and social dynamics that would influence the general transport industry, government investment plans and personal travel patterns, which will be discussed in the following sections.

Table 6.1 The Economic Environments

Features of Three Economic Environments			
	Alternative I Industrial Economic Environment	Alternative II Transitional Economic Environment	Alternative III Knowledge Economic Environment
Industrial Trend	Globalisation	Nationalisation	Localisation
Industrial Strategy	Industrial Economy	Transitional Economy	Information Economy
Economic Growth	Relatively High	Moderate Growth	Relatively Low
Employment Structure	Technical: Knowledge 70:30	Technical: Knowledge 50:50	Technical: Knowledge 30:70

6.2.2.1 Alternative I: Industrial Economic Environment

Globally, in this Industrial Economic Environment the global vehicle manufacturers and major fuel companies still control the market of worldwide vehicle sales and fuel types. Regionally, due to the pressure from the Free Trade Area (AFTA), Malaysia gradually opens up many of the protected local markets including the national car, Proton. Hence global vehicle manufacturers' policies and plans have a great direct impact on Malaysian vehicles production. The global harmonisation of automotive regulation[52] (GTR) will be well established in this economic environment. By establishing the GTR under the 1998 agreement, vehicles and vehicle parts produced under the common regulations will be easily available on the international market, giving consumers a wider choice, facilitating trade and reducing costs of compliance through the elimination of multiple testing and approvals. The worldwide trend towards cleaner, greener, smaller and technologically advanced vehicles will have huge impacts on Kuala Lumpur's choice of private vehicles.

Nationally, Malaysia enjoys a relatively high rate of economic growth due to continuing foreign investments. Government is generous in spending on projects to improve infrastructure in order to provide continuing support for the high growth economic environment. At the same time, small and medium entrepreneurs continue to prosper as they do at present Generally, household income increases tremendously and people have more disposable income to spend on luxury items, such as advanced gadgets, including car accessories.

Due to intensive training to cope with market demand, there are more skilled employees, which again generates greater benefit to the wealth of the country's as well as households. However, there are no dramatic changes in terms of social dynamics, social values and lifestyles, which remain similar to those of the present.

[52] Efforts made by the World Forum for Harmonization of Vehicle Regulations, United Nation Economic Commission.

6.2.2.2 Alternative II: Transitional Economic Environment

In this economic environment, globalisation does not penetrate every aspect of microeconomics in Malaysia. In the transition from an industrial to a knowledge-based economic environment, government plays a major role in selecting which industries remain traditional and which are encouraged to transform into a knowledge-based one. Nationalisation rather than globalisation influences the major microeconomic trend. National cars will probably continue to be protected from intense competition from global vehicle manufacturers. Also, in the process of transition, some MNC investments are lost to other neighbouring countries with cheaper labour and resources. Hence economic growth is generally slower than in the first alternative. Subsequently, there will be a slow-down in committing large-scale spending on infrastructure projects in Malaysia, more so than in the case of Alternative I.

To cope with the new information age, the Malaysian government invests a great deal in training more knowledge-based employees, whose existence in society will result in some changes in social dynamics. Accessing new ideas and knowledge via the Internet also opens up new thinking and values to society. People may be doubtful about whether the old, traditional way is the one that suits the modern age, and they are much more aware of environmental and social equity issues due to intensive assimilation of information, particularly via the Internet.

6.2.1.3 Alternative III: Knowledge Economic Environment

The Knowledge Economic Environment is a rather difficult alternative to analyse; the major trend can be roughly identified, but there is a high risk of other divergent paths occuring. The macroeconomic trend will move towards the more quickly developing areas of science, technology, business and human practice and hence yield higher results in terms of global economics. But in the Malaysian case, the microeconomics may slow down in the coming 20 years due to the destruction of the pool of technical labour from the earlier industrial

economy. MNCs will give way to the blossoming of localised, relatively small-scale, yet 'high-tech' and highly valued business. Government will shift attention to investing enormously in supporting the ICT infrastructures, e.g. broadband superhighway rather than road highways. Huge investment in manpower will also result in the dominance of knowledge-based employers in the labour market.

Social dynamics are changing dramatically. Demographically, many more women are involved in the workplace than in the above two alternatives. Flexi-working, home-based workers and tele-workers will increase tremendously to take advantage of the Knowledge Economic Environment. Lifestyles will change to suit the new type of modern life surrounded by information technology. The impacts on conventional travel patterns (e.g. home-work-home) are to be expected. Social values will also change completely; traditional thinking and values will become very fragile, influenced by the new age movements that may change the social norms on a very widespread basis, and all of this could happen in a very swift manner. In this economic environment, people may not earn very high incomes but they may spend prudently and refrain from buying unnecessarily luxurious yet environmentally damaging items, for example cars. Spending may be concentrated on information technology gadgets, while maintaining a very high quality of life.

6.2.3 Strategic Elements

Two strategic elements have been identified at this stage. The first main strategic element is technological innovation and the second strategic element refers to behaviour and cultural change. The former is a technical solution to enable sustainability, while the latter is a social engineering approach. Both are described in the following sections.

6.2. 3.1 The Main Strategic Element: Technology and Information Technology

The influence of technology is ubiquitous in today's lifestyle and will continue to be in the future. It is fair to say that people's travel behaviour and their choice of mode are mainly shaped by the transport technology that is presented to them.

As one of the conclusions found in Chapter Four, this study takes the position of pro-technology; it tries to explore the potentials and opportunities as a result of technological improvement to achieve sustainable transport aims, and this is expressed by adopting technology as the first main strategic element.

According to the Oxford Advanced Learner's Dictionary (1990), the term of 'technology' refers to the different types of mastery and utilization of manufacturing and industrial methods; the systematic application of knowledge to practical tasks in industry. To avoid confusion resulting from this wide definition of the term, in this study 'technology' specifically refers to the advanced knowledge used to improve vehicles, vehicle systems, people and their lifestyles for the purpose of sustainable development. It has then been divided into three categories:

(1) Vehicle Type – this includes fuel technology, material science and vehicle design; it is referred to as Automation Technology (AT) in this study. More details about the types of vehicles will be further explored in the following section.

(2) Vehicle System – this refers to technology (usually combined with information technology) that attaches to the vehicles or roadside infrastructures to support the vehicles to enable efficient functioning of the transport system. This has been named Advanced Transport Telecommunication (ATT). Examples of ATT are state-of-the-art traffic control centres, route guidance systems, electronic road pricing, smart cards, pocket terminals, real-time information, etc. The ATT covers both private and public modes that work quite differently to achieve different sustainable objectives. This will also be further discussed in a later section.

(3) People/Lifestyle – this refers to the implications of Information and Communication Technology (ICT) that influence people's lifestyle and behaviour, namely the

existence of the Internet, mobile phones and laptops that allow people to carry on their everyday lives in different ways. Examples of these are tele-working, e-commerce, tele-conferencing, tele-learning, etc. In this study, it is referred to as tele-activities.

Automation Technology(AT)

The automation technology innovation that exists and is likely to continue in the foreseeable future will be motivated by problems that are generated by the proliferation of the automobile itself. It is crucial to develop vehicles that can overcome the congestion problems, making it possible for cars to move more quickly, to improve safety and reduce or eliminate emissions. Some of the technological innovations that are now on the horizon are changes in the means of locomotion. For example, fuel cell technology, alternative fuels and hybrid engines all hold the promise of reducing emission of air pollutants and greenhouse gases. Others draw on developments in material science enabling the building of vehicles and infrastructure that are safer, lighter and more efficient.

Automation and fuel industries, particularly, have invested in intensive R&D programmes to achieve these sustainable objectives. The US and Japanese car manufacturers have developed advanced knowledge of these aspects. Hybrid cars such as the Honda Insight and Toyota Prius and alternative natural gas cars, such as the Chrysler Sebring and Honda Civic GX, have started to enter the market[53]. Enormous efforts have now been put into fuel-cell cars in order to develop the ultimate clean vehicle for the future[54]. Meanwhile, smaller-scale development of advanced technology is also found in relation to two- and three-wheelers, such as cleaner and quieter motorcycles, electric bicycles and neighbourhood vehicles. In the Malaysian situation, it is worth noting that the technological improvements have to include

[53] For up-to-date alternative fuel vehicle available on the international market, please see website http://www.eere.energy.gov/cleancities

[54] US's National Renewable Energy Laboratory (NREL) has up-to-date research information about hybrid electric vehicles (HEVs) and fuel-cell vehicles (FCVs) on their website homepage http://www.nrel.gov/about.html

the motorised two-wheelers. Data shows that motorcycle registration has outnumbered that of autos[55] and they are responsible for a large fraction of total gasoline consumption and also other safety problems.

The applications of AT are not limited to private vehicles; the development of public transport, such as bus technology, has been advanced to reduce air pollution and greenhouse gas emissions via various alternative fuel engines[56].

To achieve sustainable transport, the AT innovations are and will still be considered as important areas for development, especially in view of the massive support they receive fom major car and fuel industries. There are trends showing that some governments in both developed and developing countries have put serious efforts into materialising sustainable objectives via AT. For example, the *California Fuel Cell Partnership* is a collaboration of auto companies, fuel providers, fuel-cell technology companies, and government agencies demonstrating the performance of fuel-cell electric vehicles in California in day-to-day driving conditions. UK IPPR's Motoring Towards Sustainability programme (2003) has examined the role of the car in progressive and environmentally sustainable transport policy. For public transport, a number of cities around the world have upgraded their bus technology and are testing more advanced types of vehicles for their fleet, for examples the Liquid Petroleum Gas (LPG) buses in Vianne and Paris, dimethyl ether (DME) buses in North America and India and hybrid bus programmes in New York and Los Angeles. More examples can be found in the report of the OECD/IEA (2002).

In the long term, the advent of new technologies in transport such as cleaner, more fuel efficient engines, devices which cut vehicle exhaust emissions and noise and also new types of fuel are likely to be the driving forces behind sustainability.

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[55] Vehicle registration in Malaysia by January 2003: motorcycles 48.5% and motorcars 41.7% (Road Transport Department, Malaysia.)

[56] Module 4a - Cleaner Fuels and Vehicle Technologies (Fjellstrom, 2002) gives a comprehensive review of alternative fuel for buses for developing countries.

Factors, such as cost, availability of supporting resources (e.g. fuel type) and infrastructures, public acceptance, appropriateness of marketing strategy and political commitment, will influence the transport technology that a country or a city will adopt. Among others, the costs of R&D, technology transfer, pilot projects and promotion of AT are enormous and governments have to make their decision about which AT technology they are going to invest in for the benefit of the local environment. Alternative options will be explored in the Images of the Future in section 6.3.

Advanced Transport Telecommunication (ATT)

- ***Intelligent Transport System (ITS)***
- ***Traveller Information System (TIS)***

Closely related to the AT's innovations are the developments arising from the application of information and communication technologies. The ability to embed computer processing power into vehicle system components and the growth of wireless communication technologies have opened up a burgeoning class of innovations: the Global Positioning System (GPS), which uses satellite technology to provide the precise location of a vehicle either to its driver or to a control centre. Lakshmannan and Anderson (2000) predict that GPS will be included in all classes of transport within the next decade. Together with closed circuit cameras, wireless telephones, detectors installed in pavements, GPS transponders will be used to gather detailed information on traffic conditions throughout an urban road network. The information is then relayed to drivers in various forms ranging from simple warnings about traffic ahead to detailed directions about alternative routes. The surveillance system also makes it possible to detect and respond to accidents and breakdowns very quickly. In the U.S., Europe and Japan, such major technology programmes are known collectively as the Intelligent Transport System (ITS) which helps improve traffic flow (Johnson, 1996; Tokuyama, 1996; USDOT, 2000)

On the other hand, there are applications of information and communications technology to public transport which gather and assimilate information in similar ways. The purpose is to

make public transport (bus, light rail, rail and metro) function more efficiently. This includes the use of communications and GPS technologies to better manage dispersed vehicle fleets; improved provision of information to passengers about routes, schedules and expected vehicle arrival times; and use of electronic equipment to manage fare collection for multi-modal journeys. To identify the ATT as applied to public transport, this has been named the Traveller Information System (TIS). By improving the productivity of existing vehicles and infrastructure, reducing operating costs, and making public transport a more attractive option for travellers, ATT could achieve sustainable transport aims by providing cost-effective, efficient and environmentally friendly services.

Both ATTs have been widely applied in many cities of the world and have proved to be success stories. For example, the US Department of Transport Federal Highway Administration (1997) has collected 31 successful local government ATT initiatives which include both ITS and TIS applications. There is also an ambitious project, 'Transport Direct', going on in the UK at the time of writing, an effort to promote TIS by using the Internet as its principle delivery medium to offer a one-stop-shop for journey planning, booking and payment services, complemented by real-time update information (TRG, 2001). The Malaysian Government itself has set up an ITS Council to coordinate and monitor the implementation of ITS. The purposes of this council are to deliberate on ITS deployment, set the direction for ITS research, and develop and formulate implementation strategies (McGregor, 2002). These technologies will be embedded in the transport policies in our modern world in the near future, but what type of ATT and how to achieve the overall package for the optimum effect in terms of sustainable transport remains a question. The Images of the Future will explore alternatives for these technologies in different ways.

Tele-activities

As Information Technology becomes pervasive, it becomes a structural vector that influences all economic activities today and in the future. From being the preserve of the few 20 years ago, personal computers, laptops, the Internet and multi-media mobile phones have become necessities - we can use them to shop, bank, pay bills, book our holidays and much more.

There is no doubt that IT unavoidably penetrates workspace, home and all other areas of social interaction, which directly affects how people travel. In this project, tele-activities refer to the use of ICT in production, living, travelling and working via such supporting elements as Internet, email, sms, mobile communication, laptops, etc.

The prevalent participation in telecommunication activities such as teleworking, Internet using and e-commerce result in different approaches to achieving the aims of sustainability. The strength of it is the substitution of physical mobility for accessibility, an outcome due to the *dematerialisation* process. With advanced communications, many products become services. A newspaper becomes an on-line news service; an instruction manual becomes an interactive technical advice service; cinema film reproduction and cinema chain management becomes a video-on-demand service in the home. In this case the negative effects of the physical trips are completely eliminated. It is here that the greatest benefits to sustainability are to be realised.

Nonetheless, there are reservations about such optimistic assumptions being created by tele-activities. Lyons (2002) has criticized this rather simplified conceptualization of the Internet's impact. Recent literature has a more subtle analysis of the impacts of tele-activities on transport in a richer contextual background, and concluded that substitution and stimulation effects due to ICT are happening at the same time, whereby there is substantial scope for reducing some types of (less valued) travel demand, such as the journey to work, but equally it may encourage other (more highly valued) longer distance travel, such as leisure travel. (Banister and Stead, 2003).

The optimistic view of tele-activities upon transport is based on the strengths of those that may provide more choice for end-users and allow more flexibility to carry out the full range of desired activities in a variety of ways. Table 6.2 summarises some of the effects of tele-activities:

Table 6.2 Examples of ICT and Their Implication for Transport

Application	Role of ICT	Impacts on Transport
e-commerce and e-everything (Production)	Internet, sms, email, etc.	May reduce the need for the movement of goods in certain cases – for example, music is downloaded from the web, and orders are transmitted electronically
e-everything: shopping, medicine, education, banking, entertainment etc. (Living and Travelling)	Internet, sms, email, etc.	Reduces the need for individuals to travel for many transactions, but the existence of these services requires more people to work outside 'regular' working hours – with implications for transport modes. May also lead to 'new' journeys in the place of the ones that were carried out before e-activity
e-office (Working)	Internet, email, mobile communications, portable computer etc.	Possibly a reduction in travel frequency but longer distance travel could also result (when individuals travel further for work), and/or substitution of work travel - with the time saved by not travelling to work. May also lead to the use of more on-the-move working options during long distance travel
e-information	Email, ftp, extranet, etc	May reduce the need for meetings to exchange routine information

(Adapted from Banister and Stead, (2003)).

This study recognises the potential of *virtual* mobility in exploring future transport strategy, or as part of the integrated transport strategy, but it also takes into account the complicated impacts (travel stimulation rather than travel elimination) and the realistic question of whether it could replace physical travel in a significant way.

6.2.3.2 The Secondary Strategic Element: Behaviour and Cultural Change

The second main strategic element, Behavioural and Cultural Change (BCC), is a soft approach, social engineering based, and tackles the fact that an individual's travel behaviour and mode choice is hugely influenced by social norms or public opinion, opinion that is

consistently influenced by overarching factors, such as media information, policy messages and social culture itself.

As identified in Figure 2.4, Chapter 2, three out of the four driving forces which shape today's mobile society in Kuala Lumpur are cultural influences, media information and policy messages. In historical terms, Malaysia generally and Kuala Lumpur particularly have experienced a much lower level of wealth generation than their neighbours in Tokyo, Hong Kong and Singapore, but have much higher levels of car use. Conventional views of the automobile[57] only partly justify this high usage of private vehicles in Malaysia. To a large extent, it could be concluded that the demand for cars in Kuala Lumpur has been created by urban, economic and transportation policies directed towards selected social sectors, the middle and upper classes, who then perceive the car as an essential tool for their social reproduction[58]. These policy messages, initially produced by the government, have been extensively assimilated by the public via media information, and eventually owning and using cars and motorcycles have become a part of the culture in society. It has become habitual behaviour for middle- and upper-class individuals to own and use private vehicles, and this trend is gradually extending to lower income groups.

To steer society towards sustainability, there is an urgent need to confront and use these factors in a beneficial way, and to integrate the sociological and human psychological approaches into traditional engineering and technology transport policy. There is hardly any transport policy that does not require lifestyle changes, and the degree of change needed depends on how much a policy differs from the present practice. For example, the lifestyle and value changes from using a conventional car to a greener car are less dramatic than to using rail or bus instead. It is common knowledge that this second strategy is one of the most important factors in determining the success of a transport policy, but in the history of

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[57] Conventional views of the automobile refers to the anthropological view (the automobile as a symbol of power, status, wealth, etc.), the political view (a symbol of freedom and privacy), the psychological view (a symbol of youth and athleticism, self-reliance, etc.) and the economic view (most efficient trip-chaining capability). For more details, refer to Button (1982) and Small (1992).

[58] Vasconcellos (1997) expresses a similar view as one of the conclusions of his investigation into the reason for cars demand in developing countries.

Malaysian transport planning, this is the first time that the role of the BCC element has been emphasised side-by-side with conventional engineering and technology strategies.

To achieve a change in travel behaviour and choices of mode, there are two challenges faced in introducing a social norm for sustainable behaviour and in 'unfreezing' unsustainable behaviour patterns in order to neutralize the 'dilemma of the common pool'[59]. Transport policy planners have to realise that they need assistance from other disciplinarians, e.g. social psychologists, to change society's norms and values. This subject is important and itself presents a wide range of research themes. As a result of research constraint, this study does not cover the detailed investigation of the subject, but it has to be emphasised that it is important to introduce social psychological theories and tools to make sure that this second strategic element is effective. At present, there is very little literature which refers to how to change a society's travel behaviour towards sustainability. Seethaler and Rose (2003), in the paper, 'Application of Psychological Principles to Promote Travel Behaviour Change', provide good insight into the soft approach of these tools. In Malaysia particularly, the literature of this area is literally non-existent and it needs urgent and intensive research.

However, such an integrated approach has gradually gained appreciation in some developed countries, where there is funding for research to start exploring factors that could trigger a change in travel behaviour. For example, Lyons (2003) provides useful references to advocating this approach to conventional transport policy (engineering and technology) in his article, Transport and Society. The OECD Workshop on Individual Travel Behaviour: Culture, Choice and Technology, 1996, the EPOMM and TAPESTRY projects (all under the

[59] This term describes a situation where a behaviour that makes sense from the individual's point of view, when repeated by enough individuals, ultimately leads to disastrous consequences for the society as a whole (Gardner et al., 1996). The tragedy of the common pool is thus induced by three perceptual mechanisms of the individual consumer:

- The consumption of natural resources to which access is not restrained by any regulations or property rights lies in the individual actor's self-interest;
- Each user perceives little harm in doing so because the resource seems huge compared to the very little impact created by the individual's consumption. Therefore, the benefits of pro-environmental behaviour are not clearly understood or valued and;
- The other consumers are expected to behave as free riders who would continue using the natural resources out of individual self-interest rather than acting under voluntary self-restriction.

For the above reasons there is generally low interest in the topic of sustainable behaviour, low personal involvement in the cause and low willingness to spend much time thinking about it.

European Platform of Mobility Management) and Soft Measures for OECD EST project 2002 all start to explore this new field in transport policy research. In Australia, the use of the soft approach has been proved to be a part of integrated transport policy; in the Metropolitan Strategy 2030 and Victorian Greenhouse Strategy, Australia, promotion of modal change via this approach can be found in *Travel Behaviour Change Programs* (Seethaler and Rose, 2003).

The soft approach of the Behavioural and Cultural Change strategy must be recognised as important element to co-exist with the technological strategy in order to influence future travel behaviour and choice of mode. In their study, Geels and Smit (2000) have given some instructive insight into why many visions of transport futures have been wrong, and they focus specifically on transport technologies. Among others, they pointed out that '*through only functional thinking, new technologies can be judged capable of enabling the purpose of an activity to be fulfilled. This neglects to consider other social and psychological aspects of an activity that may not be addressed'*. Both authors have called for a need to move away from the primary concern of a technologically led future to one that places a much greater emphasis on the social and cultural context within which change takes place.

To ensure that plausible Images are designed, both BCC and technological elements should be complementary to each other.

In this study, three aspects of BCC are important for achieving sustainable transport:-

- Firstly, it refers to a shift of attitude from car preferences to non-car preferences (public transport and non-motorised modes);
- Secondly, it refers to an attitude in which new ideas and new lifestyles are readily welcome, accepted and adopted;
- Lastly, it refers to a willingness to tolerate stricter economic instruments for the sake of environmental benefit and social equity.

To reverse the current trend in order to achieve the sustainability aims, the three aspects of this strategic element are targeted at both government and the whole of society rather than the individual. The OECD study has proved that commitments from government with regard

to behaviour and cultural changes are much more efficient (top-down approach)[60], as individuals are generally receptive to policy signals. The study by Joseph (2000) has also advocated that social norms and efficacy beliefs rather than individual attitudes have an effect on sustainable behaviour. This second strategic element needs a change of government intention, a professionally supportive paradigm and co-operation with media in providing information, all working together to promote the message to the public about the new sustainable social norm in Malaysia and Kuala Lumpur. The media does play an important part in changing people's thinking and it has to be incorporated in order to put out the right message. For example, a study in the UK found that although manufacturers are making headway in developing alternative fuels and minimising effects on the environment, this is not reflected in the advertisements. If it were, it would start to plant in people's minds the idea that they too should consider their effects on the environment and society and thus how they use their cars (Bristow, 2001).

Examples of BCC via organisational and operational strategies include car-pooling, car-sharing, commuted payments, transport optimisation, etc. (Banister and Marshall, 2000). Another useful top-down approach of BCC is *Work Trip Management.* This refers to the initiatives taken by companies aiming at better use of the company resources to influence employees' travel patterns. Measures include teleworking, flexi-hour working, improving infrastructure for cycling and walking, subsidising public transport season tickets, guaranteeing a ride home in case of emergency and others. There are many successful company mobility management schemes implemented by well-known companies, such as Nestle, Novertis, Wolfords, etc.[61]

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[60] This is based on the conclusion of a study, Values, Culture, Technology and Choice carried out by the OECD on Transport and the Environment. For more details, see homepage http://www.oecd.org//env/consumption/scp24a.htm.

[61] More detailed information about successful mobility management measures implemented by companies may be found at the TOOLBOX – as part of the EU SAVE-II Programmes. Examples of success stories include (i) Nestle (France) has developed a complete strategy to stimulate car-pooling. (ii) Novartis (Switzerland) has an integrated cycling policy and 27% of journeys to work are by bicycle (iii) Wolfords (Austria) promotion campaign increased cycling to work from 18% to 35%. See http://www.mobilitymanagement.be/english/index.htm

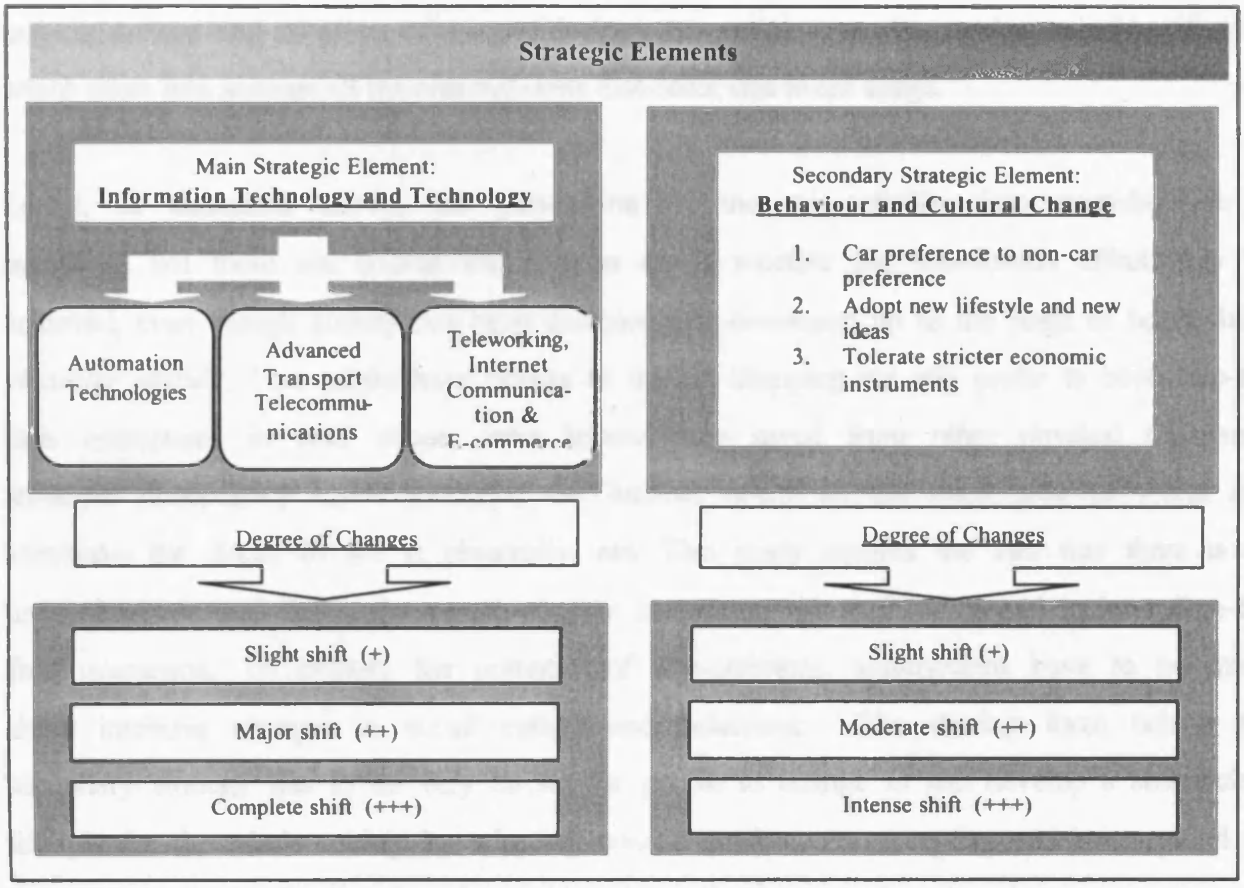
Therefore, for this BCC strategy, two approaches have been explored. Firstly, ***organisational change***, aiming at modifying and adapting the structure and functioning of institutions, organizations and lifestyles, so as to make these more amenable to alternative, more sustainable transport systems, modes and practices. An example of these strategies includes a paradigm shift towards sustainability concepts in transportation planning practice. The underlying assumption is that behaviour is embedded in and tempted by institutions and organisations in a society. Secondly, ***cognitive-motivational strategies;*** this is the provision of information, education and communication aimed at increasing people's knowledge (e.g. of transport alternatives), heightening their awareness (e.g. of environmental impacts), affecting their attitudes and strengthening their inclination to adopt other (e.g., non-motorised) kinds of behaviour. (Steg, 1997)

6.2.3.3 Interaction Effects between the Main and Secondary Strategic Elements

Figure 6.3 presents both strategic elements in a graphic form. Of these main strategic elements (AT, ATT and Tele-activities), most are on the point of happening and will continue to take place in the future, as was briefly touched on in the discussion above. These may be labelled as 'predetermined elements' events though the extent of changes that they could bring about in order to approach sustainable transport aims are variable.

Automation Technology (AT), applied to either private vehicle or public transport, is a straightforward engineering solution. If it were successfully adopted in a city or country, the effects on the transport system are foreseeable and certain. In other words, AT does not need society to change its lifestyle, culture, values and behaviour in a major way for the predetermined effects to become obvious. This is also the strength of this strategy, which requires little necessity for soft issues to be employed to influence the situation.

Figure 6.3 Strategic Elements



Advanced Transport Telecommunication (ATT), depending on either the Intelligent Transport System (ITS) or the Traveller Information System (TIS), carries two different implications. ITS, which targets drivers in order to improve the efficiency of traffic flow (via navigation and route choice), will be accepted by the general public with few problems. The underlying principle is similar to that of AT above - there is no need for massive change in present travel behaviour and choice of mode. On the other hand, the success of TIS which aims to improve the journeys taken using public transport and non-motorised modes (buses, light-rail, rail, taxi, rental vehicles, information about pedestrian routes) is less predictable. According to the study of TIS Reviews by TRG (2001), '*...creating a growing population of intelligent traveller is possible but requires continued development of information on current and future situations*'. In the same article, '*...information system (refers to TIS) in isolation of external contributory factors might not indicate the degree of effect on behaviour that could occur in practice...*'. In short, the Traveller Information System (TIS) should be

complemented by substantial changes in people's perception of transport, adoption of a new non-car culture and adoption of a new ideology supporting a modern and sustainable lifestyle which takes into account all the external costs that occur due to car usage.

Lastly, as discussed above, the penetration of the tele-activities into everyday life is inevitable, but there are critical uncertainties as to whether the substitution effect may be achieved, even though society has been designed and developed up to the stage of being fully *virtually mobile*. One might have access to on-line shopping but still prefer to have face-to-face interactions in *real* shops; extra leisure time saved from other physical trips may stimulate unnecessary travel journeys; the Internet opens up the other side of world and stimulates the desire to see it physically, etc. This study accepts the fact that there is an unavoidable natural desire for people to stay in contact with each other and to have face-to-face interaction. To explore the potential of tele-activities, assumptions have to be made about intensive changes in social culture and behaviour. The driving force behind the secondary strategy has to be very strong for people to change to and develop a sustainable lifestyle for the whole society by adopting non-car preferences, accepting and being proud of the new virtually mobile lifestyle and probably being willingly to pay for external costs.

The logical interactions described above are summarised in Table 6.3.

Table 6.3 Logical Interactions between Main and Secondary Strategic Elements

	Main Strategic Elements	Secondary Strategic Elements Behavioural and Cultural Change
1	Automation Technology +++	+
2	ATT (ITS) +++	+
3	ATT (TIS) +++	++
4	Tele-activies +++	+++

Having established the logic of the above interaction, it is also found that there needs to be strong interaction between AT and ATT (especially ITS) as the progression and development

lines for both technologies are very close. On the other hand, when tele-activities are prevalent and intensive Behavioural and Cultural Change happens in a society, it is logical to suppose that AT and ATT (ITS) may not need large-scale investment. Hence the logical interaction between the strategic elements is further generated as shown below:

Table 6.4 Further Interactions between Main and Secondary Strategic Elements

	Main Strategic Elements	Secondary Strategic Elements (BCC)	Further Interactions
1	Automation Technology +++	 +	ATT (ITS) +++
2	Tele-activies +++	 +++	Automation Technology +

Taking into account the logical thinking of the above matrix, three options for strategic interactions have been established:

Table 6.5 Three Options for Combining Main and Secondary Strategic Elements

Options	Interactions of Strategies
1	BCC + AT & ATT +++ Tele-activities +
2	BCC ++ AT & ATT ++ Tele-activities ++
3	BCC +++ AT & ATT + Tele-activities +++

6.2.4 Developing Images of the Future

After identifying the external factors (various economic environments) and establishing the combinations of the main strategies, a matrix for two axes of Images of the Future is generated, as shown in Table 6.6

Table 6.6 The Matrix of Images of the Future

Main Strategic Elements	*External factors*		
	Industrial Economy	Transitional Economy	Knowledge Economy
BCC + AT & ATT +++ Tele-activities +	I1	T1	K1
BCC ++ AT & ATT ++ Tele-activities ++	I2	T2	K2
BCC +++ AT & ATT + Tele-activities +++	I3	T3	K3

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

Nine Images of the Future were produced from the combination of the three external factors based on alternative economic environments, together with different levels of technological development and behaviour and cultural change. Nonetheless, not all seem equally plausible. The logic of the Image will be characterized by its location in the matrix, and the selection of alternative futures from the nine combinations which are considered as good Image:-

1. Need to show the impact of external forces; compatibility with external forces and minimization of cost implications.
2. Divergent, not convergent; Images need to be sufficiently different
3. In relation to the above point, Images should be able to provide different strategies.

STEP 1: Eliminating the Incompatible/High-Cost Images in Industrial and Knowledge Economic Environments

The first step in selection is to identify and eliminate the incompatible Images, i.e. those in which the strategic elements conflict with the external forces of the economic environments. In this case, Images I3 and K1 will have enormous cost implications for the future and are therefore poor Images. In Image I3, the Industrial Economy is prevalent, and worldwide vehicle manufacturers strongly advocate motoring with greener technology. In Malaysia there is high growth in GNI per capita, with people having more disposable income being hugely influenced by globalisation and media information. This means there are conflicting policy directions when adopting new BCC, while restraining the AT and ATT from becoming widely established in the country. The same situation is observed for Image K1. While the knowledge economy is well established with a significant proportion (70%) of the workforce consisting of knowledge workers, it would be irrational not to promote tele-activities.

The creation of the two Images, I3 and K1, is not impossible but if they occur, their chances of success are rather slim because the policies would act against the external forces. More importantly, these Images will cost the government vastly more, as there are too many external barriers to overcome. Therefore I3 and K1 are eliminated from the selection.

Table 6.7 The Incompatible Images

Main Strategic Elements		*External factors*		
		Industrial Economy	Transitional Economy	Knowledge Economy
BCC AT & ATT Tele-activities	+ +++ +	I1	T1	K1
BCC AT & ATT Tele-activities	++ ++ ++	I2	T2	K2
BCC AT & ATT Tele-activities	+++ + +++	I3	T3	K3

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

STEP 2: Exploring Opportunities for External Forces – Finding Compatible Images in Industrial and Knowledge Economic Environments

On the other hand, Images I1 and I2 are compatible with the Industrial Economic Environment, and K2 and K3 with the Knowledge Economic Environment.

In the environment of the industrial economy, the Malaysian government could explore the opportunities for global harmonisation of automotive regulation, and take advantage of the advanced knowledge and technologies offered by global vehicle and fuel companies to direct the transport policies towards advocating smaller, lighter, safer, greener vehicles. R&D and infrastructure resources would be appropriately invested in developing AT and ATT in line with global trends. With high growth GNI per capita, people are in a good position to spend money on upgrading their personal vehicles, influenced by media information from global vehicle manufacturers. Meanwhile, Malaysia and Kuala Lumpur will also have enough resources in this economic environment to invest in compatible 'high-tech' transport infrastructures, such as the Intelligent Transport System, to make sure that the country and city will continue to attract foreign investments by promising an efficient transport system.

Also, to fully explore the advantages of this industrial economic environment, AT and ATT for private vehicles seem appropriate and hold more potential than public transport to keep the scenario in line with global trends.

Meanwhile, in the knowledge economic environment, there are opportunities to use the prevalent tele-activities as the main part of transport policy to promote virtual mobility and reduce the number of trips, since the external forces are changing a significant proportion of the business lifestyles from traditional business methods to use of 'on-line' information. The pervasive influence of the Internet, on-line shopping, on-line learning, tele-working and the existence of 70% of the workforce consisting of knowledge workers, of which more are women workers (a high percentage of women look for flexible, home-based, working environments), are potential resources readily available to enable the government to shift to a new era of mobility. Government could use the on-line media to persuade the new-age

generation to change their behaviour and culture, shifting the traditional views in favour of cars and promoting the new type of modern tele-activity lifestyle. Tele-activities and the Internet, multimedia mobile phones, laptops and other personal telecommunication gadgets allow people to *move locally but connect globally*. Government could explore these advantages by promoting very strong links between local communities and encouraging localised, small-scale but knowledge-based and high value entrepreneurs. Local people should be given power to protect their environment and develop new greener lifestyles which are favourable to the environment and gentle attitudes for a caring society. Images K2 and K3 which emphasise tele-activities and BCC are appropriate for implementation in this knowledge economic environment. They are also cost-optimum as the Image works in line with external forces.

Table 6.8 The Compatible Images

Main Strategic Elements		*External factors*		
		Industrial Economy	Transitional Economy	Knowledge Economy
BCC AT & ATT Tele-activities	+ +++ +	I1 √	T1	K1 X
BCC AT & ATT Tele-activities	++ ++ ++	I2 √	T2	K2 √
BCC AT & ATT Tele-activities	+++ + +++	I3 X	T3	K3 √

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

STEP 3: Looking for Divergent Scenarios

As mentioned above, both Images I1 and I2 are compatible with the Industrial Economic Environment, and Images K2 and K3 with the Knowledge Economic Environment. However, I1 and K3 could develop more divergent Images than I2 and K2, as the strategies adopted in I1 and K3 are more extreme and could easily be distinguished from each other, hence they could produce more different and interesting futures as compared with I2 and K2. Table 6.9 eliminates Images I2 and K2 for this reason.

Table 6.9 Elimination of Images I2 and K2

Main Strategic Elements	*External factors*		
	Industrial Economy	Transitional Economy	Knowledge Economy
BCC + AT & ATT + + + Tele-activities +	I1 √	T1	K1 X
BCC + + AT & ATT + + Tele-activities + +	I2 X	T2	K2 X
BCC + + + AT & ATT + Tele-activities + + +	I3 X	T3	K3 √

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

STEP 4:- Developing Appropriate and Compatible Strategies in Transitional Economy Environments

With this transitional economic environment, where national governments rather than global trends or local forces have influence on micro-economics, it will be a good opportunity to expand and enhance the assets of the existing Kuala Lumpur infrastructure , i.e. the newly built, rail-based public transportation system. Without the global vehicle manufacturers' aggressive promotion of their vehicles (as in the Industrial Economic Environment), pro-public transport policies stand more chance of success.

Massive public transport infrastructure development, for example rail-based public transport, needs enormous investment, but bus technologies require less. In the circumstances of a moderate GNI per capita growth in general, transport policy should fully utilise the existing rail-based system and expand and extend the public transport network with much greener buses. It is also the right time to encourage the people to spend modestly on their private vehicles, reducing the number of unnecessary trips and using public transport instead.

The idea is to '*borrow*' the advanced knowledge of AT in relation to public transport, bus technologies in particular, and adopt them in the local environment. The R&D and resources

should also invest in 'home-grown' alternative modes such as advanced two- and three-wheelers. As the Transitional Economic Environment starts to see the evolution and proliferation of information technology and telecommunications, this will be economically applied to the ATT for public transport to create seamless networks for multi-modal journeys. BCC should be adopted to change people's attitudes from car obsession to non-car preference, in this case public transportation.

Images T1, T2 and T3 could all be developed to fit the above description with different degrees of investment and effort to develop the various strategies. However, of the three, Image T2 is the most appropriate due to its balanced strategies which combine all levels of AT, ATT, BCC and tele-actitivies. This fits the Transitional Economic Environment very well as T2 has lower cost implications for developing the advanced AT and ATT requirements than in the case of T1. T2 also requires less intensive change in BCC (as compared to the dramatic change required for people to shift to virtual mobility). In addition, the selected Images should be able to provide easily distinguishable strategies for all three alternative futures; strategies in Images T1 and T3 look similar to those of I1 and K3, considered from the perspective of levels of investment and resources necessary for AT/ATT and BCC/Tele-activities. Table 6.10 below shows that Image T2 has been selected in the Transitional Economic Environment.

Table 6.10 Selecting T2 in the Transitional Economic Environment

Main Strategic Elements		*External factors*		
		Industrial Economy	Transitional Economy	Knowledge Economy
BCC	+	I1 √	T1 X	K1 X
AT & ATT	+ + +			
Tele-activities	+			
BCC	+ +	I2 X	T2 √	K2 X
AT & ATT	+ +			
Tele-activities	+ +			
BCC	+ + +	I3 X	T3 X	K3 √
AT & ATT	+			
Tele-activities	+ + +			

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

In summary, as Table 6.11 shows, three Images of the Future were selected for fleshing out, and these are called as:

? Image I (Image I1) – ***Foresight Transportation***

? Image II (Image T2) – ***Extended Public Transportation***

? Image III (Image K3) – ***Information Society***

Table 6.11 Selected Images of the Future

Main Strategic Elements	*External factors*		
	Industrial Economy	Transitional Economy	Knowledge Economy
BCC + AT & ATT +++ Tele-activities +	***Foresight Transportation***		
BCC ++ AT & ATT ++ Tele-activities ++		***Extended Public Transportation***	
BCC +++ AT & ATT + Tele-activities +++			***Information Society***

BCC: Behavioural and cultural change AT&ATT: Automation Tech. & Advanced Transport Telecommunication

6.3 Characteristics of the Images and Achievement of Targets as a Consequence of the Presumption of the Scenario Building

After the three alterative futures had been constructed *structurally*, the next step was to flesh out the Images and analyse them for their implications. To do so, the important characteristics of the three Images had first of all to be identified, and then each of the Images could be described in writing.

The Images of the Future are designed to meet the policy targets, by using both strategic elements in different proportions and assuming a variety of external elements. As a result of the different priorities (levels of technological improvement, BCC, macro-economy and industrial strategies, micro-economic trends and employment structure) adopted for each Image, the consequences of changes in activities, travel, modal split, distances and other

subsequent implications (economic, environmental and social impacts) will also be varied. The expected changes for the three Images are presented in Table 6.12.

It is logical to predict that the target achievements will also be varied, as a consequence of the presumptions of the scenario. The fulfillment of the policy targets is hugely dependent on the strategic elements, and there are some targets that are more likely to be achieved than others. This is because there are uncertainties that exist in terms of the strategic elements, for example, the effects of BCC and telecommunications. Achievement of targets for Image III is therefore less certain.

There are targets that are unlikely to be achieved. For example, Image I is embedded in an automobile-solution which is contrary to the modal split target. For others, more resources or time may be required to realise the targets.

Some targets would be certain to be fulfilled if the implications of strategic elements were clear and straightforward. For example, technological improvements in vehicles (both public and private modes) could help to curb the levels of pollution very efficiently.

In general, the social equity target would be hard to reach and success is likely to depend on the level of subsidisation[62]. In comparison, targets that are related to environmental and economic dimensions are much easier to fulfil.

A normative summary of target achievement is present in Table 6.13. A full analysis of target achievement based on specifically designed policy packages for each Image will only be presented in Chapter 7.

[62] Subsidisation, in principal, is contrary to sustainable development. However, subsidisation is unavoidable if the social equity objective is to be achieved, and therefore it should be treated carefully. It should be ensured that resources allocated for subsidisation should focus solely on the benefits to disadvantaged groups in a society.

Table 6.12 Summary and Comparison of the Characteristics of the Three Images

Characteristics	Image I **FORESIGHT TRANSPORTATION**	Image II **EXTENDED PUBLIC TRANSPORTATION**	Image III **INFORMATION SOCIETY**
Background Information of Images			
Economic Growth Rate	High	Medium	Low
Business and Employment Changes	Global trends (Multinational companies, e.g. car manufacturers) influence local business environment and the future trends; skilled-workers outnumber knowledge-based workers.	Malaysian government selects and picks the micro-economic strategies. Vehicle markets are not opened to global car manufacturers but encourage international knowledge exchange in ICT development. Balanced structure of skilled and knowledge-based employees.	Sea changes from conventional Fordist to information-based business strategies. Malaysia leap-frogs into information innovation milieus – knowledge-based workers dominate the market.
Roles of Technologies	Complete shift in road transport technology, the emphasis is on technological improvement of private vehicle technology and advanced transport telecommunications.	Major shift in technological improvement of public transportation. Emphasis on buses and other alternative 'home-grown' modes and advanced transport telecommunication for public transport users.	Complete shift in computer/ telecommunication technologies. Slight changes in technological improvement of automation technology.
Extent of Behavioural and Cultural Changes	Slightly changed	Moderately changed	Intensely changed
Societal concern	Individualist	Socially cohesive	Socially cohesive
Consequences and Expected Changes of Images			
<u>City Planning</u>			
Urban form	Dispersed and suburbanised city	High concentration/ Decentralised concentration	Fragmentation pattern throughout city , decentralised living.
City Pattern	Decentralised living	Example:- Compact city	(1) Remote new settlements (2) Urban villages
Density	Low density	High urban densities	Medium to low density
Settlement	Scattered settlements, dispersed development.	Dense settlements	Medium to scattered settlements
Land use	Mixed land use for neighbourhood centre to reduce trip generation.	Concentration and diversity of activities, mixed land use.	Flexible zoning to accommodate multiple patterns of land use – e.g. telework centres and distribution facilities.
<u>Transport System</u>	Private vehicle usage is prevalent. Continuation of the existing car-dominated road transport situation.	The roles of public transport increase tremendously, diversion from the present private transport-dominated trend.	To some extent, a certain percentage of private vehicle and public transport trips would be substituted by telecommunications. Nonetheless, physical movement by transport systems still remains dominant and important. The role of public transport increases significantly compared to present situation.

(Continued) Table 6.12 Summary and Comparison of the Characteristics of Three Images

Characteristics	Image I FORESIGHT TRANSPORTATION	Image II EXTENDED PUBLIC TRANSPORTATION	Image III INFORMATION SOCIETY
Consequences and Expected Changes of Images (continued)			
Effect on Travel			
Overall travel trips/ flows	High (Individual trips, low vehicle occupancy, emphasis on efficient traffic flow, e.g. switching time)	Low (high vehicle occupancy rate, emphasis on switching modes and destination of trips)	Medium (emphasis on reducing the need to travel, stress on trip substitution)
Length of trips	Both long- and short-distance trips increase. There are some combined trips.	Short-distance trips increase slightly and long-distance trips decrease significantly. Overall trips decrease due to many combined and multi-purpose trips	Long-distance and highly valued trips increase; short-distance and less valued trips reduced significantly. Modified trips (e.g. home-delivery) happen.
Destination of travel	Far away from the point of origin	Getting closer to point of origin	Far away for few, long-distance trips, closer for frequent, short-distance trips
Private vehicles	High	Medium	Medium
Public transport	Low	High	Medium
Modal split Personal travel	Small	Considerable	Considerable
Energy and Environment			
Air pollution	Decreased	Intensively decreased	Decreased
Non-renewable energy use	Decreased	Intensively decreased	Decreased
R&D in alternative energy	Intensive	Moderate	Moderate

Table 6.13 A Normative Summary of Achievement of Targets

Targets	Image I	Image II	Image III
Ratio of private: public modes 45:55	Target is unlikely to be fulfilled. Image is contrary to this target.	Target fulfilled	Target probably fulfilled
Fatality rate reduced to 1.3 per 10,000 vehicles 75% reduction in total road accidents from 1998 level by the year 2020.	Target probably fulfilled	Target may be fulfilled.	Target probably fulfilled.
75% reduction in CO & NOx emissions from 1998 level by the year 2020	Target fulfilled	Target fulfilled	Target probably fulfilled.
More than 50% household access to high-quality public transport and non-motorised modes within 200 metre distance from home.	Target will only be fulfilled if there are extra resources allocated.	Target fulfilled	Target likely to be fulfilled
Less than 15% of household expenditure would be on transportation costs by lower income groups.	Yes, but subsidies for lower income groups are required	Target likely to be fulfilled if the fares for public transport could be regulated to meet lower-income's affordability.	Target is unlikely to be fulfilled by the year 2020. It needs longer time-span.

These main characteristics of the Images and the normative targets were presented to local transport experts during the second period of fieldwork. They gave valuable feedback by discussing the rationales for each Image, suggesting important components of the Images (e.g. policy strategies) and also imagining expected changes and implications. Using the table as a reference point for discussion, local transport experts justified the implication of different policy measures in terms of maximising synergetic effects, so as to achieve the targets for each Image.

Their comments and concerns regarding the Images are summarised in Table 6.15. Taking into account the inputs, the Images were modified and refined. The final versions of the description of the Images are presented in sections 6.3.1, 6.3.2 and 6.3.3 respectively. Every Image starts with an illustration of the contextual overview before providing details about the transport and urban systems. Summaries of implications (benefits and costs) of the Images are listed at the end of every description.

6.3.1 Image A: Foresight Transportation

The contextual background of this Image is based on an Industrial Economic Environment (Alternative I). In the general picture, the local economic policy will aim at stimulating economic activities to the maximum extent. Economic growth rate will be the highest of all the Images. Restrictive measures will not be introduced. This is an *individualist* Image, meaning that everyone should be able to choose his/her living area and his/her way of transport – so that travel and living spaces will only be restricted by income.

Kuala Lumpur will succeed in offering higher-income classes attractive housing and employment possibilities. The social-economic carrying capacity will be improved. Mobility will be viewed as an important condition for accommodating economic growth while congestion, accidents and air pollution will be coped with to the maximum extent. The parking policy will aim at keeping the centre of the city 'accessible'.

Because the new residential areas will be built in a spatially diffuse way, it will not be feasible to construct a high-quality public transport infrastructure in these areas because the traffic flows are too thin and the people living here would own private cars. Car ownership and usage will continue to be seen as one of the people's rights and as part of the modern lifestyle.

In this situation, ***Foresight Transportation*** provides a framework within which the contributions of technology to achieve sustainable development could be promoted and developed. Two main areas of technological development and applications will be served by this Image: (i) innovative technological improvement of automation and (ii) monitoring and control technologies using Advanced Transport Telecommunication (ATT) infrastructure for urban-based optimization of environmental impacts and traffic flow.

To improve automation, this Image shows a clear evolutionary path from current mainstream vehicles to the prevalent usage of motor vehicles that are significantly more environmentally

friendly, safer and more economical. The improved motor vehicle could still meet the mass-market's expectations, although the initial costs are high. Improvements in automation include *vehicle design* (reduced mass, rolling resistance, drag coefficient and downsizing of cars or downgrading of performance without size reduction), *engine technologies* (improved efficiency of fuel consumption to reduce levels of air pollution and CO_2 emission; road vehicle engines may also be designed for noise reduction) and *fuel technologies* (traditional fossil fuels, like gasoline, diesel, LPG and combinations of these fuels, others such as LNG, ethanol, hydrogen, battery and fuel cell vehicles, and hybrid vehicles). These technologies have been widely launched by all major vehicle-producing countries[63]; the ultimate objective will be to provide and promote cleaner, safer, lighter, quieter and more environmentally friendly vehicles with high IT and system content at a relatively low cost. The similar trends towards 'home-grown' technological improvement of two- and three-wheelers will also be launched by local research and development (R&D) programmes to suit the local climate and environment. In this Image, it is imagined that the market for these foresight vehicles will overtake the conventional private vehicle market. There will be encouragement and initiatives from government. For example, appropriate policies, would include greater scrappage for old vehicles, incentives for production and purchasing of foresight vehicles, and allocation of resources for new infrastructures, such as fuel depots, etc.

With the development of information technology and telecommunication, a new dimension has been introduced into transport and traffic planning. The potential of this dimension will be fully explored in this Image. The Advanced Transport Telecommunication (ATT) in the form of the Intelligent Transport System (TIS) will aim to provide higher efficiency, fewer accidents and reduced environmental deterioration. These will include traffic control and management (a real-time process which maintains a smooth flow of traffic in response to information available to traffic controllers), advanced parking solutions, incident and safety management, traveller information and advanced in-vehicle navigation and information for drivers.

[63] In the USA, vehicle manufacturers and the Federal Government have launched the Partnership for a New Generation of Vehicle (PNGV); Japan similarly has a major on-going programme of automotive research; the European industry (EUCAR) initiative seeks to develop a European response and in the UK, the Innovative Manufacturing Initiative (IMI) and the Land Transport-Road Vehicles programme have been launched.

Few significant behavioural and cultural changes will be observed in this Image. The assertion of the right to individual freedom of movement puts the rights of the collective in second place.

6.3.1.1. The Implications of the Foresight Transportation Image

Benefits

- The Foresight Transport Image provides possible solutions to several aspects of the concerns about sustainability. The Image moves towards meeting the targets for congestion, safety, local air and noise pollution.
- Kuala Lumpur will benefit from the high level of technological exchange between foreign countries by opening up the market to the advanced transport manufacturers.
- There will be a massive influx of new ideas for transport modes developed by local R&D and stimulated by foreign technology and knowledge.
- People will enjoy a high level of freedom regarding choice of where to live and how to move around.
- Disabled people and non-drivers (women and children) will enjoy the user-friendly transport system provided by the Foresight Transport Image as long as they can afford the technology.
- This liberty of lifestyle, plus other attractive climatic and economic factors, may attract many elites to migrate to Kuala Lumpur.
- The image of Kuala Lumpur will transform into a very modern, youthful, lively and progressive world city.
- The city and surrounding region will benefit from the inflow of economic activity.

Costs

- Social equity is a weak point in this Image. Lower income groups suffer from high level of social exclusion.
- Huge subsidies for various fields, including transport, need to be put in place to help the poor.
- City administrators will face problems in seeking funds for the subsidy, as income from transport charges, fines and taxation are literately negligible.
- Public transport usage may be further reduced. Bus business may face financial difficulty as a consequence. There are fears that bus companies may struggle to maintain sufficient services, especially on non-profitable routes.
- Slum and illegal residential areas will be found in pockets of the city.
- Social unrest may occur and this would pose a threat to economic growth.
- Overall traffic flow is high and the demand for private vehicles will be increase greatly, posing future threats to sustainability. Urban pollution from car traffic may cease to be an issue, but congestion will continue as a result of rebound effects.
- Due to dispersed settlement, the city's ecological footprint is very large.

6.3.2 Image B : Extended Public Transportation

The contextual background of this Image is based on the Transitional Economic Environment (Alternative II). It will be a rosy and relatively stable economic condition with a medium growth rate. Malaysia is growing well; she is in the middle of the process of transforming into a knowledge-based society. In contrast with the first globalisation Image, in this Image nationalisation will protect certain industries, for example, the manufacturers of the national vehicles – the 'Proton' and 'Perodua', and therefore foreign manufacturers will not affect the local private car market tremendously. In other words, the transport policies will be more regulated and locally led. We foresee that the government will pick up the present major agenda confidently, and this time will apply it to Kuala Lumpur successfully in the form of the public transportation system.

In city planning terms, a policy that focuses on spatial concentration will be introduced. As a result, mobility levels in terms of passenger transport will decrease. The concept of a compact city will be strictly implemented. No new large residential areas will be constructed, parks will be saved to keep the city attractive. Old living quarters will be renovated and upgraded, while many buildings will be replaced by high-rise blocks. Many new facilities will be constructed near the public transport routes, e.g. shopping malls, parking possibilities and infrastructures. Kuala Lumpur will become a densely built office area with skyscrapers. In this way, a compact city will come into existence. This Image will give the city an environmentally friendly image and attract new activities. Nonetheless, some economic activities may be lost to other cities due to these changes.

The transportation policy, at all levels, will aim at increasing usage of public transport. Nonetheless, restrictive policies for private cars will not be introduced on a large scale. There will be use of the 'carrot and stick' concept: on the one hand, car transport will become much more expensive to use and that will make public transport become more competitive; on the other hand, many initiatives will be taken to improve the public

transport network and make it more efficient, reliable, safe and comfortable.

New ideas for extended public transport will be implemented. The future transport system emphasises a three-pronged strategy: firstly, introduction of more advanced and greener buses (AT) to fully back up the existing 'high-tech' rail-based system; secondly, more attractive public transport through the introduction of upgraded buses (e.g. Bus Transit System) and the Traveller Information System (TIS); thirdly, in relation to the above two strategies, provision of seamless multi-modal journeys by public transport via inclusion of taxis, bicycles and rental cars thoroughout the system.

Extended public transport implies that public transport has advantages over private car traffic. This Image aims to provide timetable, route, service and ticket information which seamlessly covers all public transport modes, along with associated booking and payment facilities, updated in real time to reflect the actual state of services (on bus, rail, LRT, parking, taxis, rented car, etc). In the centre, a new, upgraded image for the rail-based systems and buses will be promoted. A shared taxi system will be set up, while there will also be more innovative non-motorised modes which can be parked easily at the main nodes of the public transport system. When these modes are inconvenient for a certain trip, efficient 'call-a-car' systems will be set up. The new information technologies will be introduced to improve the quality of this underlying network. The central idea is to provide a range of functions from provision of reassurance about the service to promotion of buses, trains and other forms of public transport.

In essence, for this Image, ***Extended Public Transportation***, a journey that involves public transport will become more personalised. Trip characteristics can be customised to fit individual requirements, helping public transport to compete on equal terms with the car. Ultimately, the travellers will be able to achieve much the same predictability, flexibility and controlled access to all available forms of public transport as is associated with the private car.

A shift in attitude from preference for the car to public transport is promoted. The general

benefits of the Extended Public Transportation Image will be strongly promoted via the media. The idea of a new Image for a modern sustainable lifestyle via public transport usage is included in formal and informal education. People accept that social cohesion should be achieved and it is one of the most valuable aspects of better quality of life.

6.3.2.1 The Implications of the Extended Public Transportation Image

Benefits

- As overall traffic flow is low, problems of congestion and air pollution in the city will be lessened. Accident rates will also decrease significantly.
- Streets in the city will become the public domain of pedestrians and cyclists.
- There will be lots of spaces left as 'green lungs' in the city due to compact and concentrated urban forms.
- The urban functions of living, learning, shopping and recreation are located around the public transport radial connections. Collective facilities are located in such a way that the citizens need to make a minimum of physical movement. In addition, this Image offers a high level of service that will ensure that Kuala Lumpur will be a very convenient place to live.
- Due to high productivity and short travelling distances, people have a great deal of spare time. The leisure industry will flourish.
- Urban areas will become very lively places as a result of high-density settlements and a variety of communal facilities
- The compact nature of the city encourages its inhabitants to feel close to each other.
  There is strong social interaction and the level of welfare is high. The social inclusion objective is achieved in this Image

Costs

- It is the nature of the 'subsidisation' of the public transportation system that will put high financial pressure on government.
- Some will feel that the collective lifestyle has been imposed on them and this is at the expense of citizens' privacy.
- Property in the city will become much more expensive and citizens will need to bear the cost of high housing prices.
- Private means of transportation is expensive and users often feel hampered in their freedom of movement.

6.3.3 Image C: Information Society

This Image is constructed against the background of the Knowledge Economic Environment. In this Image, Malaysia has transformed into a knowledge-based society. A sea change in the lifestyle of the society due to advanced telecommunication will be observed.

Kuala Lumpur will become a top international office location, with an emphasis on business and financial services. This will have a clear and positive impact on employment for more highly educated people, namely the increase in knowledge-based employment. A significant proportion of the population will be involved in the information economy and the usage of 'on-line' services will be widespread.

In everyday life, consumers will carry out much of their domestic business, such as banking, shopping and booking holidays, using the telephone network. People will receive education, medical consultation, films, music, newspapers and other information 'on-line'. The telecommunications and information services that will penetrate society can be classified into seven categories: tele-services, tele-restructuring, tele-shopping, tele-education, tele-conferencing, on-line communities and tele-working. In the city context, decentralised concentration of the urban form will occur, in which urban villages will flourish on the outskirts of the city and rural areas, supported by tele-service centres.

Every aspect of life will be different; this includes the values and concepts held by the public. In this Image, a massive shift towards a strongly socially cohesive philosophy may be anticipated, in which people accept individual restrictions in order to achieve certain social and environmental goals. Such a change will have a spin-off effect on urban development and transport.

In general, people will travel less for work and business purposes. There will be substantial trip substitution by use of telecommunication. Therefore the overall travel flow is much lower than for Image I. Nonetheless, physical movements using traditional transport systems

will still remain dominant and important. Most economic information remains embodied in physical goods that need to be physically transported, whilst 'information workers' still travel by car, train and bus for leisure and other purposes. Indeed, without a modern transport system, the information economy would simply grind to a halt. Therefore, in this ***Information Society*** Image, transport and telecommunications will be seen as 'companion' infrastructures to each other.

Restrictive measures will, however, be accepted. At the national level, intensive vehicle taxation and high fuel prices will be implemented. In Kuala Lumpur, a complementary cordon pricing system will be enforced. When a car enters a certain section, a certain amount will automatically be paid. Car driving will therefore become very expensive in the city. In addition, the urban parking policy will be very strictly applied. The number of parking places will be greatly reduced and parking restriction will be introduced throughout the city. However, the fees will be low at the main nodes of the public transport system to attract park-and-ride users. The role of public transport will increase significantly.

In short, telecommunications plus behavioural and cultural changes (BCC) make a major contribution to sustainable development, which is encouraged and shaped by a progressive society.

A Note about the Image of Information Image

Conventional wisdom holds that telecommunications is a natural substitution for transportation. It is true that the latest telecommunications and computer advances could reduce the need for physical movements, nonetheless the real effect of this 'transport-telecommunication trade-off'[64] phenomenon over total trip generation is still uncertain.

[64] It describes the possibilities for substituting the use of transport with telecommunications links, e.g. tele-working and tele-shopping. These two activities are strongly emphasised, as the activities they replace are very transport-intensive.

Some studies have concluded that reduction in trips and mileage due to use of telecommunications is less than expected[65]. Therefore the idea of telecommunications being a force for reducing the need to travel is taken cautiously in this Image.

Telecommunications technology is inherently neutral. It can facilitate travel reduction, geographic decentralisation and economic development, but this alone does not cause these things. External forces will determine how the technology is used and what its impacts are. Studies from other countries have shown that there may be an opposite effect, namely travel stimulation, which will occur if it is not properly guided. Therefore, in this Image, a major shift in cultural and behavioural changes is essential to complement the reduced need to travel resulting from telecommunications. This refers to a sea change to a new, greener lifestyle, in which new ideas are readily welcomed, accepted and adopted, for example, willingness to tolerate rigorous measures for environmental benefit and social equity's sake, as well as a shift in attitude from car-preference to non-car preference.

6.3.3.1 The Implications of the Information Society Image

Benefits

- 'High-tech' solutions make life efficient and productivity high. People will have more time for leisure.
- People enjoy the modern urban village settlement. The typical house will be a cottage with its own garden connected to broadband service. The local centres provide nearly everything needed for daily life.
- In general, people travel little for work, shopping and schooling. Flexi-working hours apply widely. These factors reduce the congestion tremendously.
- Due to drastic economic measures, people reduce unnecessary trip-making.

[65] The US Department of Transportation (USDOT) estimates that telecommuting by the year 2002 will reduce the annual total of vehicle miles travelled by just 1% below the level expected to be seen if there were no telecommuting. A follow-up study by the US Department of Energy (USDOE) calculates that the reduction in mileage from telecommuting by 2002 is likely to be even less because of (1) commuters living further from work, and (2) other travellers taking up the road space vacated by telecommuters.

- People will have a well-developed awareness of local sustainability issues, actively stimulated by the government through fiscal measures aimed at increased application of sustainable solutions.
- People will show their willingness to take responsibility for the environment through the acceptance of higher costs as a result of including externalities in market prices.

Costs

- The society will become highly stratified by telecommunications/knowledge usage.
- The fragmented city structure and the new tele-lifestyle is a serious obstacle to social interaction. Within the neighbourhoods people will stick together, and social cohesion will be quite good. However, between the neighbourhoods there will be little contact.
- There will be drastic changes resulting in unpopular institutional and government policies to curb private car usage.
- Many people will feel restricted in their movement and uneasy about the regulatory environment.
- Maintaining citizen privacy as much as possible will become one of the main issues in society.
- Public transport is not well established, while private vehicles come at a high price, the socially excluded group (the poor, low-skilled workers and less educated) suffer the most in this Image.

6.4 The Input from The Local Transport Experts

In terms of local transport experts input, discussions about and validations of Images of the Future were some of the most fruitful ones in the methodology steps. Local transport experts made two major contributions to the Images of the Future: firstly, comments on the construction elements of the scenario building; and secondly, discussion of the final three Images and their implications.

Comments on the Construction Elements of Images

Local transport experts were invited to comment on the selection of external and strategic elements in the building process of the scenarios.

External Elements

Generally, local transport experts thought that the external elements (types of prevailing economic trends, levels of national economic growth and employment structure) were well selected. Although there was a slight diversity of opinion about the level of agreement, most of the opinions fell under the category of *'relevant, essential and appropriately selected'*, as shown in Table 6.14. None of the elements were thought to be *'irrelevant and should not be selected'* or *'relevant but not essential to be selected'*.

This verdict was based on the justification that these factors would have a profound and widespread influence in the long run on the transport system. All of them agreed that an economic environment has huge impacts on the future direction of a sustainable transport system, but this had hardly been taken into account in the policy-making process in the past.

Throughout the discussion, there were another three external factors that were raised by the local transport experts and which they believed would have a significant influence on the

future sustainable transport system. The first one was 'internal political priorities', the second one was 'regional development', and the third one was 'changes in other major components of a city such as demography, housing, tourism, etc'. These three factors were discussed as to whether they should be included or replaced by any other selected external elements in the study.

The researcher realises the importance of these suggested external factors. Nevertheless, for the purposes of being succinct and focused, as well as the content and time constraints of this study, the decision was made not to add more factors to the selected ones. Rather, whenever relevant, the 'internal political priorities' and 'regional development' are covered in the elaborations on selected external factors. As for other factors that are not specifically mentioned in the study, it is assumed that their patterns do not change greatly from the present trends. As for the suggestion of 'changes in other major components of a city such as demography and housing', these have also been taken into account in the employment structure and land-use settlement pattern in every Image.

There were neither any negative comments nor additional suggestions about the combination of these external factors.

Table 6.14 Result of an Assessment of the Selection of External Elements and the Rationality of the Combinations for Building the Scenarios in this Project

External Elements I (Type of Prevailing Economic Trend)	1	2	3	4	5
Evaluation			**	******	****
External Elements II (Level of Economic Growth)	1	2	3	4	5
Evaluation			*	*******	****
External Elements III (Employment Structure)	1	2	3	4	5
Evaluation			*****	*****	**
Rationality of Combination	1	2	3	4	5
Evaluation			*****	******	*

INDICATORS:

Score 5 indicates that the element is very relevant, essential and most appropriately selected
Score 4 indicates that the element is relevant, essential and appropriately selected
Score 3 indicates that the element is relevant, essential but not sure that it needs to be selected
Score 2 indicates that the element is relevant but not essential to be selected.
Score 1 indicates that the element is irrelevant and should not be selected.

Strategic Elements

As Table 6.15 shows, all but one respondent agreed that these two selected strategic elements are *'relevant, essential and appropriately selected'* or *'very relevant, essential and most appropriately selected'*.

Lengthy discussion was carried out to examine the roles of these two strategic elements to achieve sustainable transport objectives (see Section 6.2.3, Chapter 6). It was unambiguously agreed that both of the strategic elements would make massive changes to people's lifestyles and would play a very significant role in leading towards a sustainable transport system.

Table 6.15 Result of an Assessment of the Selection of Strategic Elements for Building the Scenarios in this Project

Main Strategic Element (Technological Improvements)	1	2	3	4	5
Evaluation			*	*****	****
Secondary Strategic Element Behavioural and Cultural Change)	1	2	3	4	5
Evaluation			*	******	***

INDICATORS:

Score 5 indicates that the element is very relevant, essential and most appropriately selected
Score 4 indicates that the element is relevant, essential and appropriately selected
Score 3 indicates that the element is relevant, essential but not sure that it needs to be selected
Score 2 indicates that the element is relevant but not essential to be selected.
Score 1 indicates that the element is irrelevant and should not be selected.

In the first instance, the local transport experts had a biased impression of 'Behavioural and Cultural Change', believing that this could make a more dramatic improvement in travel patterns and transport systems than 'Technological Improvement'. As the discussion went on, local transport experts felt that although 'Behavioural and Cultural Change' sounded very appealing, they had serious concerns about how to implement the strategy as well as how to ensure its successful outcome. They felt that the component of uncertainty in 'Behavioural and Cultural Change' is much more substantial than in 'Technological Improvement', and this held back their initial enthusiasm about the 'Behavioural and Cultural Change' strategy. In contrast, they were very confident about the 'Technological Improvements' element. They

felt that all automation technologies, telematics technologies and information technologies can lead to a sea change in sustainability, providing that the tools are used properly.

The researcher had taken note of the confidence issue that related to these strategic elements. The concern about this matter will be further discussed in Sections 8.2, Chapter 8, 'Opportunities and Risks of the Images at Implementation Level'. Lack of relevant knowledge about the strategy of 'Behavioural and Cultural Change' on the part of local transport experts will also be addressed in the chapter.

The Three Images of the Future and Their Implications

Local transport experts were presented with the three Images and the summary of their characteristics at the outset of workshop discussions. They were then asked to comment on whether the three Images were sufficiently distinguishable and to scrutinise the details in each Image for consistency. They were also invited to discuss and refine the characteristics and implications of the three Images.

Local transport experts showed intense interest in the discussion of the Images. Indeed, this is the part of the methodology that they thought was novel and the most interesting one.

First of all, they all agreed that the three Images are sufficiently distinguishable from each other, and hence sufficient to produce different policy packages.

They also went through the Images one by one, and examined the rationales, plausibility, logical justifications and common sense of them. Major points that raised by local transport experts are summarised in Table 6.16 on next page.

Table 6.16 Comments and Concerns about Images from Local Transport Experts

Image	Discussion Points Raised by Local Transport Experts
General	- would like to see which Image comes nearest to the idea of sustainability - need to think further about the policy implementation of each Image, making sure that it is practical in reality, would like to see the scheme implementation over different time periods (short, medium, long term). - rethink the labelling of the image, suggestion of Techno-Mobile/ Green Mobile/Info-Access. - have to stress that the private car is still playing an important role on the road in all three Images. - would be interested to know how freight transport fits into the Images - how to make sure the whole city *behaves* according to the selected Image? Transport is just one component of a city system. - have to emphasise the importance of high-quality pedestrian ways in all Images as it is and always will be the ubiquitously complementary system in every transport system. - one of the reasons for the failure of public policy is because government's choice is not always the people's choice, getting public involvement is very important to reducing the risk.
I	- consider the national car policy and the industry of local vehicle manufacture. - concern about the cost of technology, whether Malaysia could afford the advanced technology, whether government could afford the infrastructure and whether poor people will be hugely marginalized - motorcycles have to be included in the image, this will be an affordable solution compared to car.
II	- the extended public transport system to include Car Club/Rented Vehicle/Car Sharing to form an integrated network that is an interesting, workable and promising idea - have to come up with better idea for efficient and attractive higher density city; example of Hong Kong is not appealing. - could motorcycle become a new form of public transport? - should consider enhancing the role of pricing? Pricing should be one of the most important driving forces that could shift people's attention to public transport, which is lacking in this image.
III	- the image has high potential as present government is working in a similar direction in other sectors - will Information Society Image be successful in higher economic growth level? - the Image will face unprecedented protection due to rigorous car restriction policies, what should we do to reduce the impacts of rejection? - will this Image take place? Some respondents are doubtful about the net effects of trip substitutions. - what if the Information Society is not in accordance with local culture, e.g. friendly and warm and enjoying interactions? People enjoy shopping as social and leisure activity, they might not want to use on-line shopping. - in relation to the above question, will 'Cultural and Behavioural Change' have adverse effects on present local culture? - how to make sure that the strategy of 'Behavioural and Cultural Change" happens?

Many comments were taken into account to refine the Images (the final Images can be referred to in Section 6.3., Chapter 6). Some of them (e.g. risk assessment, common conditions and basic measurements) will be discussed in Chapter 8 while one or two points have been noted for future work.

The researcher finds that Images of the Future provides a good way to inspire local transport experts to envisage plausible events in the future. They had no problem in discussing and building up the prominent substance of an Image. Most valuably, local transport experts could use the Image's platform to gain a deeper understanding of the interrelationships between the main components of a future and the ensuing implications for a transportation system. Such an approach to view a transport system as an overall picture in the future has never been done before in Kuala Lumpur. Images of the Future has successfully provided a platform to encourage local transport experts to develop their thinking and discuss at a detailed level the future sustainable transport system. Many important and influential external factors (outside the transport system) could also be scrutinised and included in the Images, giving a more realistic experience to enable visualization of a transport system for the city (see the final descriptions of the three Images and their implications).

At this stage, local transport experts successfully carried out their duty by contributing their intellectual knowledge and sensible judgement to help to build up the Images. Simultaneously, they also validated the images. At the same time, local transport experts made very positive remarks about the Images having stimulated many inspiring ideas to help them consider how to achieve a sustainable transport system in Kuala Lumpur. Even though the researcher feels that there are some limitations in the interactions, it is obvious that the local transport experts did feel inspired by the study especially in the section concerning the Images of the Future.

Table 6.17 on the next page summarises the important modifications adopted in this chapter as a result of local transport experts' views.

Table 6.17 Important Modifications Adopted at Chapter 6 and Other Relevant Sections in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their Views	Relevant Sections and Chapters
LTEs thought that Malaysia needs relatively strong growth for the next two decades, and this should be reflected in the external element in scenario building.	The economic growth is set higher than expected; the lowest is set at 4% of GNI per capita per annum.	Section 6.2.1.2, Chapter 6
LTEs were very optimistic about technological improvements (AT, ATT or ICT) to achieve sustainable transport objectives.	All three Images are techno-positive. (See also ***Policy Packages and Target Achievement*** below).	Table 6.11 (Role of Technologies) Chapter 6.
LTEs did not expect much investment on more rail development apart from the present planned rail-based project.	In Image II, the idea of major investment in other rail-based project apart from the present planned one should be discarded (see Mp 2.3, Chapter 2). Efforts to materialise the Image of Extended Public Transport should be made to provide buses, Traveller Information System and other alternative travel means instead.	Section 6.3.2, Chapter 6.
Image III was viewed by LTEs in a more optimistic light than the researcher expected.	Confirmation of the Image of Information Society. The researcher had felt rather apprehensive about presenting this Image in the first instance.	Section 6.3.3. Chapter 6.
LTEs were concerned about the consequences if none of the Images were implemented.	Search for basic conditions for change and common measures	Section 8.4 Chapter 8.

6.5 Conclusion

Although there are no future facts, scenario construction is not a constrained field with regard to future research. It is scientifically valid because of systematic use of logic and imagination to create a plausible, internally consistent story that describes a possible alternative future, and offers some information as to its genesis. This chapter describes how the scenarios were constructed and presents three Images of transport for Kuala Lumpur.

Images of the Future present impacts, changes, conditions and characteristics of alternative futures. The contribution of the scenario building is not to invent a future, but to explore possible futures with the help of local transport experts in the cities, and to try to relate these futures to what we had discovered about the present situation, as well as the future vision and targets. It is an exercise to widen the perceptions of the researcher and local transport experts in order to explore possible future opportunities, policy options and other relevant developments, as well as giving more insight into their impacts. By presenting the alternative futures in such a clear and attractive way, it not only allows a comparison of Images side-by-side, but it also help to inspire creative ideas that most probably would not be discussed when using conventional methods. Furthermore, the Images of the Future presented in this chapter provide an easily accessible insight into formulating the appropriate policy measures and policy packages and assessing their impacts.

Based on the Images of the Future that have been developed in this chapter, Chapter 7 will analyse the policy options that could link the Images and targets to what is currently going on in Kuala Lumpur.

CHAPTER SEVEN
POLICY MEASURES AND POLICY PACKAGES FOR IMAGES OF THE FUTURE

7.0 Introduction

Having identified the targets (in Chapter 5), and developed the three Images of the Future for Kuala Lumpur (in Chapter 6), this chapter presents the results of policy packages for the three Images. The chapter bridges the present situation to a future vision by designing logical policy measures and subsequent policy packages.

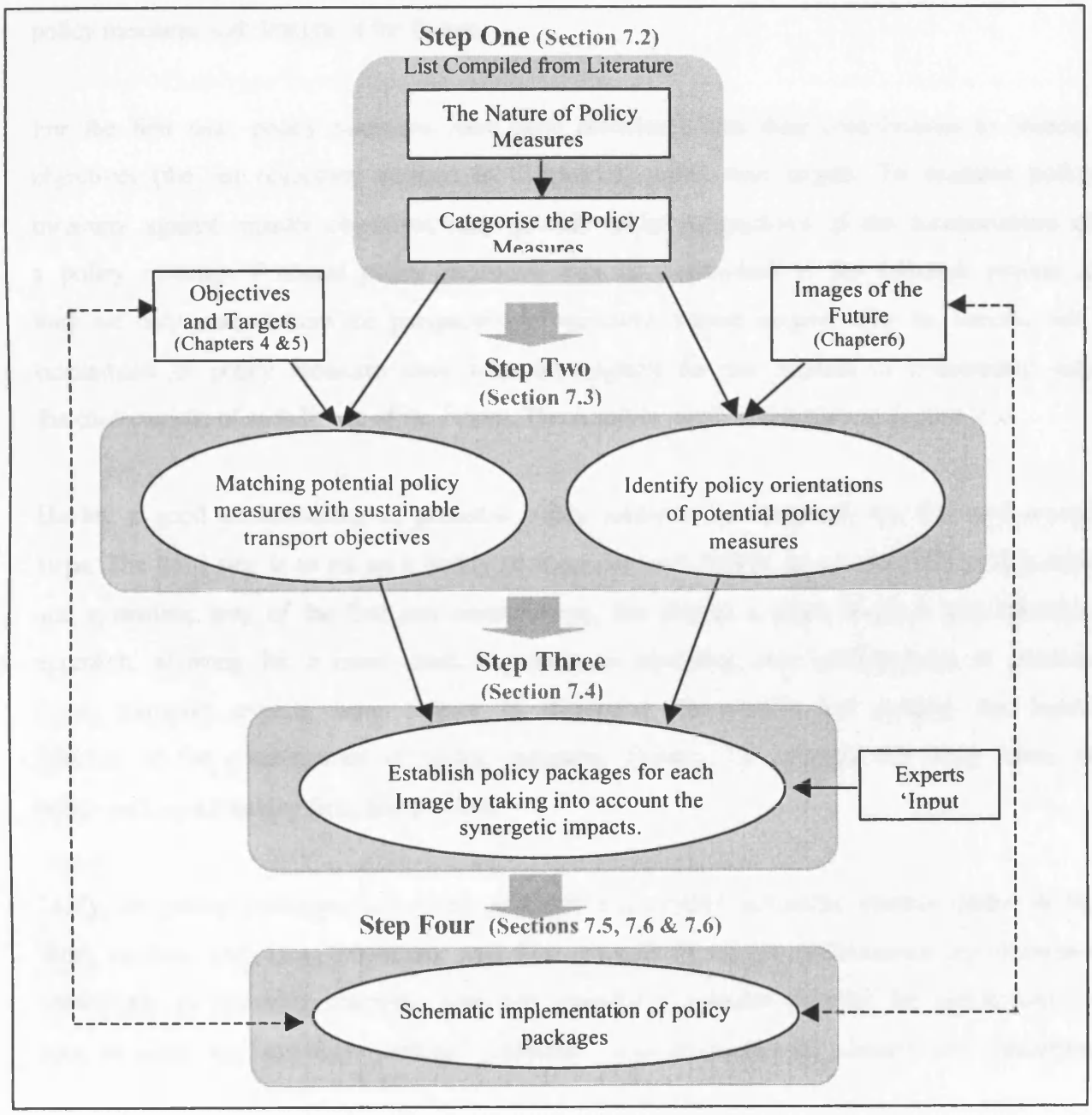
The three policy packages are presented in sections 7.5 to 7.7. Before leaping to the results, sections 7.1 to 7.4 in this chapter explain the process of identifying policy measures and packages. Policy packaging involves four stages, as can be seen in Figure 7.1 on the next page. Policy packages have been presented in short-, medium- and long-term timeframe. For the schematic implementation of policy packages, it has to be noted that the process is closely linked to the feed back from the assessment of targets in the same timeframe (refer to Section 8.1, Chapter 8), these stepwise iterative processes are important to ensure that changes could be monitored sensitively throughout the timescale. However, for the clarity of the thesis's structure, only descriptive nature of policy packages will be presented in this chapter, while the assessment of project targets will be separately presented in next chapter.

In the later part of this chapter, Section 7.8 discusses the responsibility for change towards these policy packages at implementation level. The section discusses if the present institutional changes are needed for initialising these policy packages and suggests the major stakeholders for each image. Before concluding the chapter, Section 7.9 reviews the main points raised by local transport experts in relations to the policy packages.

7.1 Process of Identifying Policy Measures and Policy Packages

As outlined in Figure 7,1, in the first step, extensive reference has been made in the literature to understanding various transport policy measures. Emphasis at this stage focuses on applications of policy measures in cities, their success stories, the interaction between policies (synergetic or conflicting effects), weaknesses and barriers for implementation, etc.

Figure 7.1 The Process of Identifying Policy Measures and Policy Packages



The review provides an essential understanding of the background of each policy measure, and how a policy measure or a combination of policy measures is best used to tackle certain transport issues. Banister and Marshall (2000) work on policy measures and analysis of the underlying mechanisms of policy measures is the main reference for this step. Policy measures have been categorised in section 7.2

The second step in the process is a further review of these policy measures, focusing on two aspects, i.e. *their potential contribution to the achievement of the targets* and the *policy orientations of each policy measure*. This step is to provide insights to associate potential policy measures with Images of the Future.

For the first task, policy measures have been associated with their contributions to broader objectives (the ten objectives defined in Chapter 4) rather than targets. To examine policy measures against broader objectives may provide wider perspectives of the functionalities of a policy measure. Potential policy measures may be overlooked in the selection process if they are only studied from the perspective of narrowly defined targets. For the second task, orientations of policy measures have been investigated for the purpose of consistency with the characteristic of each Image of the Future. These will be explained further in Section 7.3

Having a good understanding of potential policy measures is central to the first and second steps. The third step is to set up a policy package for each Image. In contrast to the deductive and systematic way of the first and second steps, this step is a more intuitive and inductive approach, allowing for a more creative process of inventing new combinations of policies. Local transport experts have helped in discussing, formulating and judging the logical thinking of the combinations of policy measures. Section 7.4 presents the main frame of policy packages resulting from this process.

Lastly, the policy packages have been presented in a logical schematic implementation in the short, medium and long time-scale, and their impacts of targets achievement are illustrated accordingly in following chapters. This step provides a valuable exercise for conceptualising how to carry out a policy package practically, and discussing in advance any anticipated

drawbacks to the process. The implementation process of a policy package in an Image background and the subsequent achievement of targets (presented I next chapter) have also allowed discussions to focus on whether sustainability could be achieved within a limited amount of time. The big sustainability topic can be scrutinised in a more detailed way, for example, which issues have been tackled and which ones have not been solved in an Image, and which stakeholders have benefited the most and which ones have not. This should help the policy-makers in Kuala Lumpur to obtain a clearer idea about their choices and the subsequent impacts on the transport system.

7.2 Categories of Policy Measures

There are endless policy measures that could be analysed, and at the time of writing there are many other new ideas coming out which could be added to the list. It is helpful to compile and recognise as comprehensive a list as possible for reference purposes, and it has to be noted that there are many more that could be added. It is sensible to categorise policy measures under the headings of their characteristics because by doing that, it is relatively easy to relate these measures to an Image.

The categories used are mainly based on Banister and Marshall's (2000) work, *Encouraging Transport Alternative: Good Practice in Reducing Travel.* They have placed policy measures in five categories (1 to 5 in Table 7.1) under themes relating to their characteristics. In this study, another category of Regulatory Reform and Enforcement has been added in consideration of its significant contribution to various sustainable transport objectives. Category 1 (Technology Means) has been expanded[66] to cover all the measurements of Technology and Information Technology that are considered as part of the under main strategic element of this study. In Category 2, the Organisational and Operational Measures are equivalent to the second strategic element of this study (the Behavioural and Cultural Changes). Categories 1 and 2 have been discussed in Sections 6.2.3.1 and 6.2.3.2 in Chapter 6, and they are not repeated here. Categories 3 to 6 will be explained below. Some measures

[66] In Banister and Marshall's (2000) work, Technology Means refers to implications of ICT only.

may overlap and could be placed under more than one category; for example, demand responsive transport is placed under Category 2, but it is also a measure of TIS and thus could also be placed under Category 1.

Table 7.1 Examples of Policy Measures According to Their Characteristics

Characteristics of Policy Measures	Examples of Policy Measures
1. Technological Means	AT: Alternative fuel and vehicles (private and public transport); vehicle design and manufacture (material, recycling of vehicles, etc.)
	ATT: Intelligent Transport System (ITS) Traveller Information System (TIS)
	Tele-activities: Home delivery of goods and services; teleworking; e-everything (living & travelling).
2 Organisational and Operational Measures/ Behavioural and Cultural Change	Organisational Change: Car pooling; car sharing; commuted payment; company work hours; demand-responsive transport; peak congestion avoidance; transport optimisation. Cognitive-motivational Strategies: Travel behaviour change programmes; media campaigns
73. Infrastructure Interventions	Cycle priority; HOV priority; park and ride; parking capacity; public transport priority; road capacity restraint; traffic calming; area access control.
4. Financial Levers (Spending and Subsidy)	Road pricing; fuel duty; emission taxes; scrappage bounties; pay-as-you-drive; vehicle insurance; parking charges; public transport investment; public transport subsidy; cycle subsidy.
5. Land-use Planning	Location of new development; location of company; mixed-use development; design of locations; car-free development.
6. Regulatory Reform and Enforcement	Emission regulations; noise regulations; safety regulations.

(Modified from Banister and Marshall (2000))

Categories 1 and 2

Refer to Sections 6.2.3.1 and 6.2.3.2 in Chapter 6.

Category 3: Infrastructure Interventions

'Infrastructure interventions' refers to the measures that give higher priorities to road space allocation to different users rather than cars. It is a type of capacity management, but the focus is on allocating *space* and *time* in order to promote alternative modes and at the same time constrain the expansion of private vehicle use. Banister and Marshall (2000) have placed these *'carrot-and-stick'* policy measures under the same heading. They argue that to

achieve a reduction in travel by car, it is necessary to reduce the amount of road space available to cars, particularly where other modes are to be encouraged.

Infrastructure interventions may not be as successful as they appear if only a single measure is introduced. For example, the major disadvantages of traffic calming are vehicle delay causing congestion and traffic spillover to other streets. Maximum synergetic effects are to observed only when both push and pull policy measures are packaged together.

On one hand, bicycle priority, high-occupancy vehicle (HOV) priority, public transport priority and road space are emphasised. On the other hand, parking management, road capacity restraint and reduction, traffic calming and area access control measures are implemented to reduce the amount of road space available to private vehicles.

Compared to capacity management of road or rail building, the infrastructure interventions that are mentioned here are cost-effective and relatively easy to implement. Restricted measures are less popular and they are best implemented as part of a package that also offers attractive pull measures.

Category 4: Financial Levers

Financial measures have been argued to be one of the most significant groups of measures that could change travel behaviour. The push measures are pricing and taxation mechanisms, and the pull measures are subsidisation on alternative modes. Both will be discussed below.

Pricing/taxation mechanism is an economic instrument that works through prices, and case studies in other cities, such as Singapore, Oslo and London, have proved that it is an important instrument for achieving the sustainable transport objective.

Examples of these measures are:

- *Urban toll/road pricing/congestion charges:* charging in the form of area licensing systems or electronic road pricing.
- *Fuel duty,* including different taxes for different types of fuel (petrol/diesel, lead/unleaded).
- *Emission taxes/pollution pricing* related directly to the pollutants emitted.
- *Variable car excise taxes* which depend on engine size or some other attribute of cars.
- *Scrappage bounties* to induce accelerated retirement of old vehicles.
- *Parking charges* to ration the supply of parking spaces.

There are also new pricing reforms which mainly work at national level to ensure fair distribution of transport systems from the perspective of financial implications:

- *Pay-as-you-drive vehicle insurance* or *distance based fees*: converting vehicle insurance and registration fees from fixed charges to per-mile fees. This is to provide a significant financial incentive to reduce driving, while making these charges more fair and affordable.
- *Revenue-neutral tax shifting*: recommended by some economists to shift taxes from socially desirable activities to those that are harmful or risky, for example, increasing fuel tax and using the revenues to replace income taxes.
- *Tradeable mobility credit*: every person obtains a limited number of road-free credits and other mobility services at reasonable prices. Establishing a market for these credits will lead to higher costs for those who travel further and to extra income for those driving less.

The effect of pricing mechanisms should generally encourage people at least to shift to smaller engines and cleaner cars, if not to shorten the trips, or eliminate the journeys altogether. Measures such as congestion charges and parking fees may encourage people to shift to public transport. Economists believe that these market-based transportation strategies can help to create efficient transportation systems that support economic development, generate revenues and reduce environmental impacts. However, in practice there are problems in identifying the economically efficient point and in designing effective tax

instruments. In addition, pricing mechanisms are usually less popular, controversial and not easy to introduce. The policies usually need a strong political intervention to initiate the schemes.

Apart from that, one of the points raised here is that pricing is a means of allowing the rich to continue to use their cars. To ensure that the distribution issues are fairly treated, *tradeable mobility credit* could also be an answer to the issue, but there is still no real implementation of this measure at present. One important point here is that revenues generated from pricing/taxation of a transport system have to be used for the same transport system, i.e. spending and subsidy.

Sustainable transport aims to achieve a commercially viable system without relying on a recurrent government subsidy. However, subsidies and spending, if used in the right way, can change behaviour and production and consumption patterns towards sustainability because of their ability to correct the market and their adaptability to changing circumstances (Moore, 1996). The key issue for government policy in relation to financing and promoting sustainable development is to establish the right incentive structure. Government should identify and reduce subsidies to those factors which have adverse effects on the environment, such as fuel price, road-building, free parking, etc. Subsidy and spending should be used to improve the environment by realigning the incentive structure in favour of environmentally sound practices. In other words, subsidy and spending should concentrate on sustainable modes, i.e. public transport, bicycle lanes and walkways, reducing public transport fares and /or improving service quality, setting up car-pooling/ride-sharing and purchasing greener vehicles. To achieve the objective of social sustainability, lower income and disadvantaged groups should also be subsidised for accessibility purposes, e.g. bicycle ownership and special public transport fares.

Category 5: Land-Use Planning

By affecting where people live and where activities take place, land-use planning influences the sorts of journeys which are made, the distance travelled and the mode used. The Department of the Environment and Transport (2000) has predicted that a 10%-15% reduction in fuel use by passenger transport could be achieved though land-use changes in the UK over a 25-year period

Banister and Marshall (2000) have suggested that land-use planning could achieve the objective of reducing car use by means of careful location of new developments and companies, mixed-use development, design of locations and car-free development. These encourage accessible points of origin, correct positioning of the nodal points of public transport, linkage of multiple-purpose trips, making facilities available within walking and cycling distance and providing feasible capacity for public transport investment.

However, they have also admitted that land-use planning measures may work best for specific types of trip with a fixed spatial dimension. For other travel purposes, land-use planning has less potential to provide alternatives. Also the high-density living and mixed-use zoning may only cater for the taste of a limited proportion of the population. These solutions would not accommodate those individuals in search of more open space or exclusively residential neighbourhoods.

Those attacking the weakness of high-density living and mixed-use zoning show that there is another school of thought about land-use planning and sustainability. For example, Gordon and Richardson (1997) and Breheny (1997) promote decentralization with flexible zoning in low-density living. Those who support the school of thought of pro-sprawl criticise the failures of the concept of compact land use, arguing that the transport effects are as follows:

- Reduced congestion – not all travelling to the same destination.
- Reduced trip time – higher vehicle speeds possible.
- Fewer short distance car miles – compact land use means shorter distances, therefore trips are more attractive and more people drive the short distances to facilities.

- Transit not popular – heavily subsidised and financially unattractive – no proof that transits cause modal shift.

Land-use planning will have significant long-term benefits in terms of reduction in levels of emissions of carbon dioxide and local pollutants, as well as accidents, noise and visual intrusion, because of its inbuilt relationship with transport. It is also necessary to note that land-use planning is a long-term commitment policy that is difficult to change once it takes place. In addition, the impacts may be less direct than expected because trip-making behaviour is an individual choice that may be changed by other socio-economic factors. Therefore the decision about land-use planning policy is very difficult to make.

Category 6: Regulatory Reform and Enforcement

Regulatory reform is the imposition of rules by government, backed by the imposition of penalties designed to modify the behaviour of individuals to either prevent undesirable behaviour, actions and activities or to enable and facilitate desirable ones (UNESCAP, 2001).

Regulatory policy instruments in this section focus on emission, noise and safety regulations. These regulations are effectively issue-specific, so noise regulations primarily influence noise, safety regulations primarily influence accidents and emission regulations primarily influence air pollution. Once the standards have been set and successfully enforced, the impacts should be straightforward and efficient. For example, successful emission regulations may be expected to reduce emissions directly as a result of the installation of catalytic converters, changing the car or better maintenance. Therefore regulatory reforms and enforcement are very important tools to ensure that set objectives can be achieved.

Apart from affecting the objectives that are controlled, compared to other policies, regulatory mechanisms appear to have less influence on travel patterns, behaviour or vehicle ownership. In fact, regulatory mechanisms will affect vehicle ownership and travel costs even though motorists are not aware of it. For example, there will be the additional costs of engine re-design to meet emission and noise regulations. Thus the resulting increased costs may influence ownership and travel decisions.

7.3 Sustainable Objective Achievement and Characteristics of Potential Policy Measures

Having identified the six categories of policy measure as described above, the research further investigates the potential policy measures in relation to achievement of sustainable objectives and their policy orientation.

The former task is to match the potential policy measures with social, economic and environmental objectives that have been identified in Chapter 4. The influence of these measures on broad types of project objectives (environmentally sound, economically efficient and socially equitable) is indicated by means of a matrix and acts as a guide for more detailed discussion for Sections 7.5 to 7.7.

The latter task is to further investigate the characteristic of potential measures as a background for identifying which policy measures are consistent with each Image of the Future. To find the policy orientation for each Image, policy measures have been examined from the following aspects:

1. The nature of policy measures, whether they are acting as *pull* or *push* strategies
2. The basis of influence for behavioural change, whether they are *market-based/ technologically-based/ lifestyle-based* or *public policies*. Some policy measures may have two or influential bases, for examples, the use of tele-activities is a technologically based measure, but it is also a lifestyle-changing policy.
3. The level of public bodies that are responsible for implementing the policy measures, whether they are *global/ national/ regional* or *local*. Most of the measures need co-operation between different levels of responsibility.
4. Involvement from private bodies to successfully implement these policy measures, whether they are *individual /neighbourhood* or *company*. Again, most of the measures need more than one party for implementation.
5. Finally, the financial resource implication, whether the measures will create a *cost* burden or generate *revenue* for the public purse

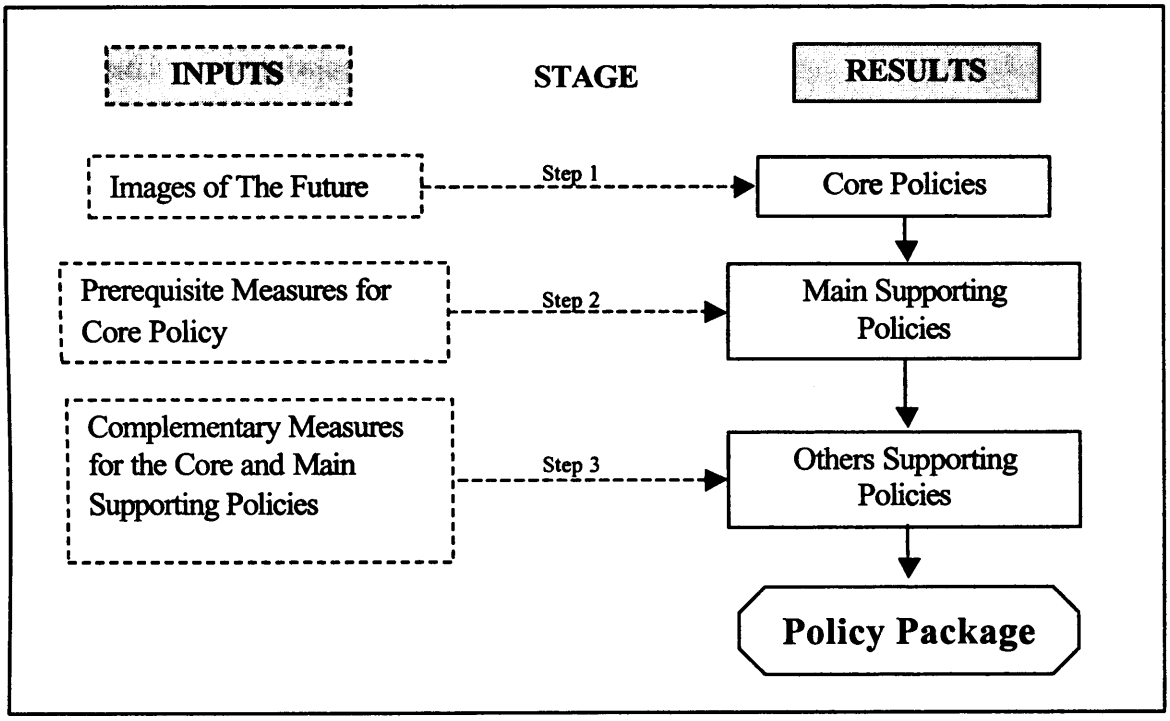
These aspects provide useful information to mix-and-match the policy measures for each Image. For example, in the circumstances of Image I, policy measures that are consistent with this future require more push strategies; changes should mainly come from technologically-based measures; global and national influence should be more than that from the local level etc. Aspects 3, 4 and 5 above especially provide further insight at implementation level and allow planners to think a step ahead with regard to who should be responsible for implementing these policy measures and what their financial implications are. These will be discussed further in Chapter 8.

The final results of this information are presented in Tables 7.3, 7.5 and 7.7 respectively. The characteristics of policy measures will be further discussed for each Image in Sections 7.5 to 7.7.

7.4 Process of the Setting Up the Main Frame of Policy Packages

Modelling a multitude of combinations of measures in order to test the most beneficial grouping is the ideal way to establish a policy package. However, there may be insufficient data available for that purpose (Banister and Marshall, 2000), therefore another approach has to be adopted here. This involves a process of three steps, which are illustrated in the graphic description below:

Figure 7.2 Process of Setting Up Policy Packages



The first step in setting up is as follows:

It is obvious that the Images will naturally lead to the development of broad transport policy directions. For example, **Image I - Foresight Vehicles** will logically lead in the direction of technological improvement in vehicles; the emphasis of **Image II - Extended Public Transportation** will be on public transportation; and **Image III - Information Society** will strongly rely on the innovation of information technology. These core policies were part of the scenario building in Chapter 6. At this stage, the above policies have been scrutinised

using the policy analysis (in Section 7.3) to ascertain that these policies are consistent with Images of the Future. The end results verify the establishment of main core policy measures for each Image of the Future.

The second step involves finding the main supporting measures:

The purpose of this process is to find out the main supporting policies to correspond with the core policies. The main complementary policy acts as a prerequisite for successful implementation; without it the core policy could not perform effectively to achieve sustainability. Knowledge gained from other case studies has been transferred and used to find main supporting measures. The main supporting policies identified for each Image are summarised in the table below.

Table 7.2 Identifying Main Supporting Policies for Core Policy in Images of the Future

Image	Core Policy	Main Supporting Policies
I	Promote Usage of Foresight Vehicles (*Technological Improvement*)	• Traffic Management & Roadside Telematics (*Advanced Transport Telecommunication*) • Supporting Facilities (*Technological Improvement*) • Financial and Tax Provision (*Subsidy*)
II	Extended Public Transportation System	• Concept of Compact City (*Land-use Planning*) • Advanced Traveller Information System (*Integration and Interface Information derived from Technological Improvement*) • Collective Lifestyle (*Behavioural and Cultural Change*)
III	Usage of Telecommunication (*Information Technology*)	• Car Restriction Measure - *Traffic Calming* - *Pricing/Taxation Mechanism* - *Parking Management* • Promote strong commitment to sustainable tele-lifestyle & accept individual restrictions for social & environmental goals (*Behavioural and Cultural Change*)

The third step involves finding other supporting measures:
At this stage, we are looking for some policies that blend naturally with others and thereby enhance the results of each. The main purpose of this is to enhance or boost the effects of the predetermined measures of the first and second steps; and, where possible, the supporting measures are also likely to offset the predetermined measures' adverse effects, to compensate losers, as well as to increase public acceptance.

For this section, experiences from Banister and Marshall's study (2000) have been used and the general guidelines have been adopted. The good practice in packaging measures they have recommended are:

- A combination of push and pull policies;
- A range of alternative pull policies, so that individuals are presented with a series of choices;
- The promotion of the push and pull measures together as a package.

However, as the guidelines aim to reduce travel by promoting alternative modes, they are more appropriate for Images II and III.

A good reference for the policy package of Image I is the UTOPIA project. The project assessed the most promising applications for cleaner vehicles and supporting measures from a city perspective, and gave recommendations on policy actions to promote or facilitate market introduction and demonstration. Further information can be found on website http://www.utopia-eu.com/

Other relevant studies about transport policy measures are also referred to, such as Schwaab and Thielmann (2002), Fjellstrom (2002), case studies of sustainable transport success stories in developing countries[67] and other integrated urban transport policies projects which mainly taking place in a European context (TELL-US,DANTE, SUTRA,EST[68]).

[67] Website Mobility in the Developing Countries http://www.movingtheeconomy.ca/content/home_cs.html
[68] See the project websites in the reference list.

7.5 Policy Package for Image I - Foresight Vehicles

7.5.1 Description of Policy Package

The key policy for Image I is to promote the use of foresight vehicles. This is a complete shift in road transport technology, emphasising technological improvement in private vehicle technology (car, two- and three-wheelers) and advanced transport telecommunication.

In this study, technological improvements in automation refer to those that are 'new models in the market' or 'prototype models' rather than imaginary automation technology. Examples of new fuel vehicles that are available on the market now include the Honda Civic Hybrid, Honda Insight (Hybrid), Toyota Prius (Hybrid), Honda Civic GX (natural gas), Ford Crown Victoria (natural gas), Chrysler Sebring (ethanol) and others[69]. Examples of 'prototype models' have been tested and showcased by major car manufacturers such as GM, Daimler Chrysler, Ford, Honda, Hyundai, Nissan and Toyota.

Fuel technology available on the global market, ranges from conventional cleaner diesel and gasoline to very advanced fuel-cell vehicles. The potential of the Malaysian vehicle market in 20 years' time should arise from intermediate technology, i.e. alternative fuel and hybrid vehicles. Both fuel technologies have been picked up by the Malaysian government, and related R&D projects are going on at the time of writing. Natural gas-based vehicles such as - GTL, CNG and bi-fuel are regarded as potential renewable energy resources, as there are abundant natural gas reserves available in the country (EIA, 2003). Hybrid vehicles are another potential alternative in which electricity generated from solar energy is abundantly available.[70] These new fuel vehicles are also associated with new technology in the form of

[69] US Department of Energy gives details of up-to-date green and advanced vehicles that are available on the market. See website http://www.eere.energy.gov/cleancities

[70] The Malaysian government is seriously looking at renewable energy as a major energy source, and pilot projects are being undertaken such as:
a. The use of biomass in the form of rice husks, wood fuel and palm oil waste to generate energy.
b. The application of biomass energy technology through briquetting of biomass, mainly wood.
c. The Solar Photovoltaic Power Generating Project in Sarawak, where solar electrification is being tested for implementation. (Sharkan,2002)

in-vehicle telematics, such as intelligent cruise control, collision warning/intervention, vision enhancement, parking aids, etc.

For another section of society that cannot afford the above advanced vehicles, another aspect of progress places emphasis on two- and three-wheelers. Two- and three-wheelers referred to in this study include electric bicycles and neighbourhood vehicles, examples of which include Columbia ParCar, Sedan, Gizmo, etc. The development of two- and three-wheelers is especially encouraged as being 'home-grown' from local manufacturing.

To ensure the successful operation of this Image, there are a few very essential complementary policies necessary in order to have major impacts on the promotion of foresight vehicles in Kuala Lumpur. Three main supporting policies that have been identified for these foresight vehicles, which are: (i)Supporting Facilities; (ii) Traffic Management & Road-side Telematics; and (iii) Financial and Tax Provision (Subsidy).

Supporting Facilities refer to refuelling/recharging infrastructures for foresight vehicles. New charging points for battery /electric vehicles and new fuelling stations for natural gas vehicles need to be established to replace the old petrol garages. The infrastructures are indeed the prerequisite conditions for foresight vehicles.

Traffic Management & Roadside Telematics are important to ensure that the foresight vehicle traffic could be run in the most efficient way. Traffic Guidance Systems, Parking Guidance Systems and Advanced Traveler Information Systems are three main components of traffic management that provide drivers and passengers with information about routes, parking, weather, accidents and other relevant data. A Traffic Control Centre will gather information, manage and monitor traffic conditions, then transmit them via roadside signboards, in-vehicle screens, radio or personal information systems (mobile phones and computers). Enforcement will be efficiently carried out via electronic equipment.

Financial and Tax Provision (Subsidy) policy measures are the most important ones for the introduction of foresight vehicles to the market. There are two types of fiscal incentive or

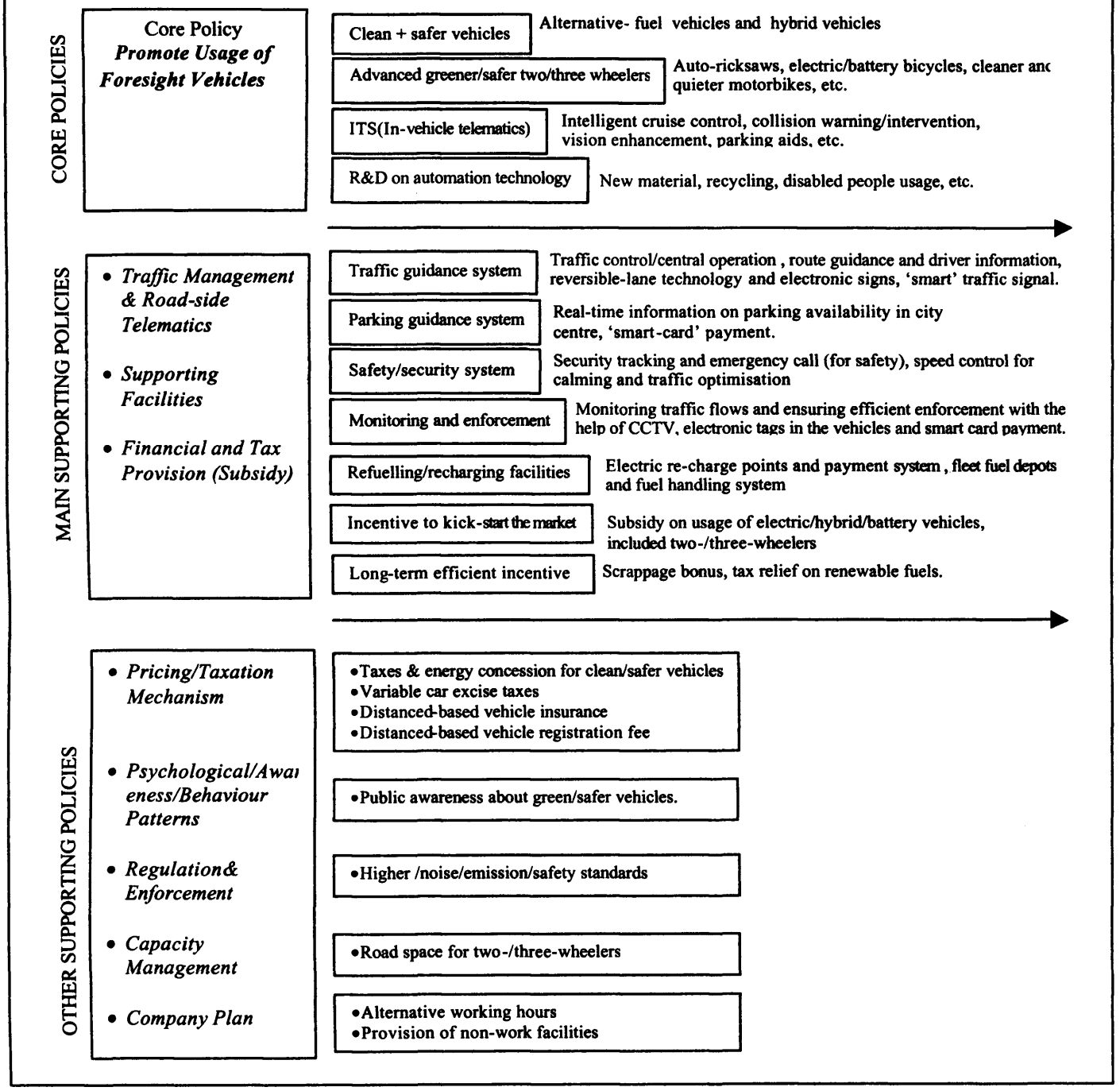
subsidy that apply in this policy package: one is to kick-start the market for individual fuels, and the other is to provide efficient incentives in the longer term that are not technology-specific (e.g. differential rates of fuel taxation based on relative environmental damage).

The three main supporting policies will form a solid foundation for the core policy (promoting the usage of foresight vehicles) to replace the market for old types of vehicle. Other supporting policy measures include:

- Variable car excise taxes to encourage environmentally friendly car usage by switching to smaller, lighter, cleaner vehicles;
- Distance-based vehicle insurance and registration fees to encourage fewer trips and shorter distances;
- Stricter noise/emission/safety standards to tackle noise, pollution and accident issues;
- Road space for separate two-/three-wheelers for safety purposes;
- Alternative working hours to reduce the congestion at peak hours;
- Provision of non-work facilities in companies, such as company nurseries and deliveries of food to the workplace, will reduce the need to make extra car journeys.
- Public awareness of greener/safer vehicles that are available in the market and the benefits of these foresight vehicles for sustainability.

The summary of the policy package of Image I is presented in Figure 7.3 on next page.

Figure 7.3 Policy Package for Image I



7.5.2. Characteristics of Policy Package

Referring to the characteristics section (the right hand end of the table) of policy measures in Table 7.3 on next page, it is obvious that the core policies of this policy package are technologically based, and they are supported by market-based policies and some of the public policies. To a certain extent, the usage of foresight vehicles could be considered as a lifestyle policy too, as it will be a decision that involves a change in lifestyle to go for greener and safer vehicles, or even to go for advanced two- or three-wheelers. Such choices, however, will not be pushed by restrictive policies; they are mainly pursued by many attractive pull policies (e.g. alternatives of greener and safer vehicles, fiscal incentives, ways to avoid unnecessary or unpleasant trips).

There will be only a slight change in terms of the behavioural and cultural aspects, as the whole Image and policy package will still be private-vehicle orientated, which is very similar to the present trend. Kuala Lumpur will remain a very individualistic society, although most of the people will be aware that to drive a greener vehicle is good practice for sustainability. The cognitive-motivational strategy that is used in this policy package is limited to the promotion of public awareness about the availability of foresight vehicles. Even then, the promotion may probably be carried out by vehicle manufacturers instead of the Malaysian government.

Although there will be necessary costs to support the new refuelling/recharging infrastructures as well as the establishment of the roadside telematics and the Traffic Control Centre, this policy package is still considered likely to provide a profitable transport system. In the same way as the media promotion of foresight vehicles, major car manufacturers will also be involved intensively in those necessary facilities and thus reduced costs borne by government.

Considering the current technology gap between Malaysia and other major vehicle producing countries, the materialisation of this Foresight Vehicle Image will hugely depend on the involvement of global car manufacturers and all levels of authority. Internationally, there will

Table 7.3 Policy Measures for Image I - Their Characteristics and Implications for Sustainable Transport Objectives

Potential Policy Measures		Sustainable Transport Objectives										Characteristics of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P)	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
Core Policies	Cleaner/safer vehicle		•				•		•		•	■	T/L	G/N/R/L	C	-
	Advanced greener/safer two-/three wheelers		•			•			•	•	•	■	T/L	G/N/R/L	C	-
	ITS (in-vehicles)		•				•		•	•	•	■	T	G/N/R/L	C	-
	R&D on automation technology		•			•			•	•	•	■	T/P	G/N/R/L	C	C
Main Supporting Policies	ITS(Traffic Guidance System)		•				•		•	•	•	■	T	G/N/R/L	C	C
	ITS (Parking Guidance System)		•				•		•	•	•	■	T	G/N/R/L	C	C
	ITS (Traveler Information System) - Timetable/route info/ticketing system		•				•	•	•	•	•	■	T/L	G/N/R/L	I	-
	Refueling/recharging infrastructure						•		•		•	■	T/L	G/N/R/L	C	C
	Subsidy for greener /safer vehicles		•			•			•	•	•	■	P	G/N/R/L	N/C	C
	Subsidy for advanced green/safer two/three wheelers		•			•			•	•	•	■	P	G/N/R/L	N/C	C
	Tax relief for fuel from renewable source						•		•		•	■	M	N	-	C
	Scrappage bonus		•				•		•	•	•	■	M	N	-	C
Other Supporting Policies	Taxes & energy concession – cleaner/safer vehicles		•				•		•		•	■	M	G/N	-	C
	Public awareness about green/safer vehicles		•						•		•	■	P	G/N/R/L	I/N/C	C
	Variable car excise taxes						•		•		•	■	M	N	-	-
	Distance-based vehicle insurances	•	•	•			•	•	•	•	•	■	M/L	G/N/L	C	-

Image I Policy Measure (continued)

Potential Policy Measures		Sustainable Transport Objectives										Characteristics of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P)	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
Other Supporting Policies	Distance-based vehicle registration fees	•	•	•			•	•	•	•	•	■	P/L	G/N/L	-	-
	Higher emission/safety standard		•						•		•	□	P	G/N	-	C
	Road space for two/three wheelers											■	P	N/R/L	-	C
	Alternative working hours		•				•					■	L	N/R/L	C	-
	Provision of non-work facilities (company)	•	•	•			•		•	•	•	■	L	R/L	I/N/C	-

be agreement on standards for vehicles and fuels to create an unified market. Nationally, green procurement by Malaysian governments will be necessary, i.e. higher standards for pollution, noise and safety regulations, and much lower or zero import taxes on foreign foresight vehicles. Locally, a niche market will be initiated for promotion and awareness purposes. To achieve sustainable transport through technological improvements, this Image and policy package need seamless efforts from all levels of authority working openly and closely.

To catch up with the competition in the global market, the Malaysian vehicle industry will be allowed to learn new greener automation technologies via technology transfers. In this Image, globalisation would open up Malaysian vehicle markets and also 'kick-start' many other local transport business opportunities such as refuelling garages, telematics services and information centre etc. The presence of foresight vehicles initiated by global car manufacturers will enable the local transport industry to flourish in new areas.

The public has received this policy package well because it restricts people's freedom of choice very little. It retains the advantages of private vehicle use, namely comfort, speed and flexibility. This package also appears to be politically preferable as it involves the least amount of government intervention and restriction.

7.5.3 Schematic Implementation of Policy Package

Referring to Figure 7.4 on next page, this section analyses the schematic implementation of the Foresight Vehicles policy package along the timescale.

7.5.3.1 Immediate Steps (from the year 2004 to the year 2008)

This is a phase when foresight vehicles, private cars particularly, are newly introduced into the local market. There are alternative fuels with in-vehicle intelligence systems. The main purposes of this phase are to give clear signals to industry in order to create niche markets for these vehicles and to raise awareness of these advanced technologies.

Within this short-term period, fiscal incentives and tax credits are available for alternative fuel and hybrid electric vehicles. Scrappage bonus is also available if people choose to get rid of their old and obsolete petrol vehicles and switch to foresight vehicles. Public exhibitions and public test-drives of these foresight vehicles are taking place at various events. The demonstration of these vehicles also features refuelling and recharging facilities. People have been made aware of the benefits of these vehicles, focusing on the green and safety aspects. Variable car excise taxes are imposed to encourage people to choose lighter, smaller and greener vehicles.

At the same time, government has also run several pilot projects for Advanced Traffic Management and Roadside Telematics. A Traffic Control Centre has just been established, and from this centre, real-time information about routes and parking guidance is transmitted to the pilot project's designated areas, vehicles' screens and personal information systems.

Besides promoting a greener environment by using foresight vehicles, road safety is another important issue to be tackled in this Image. Together with the Traffic Control Centre, integrated safety policies have been initiated by the Road and Safety Council to include comprehensive measures such as improving pedestrian and cyclist safety on road, specific

Figure 7.4 Schematic Implementation Programmes for Image I

and constant enforcement and better planning of traffic flow[71]. R&Ds have started with help from vehicle manufacturers[72] to produce safer cars for the long-term objective.

7.5.3.2 Intermediate Steps (from the Year 2009 to the Year 2014)

After nearly five years of intensive promotion, the foresight vehicles have successfully penetrated the Malaysian traditional market for petrol vehicles. More than that, the alternative fuel and hybrid vehicles with intelligent systems have expanded their own market with unprecedented dynamism. The Safety Concept Car is starting to be incorporated in the Foresight Vehicle design and this helps to achieve the target of road safety. Prices of cars started to drop significantly. Government subsidy has stopped but many people can afford them by now. This is a phase in which the Malaysian government has the confidence to steer towards sustainability by adopting a mainly foresight vehicles policy for the Kuala Lumpur transportation system.

Globally the technology of foresight vehicles has matured, its market has been flourishing and the R&D of this technology has been expanding. At this stage, there is the new introduction of advanced two-/three-wheelers into the Kuala Lumpur market. Three factors contribute to these new private vehicle products: firstly, global vehicle manufacturers constantly try to expand their business by exploring new markets, and the success of the advanced car market in Kuala Lumpur has stimulated other private vehicle products; secondly, the Malaysian government has realised that something has to be done to include the lower income group into the foresight transport policy; upgrading their obsolete bicycles and motorcycles into more advanced, greener and safer two-/three-wheelers is a very logical option. Thirdly, there is public awareness of the desirability of switching to smaller, lighter

[71] These integrated policy measures have been concluded by WHO (2004) to be useful in achieving greater road safety. They should achieve a great improvement in the present Kuala Lumpur transport system that still seriously lags behind in all sorts of planning and regulations for safety. (For further details of the present accident issue in Kuala Lumpur, see Section 2.2.2, Chapter 2)

[72] Volvo "Safety Concept Car" is an example of how a vehicle manufacturer could help to achieve greater road safety by re-designs a car. See website http://www.driveandstayalive.com/articles%20and%20topics/test%20drives/td-volvo-scc.htm

and greener vehicles, and therefore there is a huge potential market for advanced two-/three-wheelers readily available.

Fiscal incentives and tax credits are available for advanced two-/three-wheelers now. A scrappage bonus continues to be offered to get rid of old and obsolete petrol vehicles from the road. At the same time, regulations concerning noise, emissions and safety have been further tightened. Along with these policies, the public has been made aware of the existence of greener and safer private vehicles, and also the benefits of shortening or reducing unnecessary trips. New reforms in vehicle insurance and registration fees have become distance-based so that people will use their private vehicles with much greater caution.

Traffic and parking guidance systems have been widely applied now, extending beyond the pilot project sites. Reacting to this development, real-time information about traffic and parking conditions, weather, accidents, etc. are widely available via electronic roadside signboards, in-vehicle screens, information kiosks, pagers, mobile phones, computers and even public telephones. Drivers can also find out more information or ask for help in relation to emergency incidents. This two-way, real-time communication of road information has been named the Advanced Traveller Information System; it helps traffic management work at its highest efficiency.

7.5.3.3 Long-term Steps (from the Year 2015 to the Year 2020)

Markets for foresight cars have been established, and prices still keep dropping; they appear affordable for the majority of people in Kuala Lumpur. The markets for advanced two-/three-wheelers also expand enormously, attracting not only the main target group of lower income people, but also other income groups. They have also become the second most popular type of transport mode besides the car. To further promote the usage of these modes, specially designated road spaces for two-/three-wheelers have been made to separate them from other vehicles. Just like the advanced cars, the prices of these advanced two-/three-wheelers also

drop significantly. The government has now limited the fiscal incentive so that it is available only for the lowest income group to purchase them.

The refuelling and recharging infrastructures for foresight vehicles are all in place now, supporting the alternative fuel and hybrid car technology. Resources are now shifted to new testing schemes, keeping up with better forms of foresight vehicle, and even trying to explore the possibility of the fuel cell car market for the distant future.

It is worth to noting that at this stage, local vehicle manufacturers should have been able to catch up with these alternative and hybrid transport technologies. The advantage of these local vehicle manufacturers is that they react sensitively to local market demand and can design products that suit the local environment. They are involved intensively in R&D of future foresight vehicles, particularly for the markets of Malaysia and Kuala Lumpur. There is new tax relief for alternative fuels from any renewable sources from this point onwards.

All advanced transport telecommunications are also well established in Kuala Lumpur now. Traffic management can perform up to the highest efficiency to handle vehicle traffic in the city. Nonetheless, in this Foresight Vehicles Image, there is always a latent threat of travel stimulation due to technology. The stimulation will create more traffic on the road than could be handled. Therefore, there are several preventative measures taken at this point, mainly to reduce the number of trips or to shorten the journey. There is a revolutionary reform in vehicles insurance and registration fees, changing from the traditional fixed ones to those that are distance-based. Companies are encouraged to set up alternative working hours and provide non-work facilities. The former would be likely to target the worst peak hour traffic conditions and the latter would hope to eliminate other non-work trips. These measures are not strict in nature; instead, they are offering alternatives for people to plan their travel pattern and use their vehicles wisely.

Other policies continue as outlined in the intermediate steps.

7.6 Policy Package for Image II - Extended Public Transportation

7.6.1 Description of Policy Package

Improving the efficiency of public transportation systems has always been an important element in Kuala Lumpur's transport policy. The recent massive undertakings of building the Light Rail Transit, the monorail and upgrading the old railway system shows that there is a keen commitment to a public transportation system.

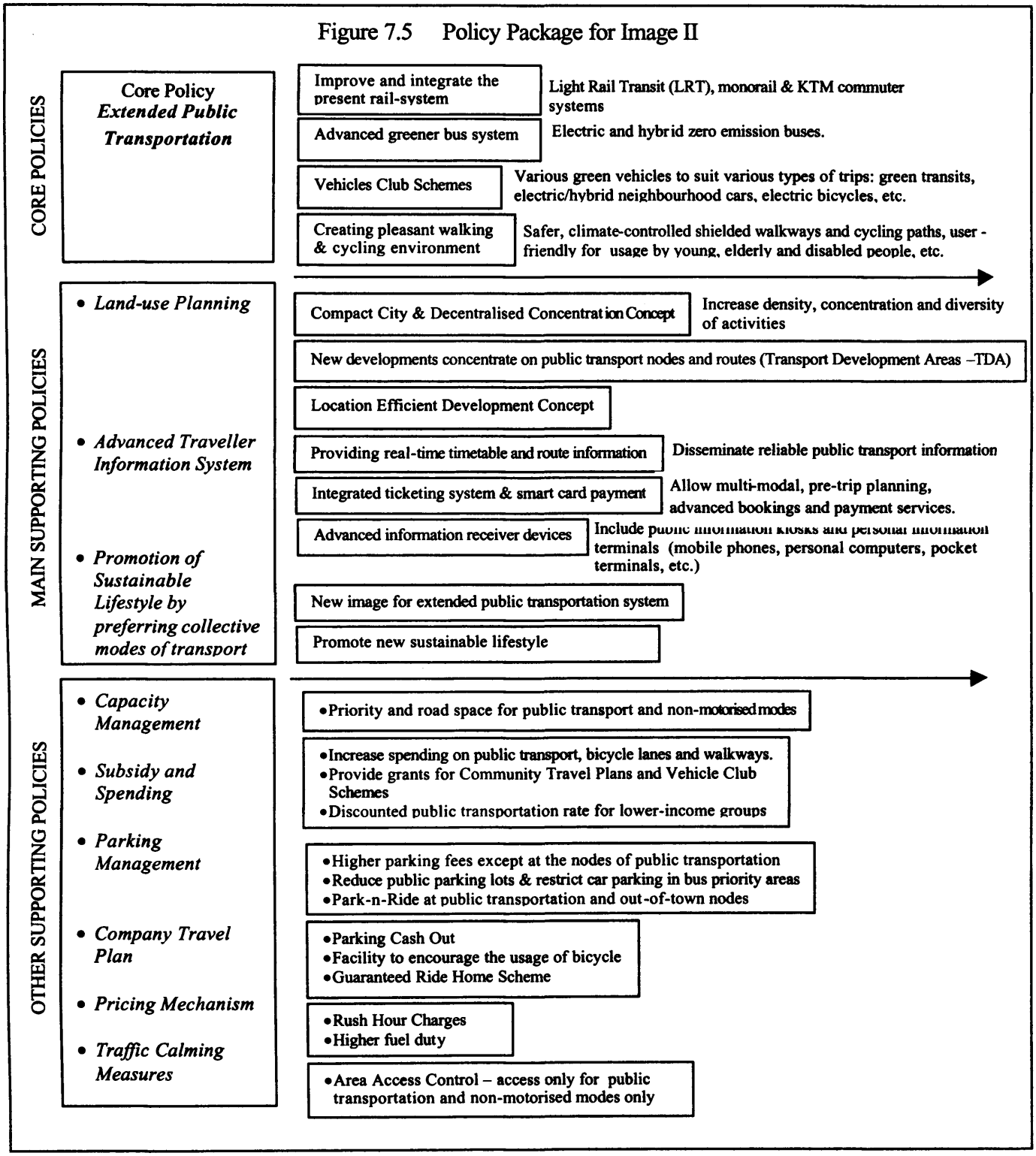
The second Image of this study depicts an image of the future that needs greater effort, stronger commitment and more enthusiasm from all levels of authority towards a public transportation system. This involves the additional introduction of new forms of public transportation, major automation and information technology improvements, a change of public lifestyle and significant modifications in land-use patterns. This is a massive change if compared to the present situation; it is geared towards sustainability by putting most emphasis on public transportation.

As illustrated in Figure 7.5 on next page, the core policy for Image II is to explore a new era of public transport system for Kuala Lumpur. Key developments include: -

- Firstly, improving and upgrading the present rail-based public transportation system that consists of intra-city services (light rail transit and monorail) and a suburban railway service (KTM commuter).
- Secondly, gradually replacing the old, obsolete, noisy, dirty buses with advanced, greener, safer, more modern and comfortable electric or hybrid buses;
- Thirdly, encouraging the establishment of markets for new rented vehicles, with particular emphasis on advanced greener vehicles, including two- or three-wheelers[73]. Rented electric bicycles, scooters and electric cars are to be found at the main nodes of

[73] The vehicles mentioned here refer to those that have been discussed in Foresight Transport's key policy.

Figure 7.5 Policy Package for Image II



bus and rail terminals. On the other hand, various Vehicles Club Schemes[74] have been established which provide efficient personal travel services for their members;

- Lastly, creating pleasant walking and cycling environments.

Rail and bus systems will become the main backbone of the public transportation system in Kuala Lumpur. Vehicle Club Schemes and other rented vehicles provide more flexible modes for personalised trip-making. The provision of safe, weatherproof and comfortable walking and cycling environments in the city will increase the attractiveness of the whole extended public transportation system. These underlying networks will cover the whole of the city's transport routes. The basic idea is to give people many more possibilities for flexibility in choosing their public transport modes in the most convenient and personalised way. Hence, this makes the whole extended public transportation system appear to have competitive advantages over private vehicles.

Three main supporting policies that are closely related to the above extended public transportation policies are: (i) Advanced Traveller Information System, (ii) Land-use Planning, (iii) Promotion of Collective Lifestyle.

The extended public transportation system needs a vital link to connect all types of public transport modes and to make them operate seamlessly. In this project, we have regarded this very important main supporting policy as the *Advanced Traveller Information System*. Three types of measures are included here: firstly, technological improvements in information technology fields result in the development of up-to-the-minute, real-time, state-of-the-art services, focusing on route timetables, delay or emergency rerouting and service conditions. Secondly, the real-time information is available via various advanced information receiver devices, via the development of public information kiosks, public telephones or mobile phones, personal computers and personal pocket terminals. Public transportation information and services are hence becoming very reliable and easily accessible. Lastly, an integrated ticketing system and smart card payment allow multi-modal pre-trip planning, advanced

[74] The Vehicle Club Schemes are a modified version of the Car Club Scheme. Besides car, Vehicle Club Schemes provide other transport modes such as bicycle and scooters. In this study, these refer to the advanced greener vehicles.

booking and payment services. These three-pronged measures form the *Advanced Traveller Information System* that enables the extended public transportation to provide reliable and consistent services. Reference may be made to the efforts to integrate public transport and information in order to persuade people to change from using their cars to other modes of transport, as can be seen in the project INFOPOLIS[75].

The next main supporting policy refers to *Land-use Planning*. Lessons learned from other cities' experiences show that it is one of the most important policies required to complement public transportation system. In this Image, the *Compact City Concept* (city centre) and the *Decentralised Concentration Concept* (suburbs) are strictly implemented. By increasing land-use density, concentration and diversity of activities, public transportation could be certain of high load factors and subsequently become very cost-effective. Urban concentration and developments at public transportation nodes (Transport Development Areas) will also help public transportation modes to become more attractive and competitive. A compact city, ensuring that travel distances are relatively short, is a vital precondition if public transport modes are to be successful. The compact city could also achieve more energy, social, land and utility efficiency than sprawling land-use patterns. Besides the *Compact City* and *Decentralised Concentration Concepts, the Location Efficient Development Concept*[76], a newly reformed residential planning concept, is implemented to encourage residents to use the extended public transport system and give up their private cars.

[75] Infopolis was a project partially funded by the European Commission Telematics Application Programme (Transport Sector) up to the year 2000. Its aim was to improve user access to electronic intermodal traveller information by developing guidelines for the presentation of information. At a later stage, Infopolis concentrated exclusively on information for public transport users, and particularly on intermodal public transport information.

[76]The Location Efficient Development concept consists of residential development in areas with good transportation choices (walking and cycling conditions, transit and car-sharing services) and proximity to common services. These features result in reduced automobile ownership and use, which provides transportation and parking cost savings to consumers. Location Efficient Mortgages recognize these potential savings in credit assessments, giving homebuyers an added incentive to choose location efficient residences. (VTPI, 2001). See also Hoeveler (1997) and Goldstein(1996)

The last crucial complementary policy is the *Promotion of Sustainable Lifestyle by preferring collective modes of transport.* This is a human behaviour mechanism policy that expressly seeks to change people's behaviour to achieve less environmentally harmful travel patterns, by promoting the usage of the extended public transportation system. Only two clear and simple messages are focused on to give people a very basic idea about this policy:

1. *A new modern image of extended public transportation is promoted.*

   Having put much effort into upgrading and extending Kuala Lumpur's public transportation system in a 'hard' way which involves intensive investment and increased infrastructure, there is now a 'soft' way to disseminate the message of the efficient, reliable, flexible and personalised public transportation system. This is to change the traditional perception of the public transportation characteristics, which is worse than they actually are.

2. *There is recognition that using collective transportation modes is a way of achieving a sustainable lifestyle.*

   Explicit messages are disseminated assimilated to highlight how public transportation will tackle the environmental issues, balance the social inequality in the transport system and make the city more attractive.

Both *organisational changes* and *cognitive-motivational strategies* are needed to enable the messages to reach every individual strongly and convincingly.

The core policies together with three main supporting policies present a solid foundation for a transport system that has a strong bias towards collective modes in Kuala Lumpur. Other supporting policy measures that have been identified include:

- Priority and road space provision for public transport and non-motorised modes.
- Increased spending on public transport, bicycle lanes and pedestrians.
- Provision of grants to encourage vehicle club schemes and community travel plans that use advanced greener vehicles.
- Provision of 'discounted rate of public transportation fees' for lower income groups.
- Higher parking fees, except at the nodes of public transportation.
- Reduction of public parking lots in general and restriction of car parking in bus priority areas.

- Establishment of Park-n-Ride at public transportation and out-of town nodes.
- Company Travel Plans include Parking Cash Out, provision of facilities to encourage bicycle use and initiation of Guaranteed Ride Home Scheme
- Implementation of Rush Hour Charges and imposition of higher fuel duty to discourage private vehicle usage.
- Designation of Areas Access Control whereby allowing access only to public transport and non-motorised modes.

7.6.2 Characteristics of the Policy Package

The traditional thinking about public transportation would be public policy oriented, in which government would be the main provider and operator. This was and has been exactly the case for Kuala Lumpur public transportation's system, even though privatisation has shifted many government responsibilities recently. Quite contrary to this, in this study the measures of the extended public transportation Image consist of a good mixture of public, lifestyle and market technology policies (Please refer to Table 7.4 on next page).

Government still carries huge responsibilities to plan, build, monitor and regulate the whole public transportation system. The provision of backbone public transportation is considered as public policy. The private sector, on the other hand, has many opportunities to play a big role, particularly in the operation of rail and bus systems. There are also new areas of transport business for them, such as the establishment of Vehicle Club Schemes and Traveller Information Services. In the study time-frame, the protection policy for national cars will be continued in this Image, and foreign vehicle manufacturers will explore new opportunities to introduce their advanced greener vehicles to Malaysia via the rented market instead, which is highly encouraged and promoted by the Malaysian and Kuala Lumpur authorities.

Table 7.4 Policy Measures for Image II - Their Characteristics and Implications for Sustainable Transport Objectives

Potential Policy Measures		Sustainable Transport Objectives										Characteristics of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P) Policies	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
Core Policies	Light Rail Transit/Monorail/Train	•		•	•			•	•	•	•	■	P	N/R/L	C	C
	Zero Emission Bus (Electric/Hybrid)	•		•	•	•		•	•	•	•	■	T/P	N/R/L	C	C
	Community Vehicle Plan [Vehicle Club]	•		•	•		•		•	•	•	■	P/L	L	I/N/C	-
	Taxi & Dial-a-Ride	•		•				•	•	•	•	■	P/L	L	C	-
	Advanced Greener/Safer Cars, Two & Three Wheelers for rental purposes	•	•	•		•	•	•	•	•	•	■	T/P/L	G/N/R/L	N/C	-
	Pleasant Walking Environment	•	•	•	•	•		•	•	•	•	■	P/L	R/L	N	C
Main Supportin g Policies	Land -use Planning (Compact City/ Decentralisation Concentration/ TDA)	•		•	•			•	•		•	-	P	R	-	-
	Land Use Planning (Location Efficient Development)	•		•			•	•		•	•	■	P/M	L	C	-
	Advanced Traveler Information System (Timetable and Route Information)	•	•	•			•	•	•	•	•	■	T/L	G/N/R/L	-	C
	Advanced Traveler Information System (Integrated Ticketing System &Smart Card Payment)	•	•	•			•	•	•	•	•	■	T/L	G/N/R/L	-	C
	BCC (organisational change) Promote new images of public transportation	•		•	•	•		•	•	•	•	■	L	N/R/L	N/C	C
	BCC (cognitive-motivational strategies) Awareness of sustainability lifestyle	•		•	•	•		•	•	•	•	■	L	N/R/L	I/N/C	C
Other Supportin g Policies	Priority and road space for public transport and non-motorised modes	•	•	•	•	•		•	•	•	•	■	P	N/R/L	-	C
	Increase spending on public transport and non-motorised modes	•	•		•	•		•	•	•		■	P	G/N/R/L	-	C
	Grants for Community Car Plan	•		•	•		•		•	•	•	■	P/L	N/R/L	N/C	C

Image II: Policy Measures (continued)

Ptential Policy Measures		Sustainable Transport Objectives										Characteristics of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P)	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
	Higher parking fees except at nodes of public transportation			●			●	●	●	●	●	□	P/M	L	-	R
	Parking Cash Out						●	●	●	●	●	■	M/L	N/R/L	C	C
	Park-n-Ride	●		●				●	●	●	●	■	P	L	C	C
	Facility to encourage the usage of bicycle	●		●		●		●	●	●	●	■	L	R/L	C	-
	Guaranteed Ride Home Scheme			●				●		●	●	■	L	L	C	C
	Rush Hour Charges			●			●	●	●	●	●	□	M	L	-	R
	High Fuel Duty			●			●	●	●	●	●	□	M	N	-	R
	Area Access Control "Public transportation and non-motorised modes only"		●	●				●	●	●		□	P/M	R/L	-	-

To a large extent, the policy package also consists of lifestyle-changing policies. The main idea is based on using collective transport modes and the belief that it is a symbol of a new sustainable lifestyle. Travelling by rail-based or bus systems, joining Vehicle Club Schemes or using rented vehicles all differ from the present travel behaviour. The compact city, communal green spaces and more social interaction resulting from more opportunity to meet others are changing the present social norm of individualism as well.

For the technologically based policies, the greatest credit belongs to the establishment of the Advanced Traveller Information System; this would be a new and comprehensive implementation of Advanced Transport Telecommunication (ATT) applied in Kuala Lumpur. There is also the introduction of zero-emission buses and advanced greener vehicles for the rented market, which are improvements in automation technology. However, if compared to the first Image (Foresight Vehicles), it could be said that only about half the force of the technological improvement strategy has been exercised.

Market-based policies, however, have been used mainly as *other supporting policies*, as can be seen from Figure 7.5

All in all, this policy package provides many attractive pull policies, which are needed to persuade people convincingly to change their habitual private vehicle usage. Lots of public transport choices are presented with greatly increased capacities and frequent services; flexible alternative transport modes are available; emergency backups (such as Guaranteed Ride Home Scheme) are set up. Nevertheless, there are also some push policies; the 'carrot and stick' concept is adopted by imposing a certain degree of private vehicle restriction. These policies are not the main supporting policies; their implementation is more flexible and dependent upon public responses. Examples of these are Rush Hour Charges, Area Access Control and higher parking charges, etc.

The restrictive policies have in one way generated some revenue for government, but it is very little if compared to the huge amount of investment and maintenance costs for the whole public transport system. Although the private sector has been involved intensively in the

whole policy package, over the time-span of this study the economic feasibility of the whole transport system in Kuala Lumpur is considered to be a subsidised one.

In this Image where there is a *prevailing nationalisation (select and pick) economic trend*[77], The Malaysian government, especially at national level, has major control over industrial, economic and business types, and is least influenced by globalisation. This has huge impacts on the transport business and the system. Apart from a few policies (generally technologically based) that have been closely related to international inventions and therefore involved global regulations (such as ITS and advanced greener vehicles), most of the policies in this package have been initiated, implemented and regulated by the Malaysian government herself; for example, land-use planning, spending and subsidy on transport, promotion of Behaviour and Cultural Change, etc. Also, as mentioned above, the national car industry has been protected and only foreign advanced greener vehicles could be imported without high excise taxes.

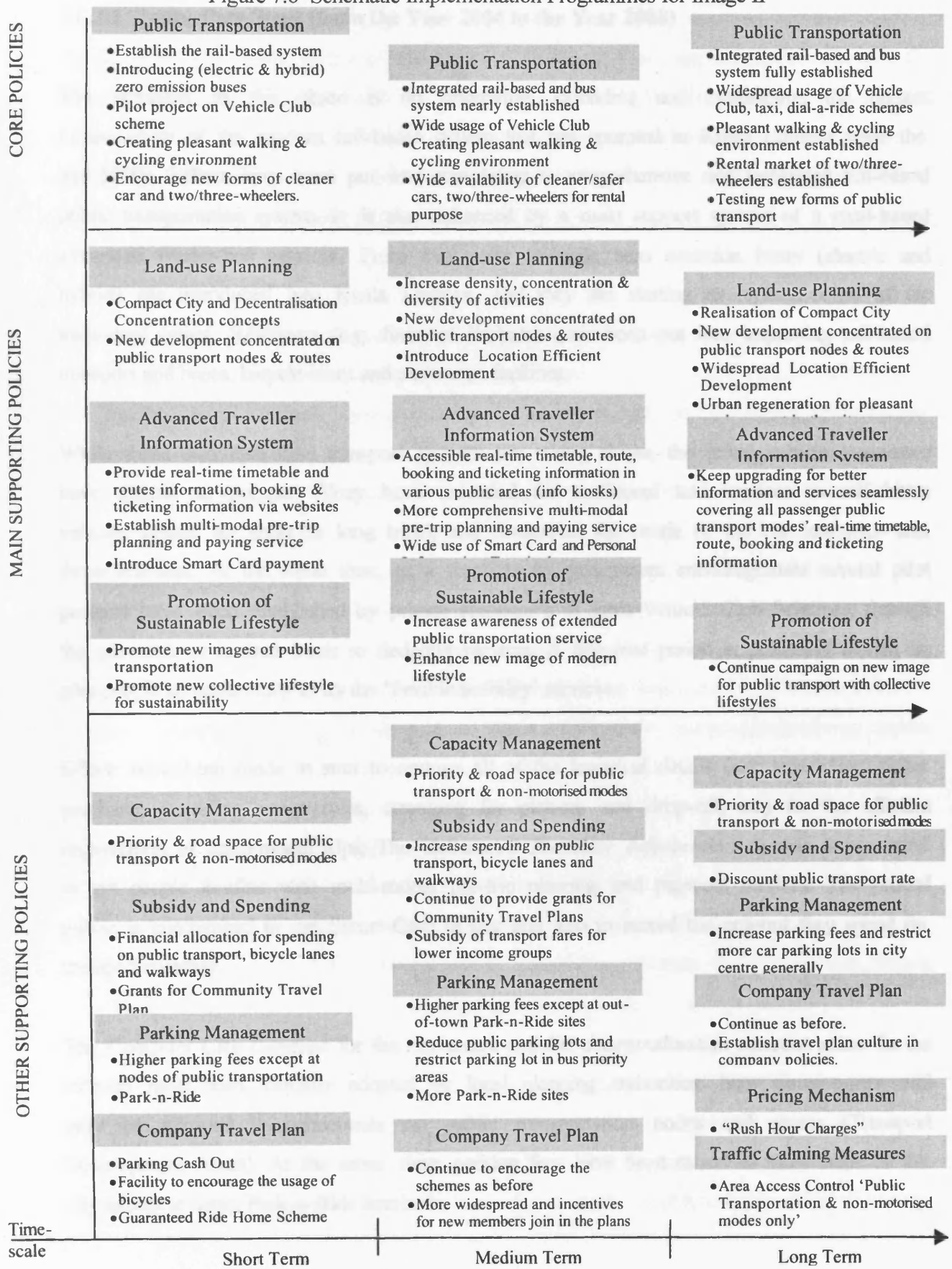
This policy package puts emphasis on a new image for the city of a modern and efficient extended public transport system. It provides more transport choices for people, with more personalised, flexible and reliable public transportation services. The majority of people have welcomed such a change of emphasis being put on collective modes, but there is a risk that some people may resist it because they see it as a threat to their continued usage of private vehicles.

7.6.3 Schematic Implementation of Policy Package

Referring to Figures 7.6 on next page, this section presents the schematic implementation of extended public transport policy package and the achievement of targets along the timescale.

[77] Please refer to Section 6.2.2.2., Chapter 6.

Figure 7.6 Schematic Implementation Programmes for Image II



7.6.3.1 Immediate Steps (from the Year 2004 to the Year 2008)

The emphasis in this phase is on improving, extending and establishing the present infrastructure of the modern rail-based system that has operated in Kuala Lumpur since the mid-1990s. Efforts have been put into completing a comprehensive and integrated rail-based public transportation system. It is also enhanced by a main support system of a road-based advanced feeder-bus network. From this point onwards, zero emission buses (electric and hybrid) are introduced into Kuala Lumpur, and they are starting to replace some of the traditional buses. Resources (e.g. financial budgets) have been put into improving rail-based transport and buses, bicycle lanes and pedestrian facilities.

While these two backbone transport systems are taking shape, the rental vehicle businesses have started to prosper. They have extended the traditional taxi services to self-driven vehicles (either for short or long trips), and diversified the mode of the car into two- and three-wheelers. At the same time, as a response to government encouragement several pilot projects have been established by private companies to form Vehicle Club Schemes, through the provision of limited funds to fledgling projects. A free trial period is promoted aiming to give people an opportunity to try the 'flexible mobility' services.

Efforts have been made to start to arrange all of the logistical details (e.g. scheduling, ticket purchase, providing usage rules, arranging for pick-up and drop-off, etc) for the efficient organisation of multi-modal trips. The *Advanced Traveller Information System* is promoted to get people familiar with multi-modal pre-trip planning and payment services. The general public is encouraged to use Smart Card to pay and also to record the amount they spend on transport monthly.

The *Compact City Concept* for the city centre and the *decentralisation concentration* for the suburbs have been formally adopted by local planning authorities. New development will only be allowed to concentrate on public transportation nodes and routes (Transport Development Areas). At the same time, parking fees have been raised in most areas of the city except at major Park-n-Ride terminals.

People have been made aware of the above changes, of the government bias towards the public transportation system and the transformation of its extended mobility services. Schools, companies and public organisations were firstly targeted to receive these messages. Company Travel Plans and grants for Community Travel Plans are made available to encourage establishment of these plans.

7.6.3.2 Intermediate Steps (from the Year 2009 to the Year 2014)

The replacement of the old buses is progressing rapidly and at the end of this period nearly 75% of buses that run on the road are part of zero-emission fleets. Except for very few routes, the integrated rail-based and bus systems have also been established. Together with these backbone public transportation systems, rented vehicles and Vehicle Clubs have made a united effort to form a near-perfect, seamless network to provide efficient services. Responding to the Kuala Lumpur government's encouragement, most of the rented and Vehicle Club's cars are now run on alternative fuels. Improved walking and cycling routes have also almost been completed in and around the city, adding attractive features to Kuala Lumpur. More priorities, spending and road space have been allocated to public transportation and non-motorised modes.

The Advanced Traveller Information System is fully established at this stage, together with the well-established extended public transportation system. Real-time information about public transportation services is more widely available than during the first phase via public information kiosks in shopping complexes, leisure centres, libraries, workplaces, etc. People use multi-modal, pre-trip planning and payment services frequently.

Meanwhile, the *Compact City* concept is taking shape gradually in Kuala Lumpur. Suburban developments are adopting the decentralised concentration pattern. In general, there is increasing density, concentration and diversity of activities in these centres. Seeing that the extended public transportation system has almost been established, local governments,

developers and mortgage dealers in the city have co-operated and introduced *Location Efficient Development*. This refers to new zoning in residential areas, which strictly prevents private car accessibility except for visiting purposes. By agreeing to have a lifestyle that prevents private car ownership but depends on extended public transportation, people can move into the designated residential areas of this new development. Without the need to spend money on private cars, they will have larger budgets available for mortgages for houses. Without the need to provide parking spaces, residents will have safer, cleaner and more spacious communal green spaces, in addition to having more opportunities for social interaction and harmonious neighbourhoods. Parallel to this new development, additional grants are made available to encourage the forming of Community Travel Plans, for example, ride-sharing while using a vehicle from a Vehicle Club.

The presence of the physical infrastructure of public transport and the putting in place of information services in Kuala Lumpur, to a large extent, will automatically promote a collective lifestyle. Now, the main effort in terms of 'soft-way' promotion is to make people aware of the many choices available in Kuala Lumpur. It also strongly emphasises the positive selling points, such as the avoidance of expenditure on motor vehicles, time-saving in certain contexts (such as congestion), no maintenance costs, the possibilities for exercise, and the accordance with social equity and environmental benefits, etc. At this stage, the major work in changing travel behaviour is to change the traditional image of public transportation users as poor, disadvantaged and working-class groups. Successful in terms of status, possessing a modern lifestyle, environmentally consciousness and part of a caring society are the new images directly linked to the usage of extended public transportation.

More private companies are encouraged to outline their own travel plans in accordance with the extended public transportation system. Popular measures include the Parking Cash Out, the Guaranteed Ride Home Scheme and provision of facilities (e.g. shower rooms, bicycle parking lots, bicycle repair tools, etc.) to encourage the usage of bicycles.

At the same time, public parking lots are being taken out from the city while the remaining lots are charging higher fees. These restrictive policies act as 'stick' measures, alongside other many 'carrot' strategies.

There is also some subsidy for public transport fares for lower income groups in order to achieve for social equity objectives.

7.6.3.3 Long-term Steps (from the Year 2015 to the Year 2020)

By this period, the extended public transportation has been fully established. The markets for rail-based transport, buses, rented vehicles and Vehicle Clubs have matured. Consequently, prices are dropping due to intensive competition from each other. The associated information system has also concurrently reached its peak. Responding to these transport infrastructures, information facilities and education from media promotion, the public in Kuala Lumpur is adapting enthusiastically to this extended public transportation as a major part of their life.

Those who have cars do not use them without due consideration now. A person has been taught to judge the value of a trip made by alternative modes instead. The second or third car syndrome has gradually disappeared and been replaced by joining Vehicle Clubs or Community Traveler Plans instead. There are significant amounts of people choosing not to have a car at all, and proud to be able to contribute less to environmentally harmful travel patterns. Gradually, there is a cultural change resulting in a perception of these people as highly moral, having the virtue of integrity and they are well respected. The concept of private car ownership as a symbol of high status in society has been wiped out. The campaign to promote sustainable lifestyles by using public transportation continues in this period.

Now Kuala Lumpur is a genuinely vibrant compact city, with high-rise buildings and plenty of 'green lungs' in the city centre. Urban regeneration is an important item on the city planning agenda. Planners revive old living quarters with an attractive diversity of activities.

Major developments are only approved on condition that they provide good public transportation connections, as well as cycle paths and pedestrian ways.

At this point of development, several drastic measures have been introduced to the city, i.e. Area Access Control. Several major areas have been designated for public transport, bicycles and pedestrian access only, while private vehicles are banned from these areas completely. There is the new introduction of Rush Hour Charges for private vehicles in certain areas. At the same time, apart from alternative fuels, higher charges have been introduced for petrol and diesel, aiming to further reduce energy usage and atmospheric pollutants.

The extended public transportation system has cost government a lot in terms of infrastructure building/maintenance and subsidies/grants to encourage the pioneers of sustainable transport schemes as described before. However, in view of the fact that now the whole transport system is mature, stable and has even started to make profits, the Kuala Lumpur government can now redirect the funds into spending and subsidies. Government is now using the spare financial resources to further aid the expenditure on mobility by the lower income groups. The new policy is to provide lower income groups with a huge discounted rate to use public transportation. This policy has given them an equal right to enjoy the infrastructures that have been built for all of the citizens of Kuala Lumpur.

Other policies such as capacity and parking management, company and community travel plans are implemented continuously.

7.7 Policy Package for Image III – Information Society

7.7.1 Description of Policy Package

This third Image picks up the themes of the 'Multimedia Super Corridor' and 'the knowledge society' that have been enthusiastically initiated by the highest level of authority in Malaysia. With such top-down efforts, many 'telecommunicating prerequisites', such as government will, high-capacity telecommunications network, legislative support, etc. have been laid down to form a solid foundation in order to materialise the information society in Kuala Lumpur. But then, how should the transport system respond to ensure the achievement of sustainability against this background? In this context, this policy package has sought to provide a path to bridge the present effort put into telecommunications and the sustainable future.

First and foremost, this Image recognises the effects of telecommunications upon a society's structure and the ensuing lifestyle choices. Analogously, it recognises that a transport system is reflexively affected by the changes in society due to telecommunications. Therefore, quite contrary to the Foresight Transport and the Extended Public Transportation Images, the core policies of Information Society are not conventional transport-based measures. Rather, it is the idea of 'telecommunications as natural substitution for transportation' that has been explored to achieve sustainable development, and the conventional transport measures in this Image have become secondary in the hierarchy.

The *presence of an information society* in Kuala Lumpur is therefore the central pillar of this policy package. A significant amount of people, say about 45% to 55% of the population, would shift to a new on-line lifestyle. Two major aspects, i.e. working and shopping, are the focuses of the substitution mechanism as they constitute high-frequency trips. Other tele-activities, (for example tele-conferencing, tele-education, tele-services) are also intensively promoted for the same substitution purpose, if not to shorten their original trip lengths. Physically, the tele-centres are built to act as neighbourhood offices and also goods distribution centres; the tele-cottage residence concept is established and is formed in many

local neighbourhoods. A broadband access point in every household means that people could be on-line all the time.

Tele-lifestyle (tele-cottaging, home-working or telecentre-working) is like giving a 21st century twist to Ebenezer Howard's vision of combining the benefits of town and country. More than that, people in Kuala Lumpur are connected globally without losing any competition in the economic and market fields, since they have advanced information and knowledge flow in and out via 'on-line' connections. They also form close-knit local communities from a mixed background of professionals. This 'connect globally' but 'act and be mobile locally' lifestyle is an important policy to ensure the presence of an information society and it is strongly promoted.

However, the move towards an information society does not automatically mean that it is a move towards a sustainable society. Sustainable development will not occur by itself even if the society has an extremely powerful tool – information technology. Telecommunication is an advanced tool that could provide new opportunities to rearrange the society's structure, but it is intrinsically neutral. Apart from the tool and the opportunities, complementary strategies are needed to change society towards sustainability. The transition to an information society thus needs to develop a collective consciousness, will, action and governance. Drastic changes in individual behaviour and government will are needed in this Image:-

- Firstly, there is a flexibility in accepting the tele-lifestyle and the 'local destination' as a modern way of living;
- Secondly, there is a sea change in accepting individual restriction for communal benefits, including environmental goals;
- Thirdly, there is a recognition that public transportation and alternative travel means are ways to achieve a sustainable lifestyle.

Both *organisational changes* and *cognitive-motivational strategies* are needed to pioneer these changes in a society.

From the transport perspective, as much as it is hoped that telecommunications will offer opportunities for counteracting the present highly centralised flow for commuting and shopping-related travel in Kuala Lumpur, the relationship between telecommunications technology and transport is not a straightforward one. Theoretically, telecommunications should be able to reduce travel altogether by the mechanism of substitution, but this will not happen naturally. Instead, without proper guidance, telecommunications could facilitate the opposite result - increased travel. A more realistic view about telecommunications is, however, to substitute, modify and stimulate trips at the same time (Banister and Stead, 2003). Telecommunications provide flexibility for people to access a service or goods regardless of time and space and also to increase quality of life by allowing extra leisure time. The implication of this technology would be a mixture of positive and negative impacts on trip making.

Therefore, rigorous car restriction policies have to play an essential role here to prevent telecommunications pulling society further into unsustainability. *Traffic Calming*, *Pricing/Taxation Mechanisms* and *Parking Management* are three measures that have been identified under the heading of car restriction policy. These policies have been adopted in the package because apparently they would efficiently restrict the car use; meanwhile, people have been provided with alternatives to induce them not to use the car at all. This should not be considered unreasonable as the land use, telecommunications, lifestyle and alternative travel means are already set up to absorb and satisfy mobility and access demands. Moreover, these policies are also backed up by the promotion of *Cultural and Behavioural Changes* that advocate individual restrictions (car use) for communal benefits.

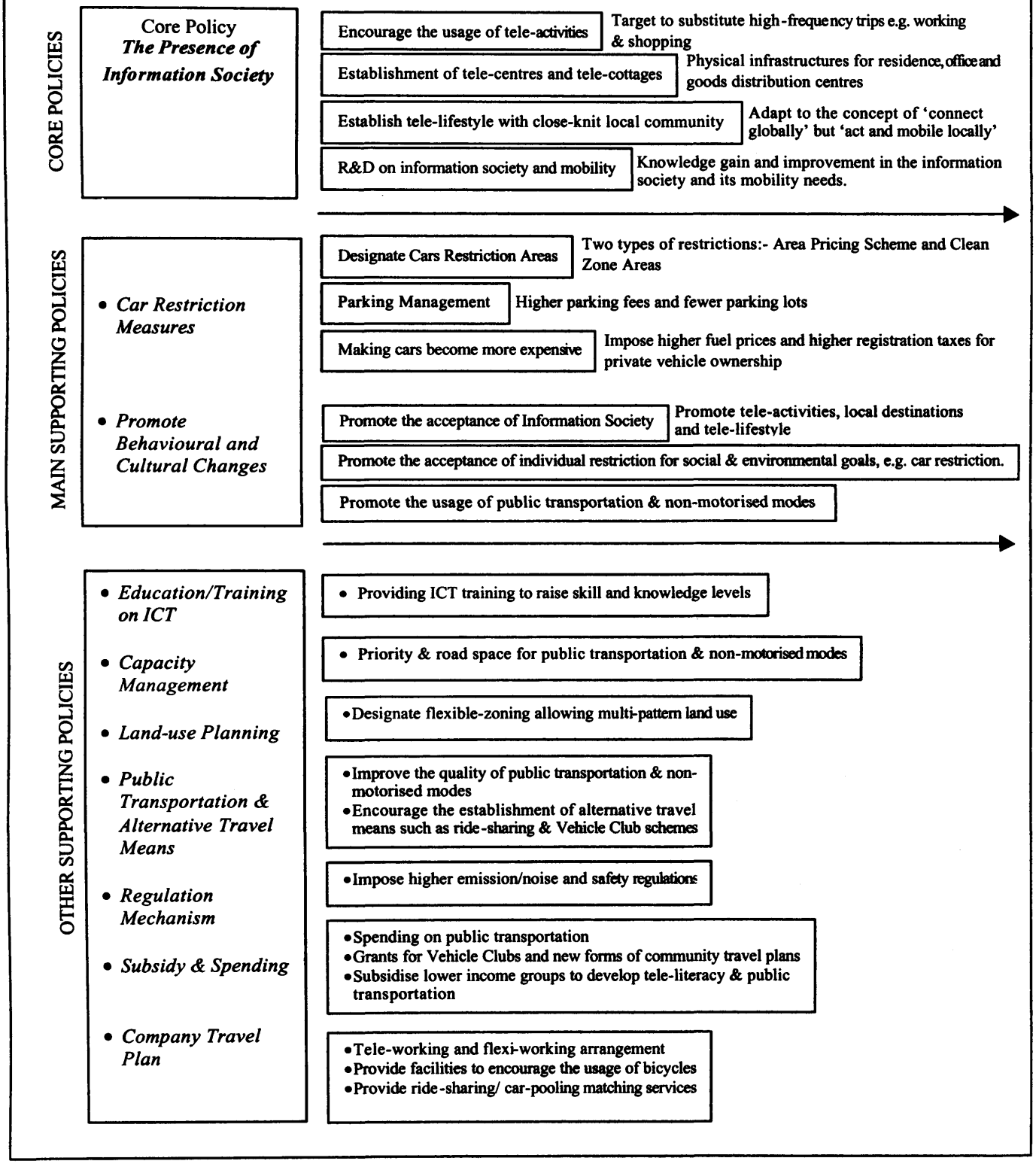
The core supporting policies described above have set the scene for a path towards a sustainable society via telecommunications. To complement these policies, other supporting policies have been identified as follow: -

- Providing ICT training to increase skills and knowledge;
- Priority and road space provision for public transport and non-motorised modes;
- Designate flexible zoning to accommodate multiple patterns of land use;
- Improve the quality of public transportation and non-motorised modes;

- Encourage the establishment of alternative travel means such as ride-sharing and Vehicle Club schemes;
- Provide grants to encourage Vehicle Club Schemes and Community Travel Plans;
- Subsidise lower income groups to use public transportation;
- Encourage and subsidise lower income group to develop telecommunications literacy;
- Impose tougher emission, noise and safety regulations;
- Company Travel Plans to include provision of facilities to encourage bicycle use and initiate Ride-sharing and/or Car-pooling schemes;
- Tele-working and flexi-working hours arrangements commonly practised.

The whole policy package is summarised in Figure 7.7 on the next page.

Figure 7.7 Policy Package for Image III



7.7.2 Characteristics of the Policy Package

As could be seen in Table 7.5 on next page, the core policy of this package is a technology-based as well as a lifestyle-changing one.

The Information Society, a new and different model of economy and society from the traditional industrial form, is heavily characterised by revolutionary telecommunications technology (e.g. tele-working, tele-shopping, tele-banking, etc). By the time an Information Society has materialised, every aspect of life has been penetrated by this technology. It touches everybody and everything in this Image of modern society in Kuala Lumpur. These technology-based measures obviously have an inherently lifestyle-changing impact. But to ensure that the move towards the Information Society is a move towards positive developments on broader human, social and ecological grounds, a sea change in human perceptions about culture and behaviour in accordance with sustainability will have to be made. Therefore, the policy package has adopted many 'pro-active', lifestyle-changing policies such as promotion of local destinations, individual restrictions, public transportation, etc. Taking advantage of the opportunity offered by telecommunications for new ways of doing things and organising society, these policies could gradually steer the society towards sustainability.

The appliances of Telecommunications and the Cultural and Behavioural Changes are non-transport policies and they are not usually to be found in the most pivotal role in a transport study. This policy package has taken an adventurous step by including other disciplines in this context. From the transport policy's point of view, if compared to the previous two packages, this policy package has made a distinction by adopting very drastic car restriction measures as one of its main supporting policies. These are mainly market-based and public policies. Market-based measures such as Area Pricing Scheme, higher parking and car registration fees, higher fuel prices, etc. have been endorsed to restrain car travel by making car possession and its usage an expensive activity. In addition, public policies, such as Traffic Calming, establishing Clean Zones and parking management have also contributed to the control of traffic flow.

Table 7.5 Policy Measures for Image III - Their Characteristics and Implications on Sustainable Transport Objectives

Potential Policy Measures		Sustainable Transport Objectives										Characteristic of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P)	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
Core Policies	The usage of Tele-activities	●	●	●					●	●	●	■	T/L	G/N/R/L	I/C	-
	The presence of Tele-centre/Tele-cottage	●	●	●					●	●	●	■	T/L	R/L	N	-
	The practice of Tele-lifestyle (think global, act local – connect global, mobile local)	●	●	●	●			●	●	●	●	■	L	R/L	I/N/C	-
	Personal information system (computer, mobile phone, pocket terminal etc.)						●					■	T/L	G/N/R/L	I	-
Main Supporting Policies	BCC (adopt tele-lifestyle as sustainable living)	●	●	●	●			●	●	●	●	■	L	L	I/N	C
	BCC (acceptance of car restriction policies)	●	●	●				●	●	●	●	□	L	L	I/N	C
	BCC (promote public transport & non-motorised modes)	●		●	●	●		●	●	●	●	■	L	N/R/L	N/C	C
	Area Pricing Scheme (Clean Zone)		●	●				●	●	●		□	P	R/L	-	-
	High Parking Fee			●			●	●	●	●	●	□	M	L	-	R
	Reduce Parking Spaces			●				●	●	●	●	□	P	R/L	N/C	-
	Higher Fuel Price			●			●	●	●	●	●	□	M	N	-	R
	Higher Car Ownership Registration Fee			●			●	●	●	●	●	□	M	N	-	R
Other Supporting Policies	Training/Education on ICT	●		●	●	●	●					■	L	N/R/L	I/N/C	C
	Priority and road space for public transport and non-motorised modes	●	●	●	●	●		●	●	●	●	■	P	N/R/L	-	C
	Land Use (Flexible zoning & multi-pattern)	●		●	●			●	●	●	●	■	P	N/R/L	-	-
	Higher Noise/Emission/Safety Standard		●						●		●	□	P	G/N	-	C
	Improve public transport and non-motorised modes	●	●	●	●	●		●	●	●	●	■	P	N/R/L	-	C
	Encourage use of alternative modes	●		●				●	●	●	●	■	P/L	G/N/R/L	I/N/C	-

Image III: Policy Measures (continue)

Potential Policy Measures		Sustainable Transport Objectives										Characteristic of Policy Measures				
		Social Equity/ Environmental				Economic Dev./ Social Equity			Economic Dev./ Environmental							
		Enhance accessibility instead of mobility	Reduce Accident rate	Reduce automobile dependency	Increase social cohesion	Provide affordable transport to disadvantaged groups	Provide cost-effective services	Enhance accessibility by public transport and non-motorised modes	Reduce traffic pollution	Reduce congestion	Reduce energy consumption	Pull (■) or Push (□) Policies	Market(M)/Technology(T)/ Lifestyle (L)/Public (P)	Authority Involvement (Global(G)/ National(N)/ Regional(R) /Local (L) Authority	Other Party Involvement (Individual(I)/Neighbourhood (N)/Company (C))	Financial resource implication (cost (C) or revenue (R) to public purse)
Other Supporting Policies	Increase spending on public transport and non-motorised modes	•	•		•	•		•	•	•		■	P	G/N/R/L	-	C
	Grants for Community Travel Plan	•		•	•		•		•	•	•	■	P/L	N/R/L	N/C	C
	Subsidise low income group (tele-access)	•	•	•		•			•	•	•	■	P/L	N/R/L	-	C
	Subsidise low income group (public transportation & non-motorised modes)	•		•	•	•		•				■	P	G/N/R/L	-	C
	Facility to encourage the usage of bicycle	•		•		•		•	•	•	•	■	L	R/L	C	-
	Ride-share/car-share matching services	•	•	•	•		•	•	•	•	•	■	P/L	R/L	I/N/C	C
	Flexi-working hours arrangement		•				•		•	•	•	■	L	R/L	C	-

These car restriction measures are usually unpopular and difficult to implement, as they are push policies by nature. However, in this Image, they are consistent with the Image of the Information Society, in which there are social changes from individualist behaviours to those of social cohesion, and this should soften the impacts of these restrictions. In addition, apart from telecommunications tools, there are still many transport-related pull policies that provide favoured alternatives, such as Community Travel Plans, improved public transport and non-motorised modes. These policies have been found under the heading of 'other supporting policies', acting as transition mechanisms for backing the unpopular policies. In short, the whole policy package has combined push and pull measures, and creates awareness in the society about them in order to gain maximum effect.

From the governance perspective, the Malaysian federal government has given the green light at a high level to develop a knowledge society in the future. In this policy package, the prominent role of government in driving towards a more sustainable society via telecommunications is now lying heavily on local authorities, and the co-operation between local and regional governments. Much depends upon local and regional authorities to back up the pioneer projects leading to the tele-lifestyle, including the promotion of the idea of local destinations, zoning changes, imposing car restriction policies, etc. International influence is less obvious in this policy except in the area of technical assistance in the improvement of technology.

Apart from the initiatives from local authorities, this policy package needs a very strong commitment from every individual and neighbourhood to make it a success. The involvement from the grass roots level is needed more than for the last two packages because it needs the most dramatic paradigm shifts in Behavioural and Cultural Change from individuals and the community to achieve a sustainable Information Society and subsequently a sustainable transport system. Individual decisions about certain lifestyles and ensuing transport choices could either make or break this policy package. Continuation of training programmes over a long period is emphasised for those who are technologically illiterate.

In terms of financial feasibility, there have been spending on and subsidies for lower income people to get them involved in the new lifestyle, but no major spending on transport-related infrastructure, except on improvement of public transportation, pedestrian ways and cycle lanes. Changes that take place, such as new zoning and the adoption of a tele-lifestyle do not cost the government a fortune. Financial resources to improve technological improvements at grass-roots level, such as the usage of personal computers and tele-working arrangements, have mainly been borne by companies and individuals. Indeed, the market-based car restriction measures have even generated a significant amount of revenue for the transport system. This policy package therefore does not burden the government financially as much as those of the first and second Images.

To sum up, the first and most important choice of this policy package is to substitute physical travel via telecommunications technology. The second is to encourage the use of public transportation and other alternative travel means. When the use of car is necessary, the bottom line is to promote the shortest length of journey. The creative and novel trip substitution mechanism needs a complete change in social structure, organisation arrangements and individual lifestyles. And the mode switching and destination switching require very strict car restriction measures. The reactions from the people towards this very unconventional policy package are unpredictable; it is probably safe to state that it is a mixed one. People who are comfortable with the new policy are excited about adopting a new tele-lifestyle in the information age. Some of the strongest resistance will be received as a result of the drastic changes. Those who resist this Image and subsequently the policy package may decide to leave the city.

7.7.3 Schematic Implementation of Policy Package

Referring to the Figures 7.8, this section analyses the schematic implementation of the Information Society policy package and the achievement of targets along the time-scale.

Figure 7. 8 Schematic Implementation Programmes for Image III

7.7.3.1 Immediate Steps (from the Year 2004 to the Year 2008)

Stimulated by strong local government in Kuala Lumpur, this is a phase of explosive development of sophisticated information and communications technology. The spin-off effects of the MSC[78] have started to be seen in everyday life in Kuala Lumpur, whereby there is greater telecommunications literacy awareness among residents. Personal computers with Internet access and advanced on-line mobile phones are becoming basic household necessities[79].

Concurrently, the local governments in Kuala Lumpur have enthusiastically operated as chief promoters of a sustainable information society. They strongly promote the usage of tele-activities, focusing initially on high-frequency trips, such as those for work and shopping purposes. Both tele-working and tele-shoppng have been taken seriously and promoted as new options affecting transport demand management in the city. New forms of local plans for traffic management and decentralisation of transport provision have been drawn up. This includes the planning for the construction of neighbourhood 'tele-working centres' and 'distribution facilities', and flexible zoning to accommodate multiple patterns of land use.

Meanwhile, pilot projects for Area Pricing Scheme have been initiated at several highly sensitive environmental locations. There are also pilot programmes to increase parking fees and reduce parking lots in the city. To complement these car restriction measures, spending has been put into upgrading transportation and non-motorised modes. Priority and road space for these modes have also been rearranged to encourage the usage of them.

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[78] The MSC is a 15 by 50 km zone extending south from Kuala Lumpur. Government has designated this massive corridor to be devoted to creating an environment for companies wanting to create, distribute and employ multimedia products and services. (Multimedia Development Corporation)

[79] Most of the present new housing development in and around Kuala Lumpur such as Cyberjaya and Putrajaya has broadband network-ready. Examples of technology infrastructure applied in Cyberjaya, for instance, include development of a fully integrated City Command Centre, broadband connectivity to all buildings, local online e-commerce portals, etc. For further information, please visit website http://www.cyberjaya-msc.com/html/cyberjaya_technology.htm

Various campaigns have started to promote the new era of information society. The idea of the tele-lifestyle has been assimilated by the public, the benefits of using public transport have been highlighted, and the Image of Kuala Lumpur has been portrayed as a conurbation of advanced closed-knit local communities with access to global knowledge and technologies. The objective at this stage is to make sure that people have been made aware of the above changes and the Kuala Lumpur government's vision to guide the society into a sustainable and knowledge-based future.

As this is a very different Image and policy package, there is a survey and feedback to check on mobility needs in the society.

7.7.3.2 Intermediate Steps (from the Year 2009 to the Year 2014)

After about five years of effort to promote the Information Society, at this stage, tele-working is highly developed. People tend to work at home for two or three days on average. Distance learning is widespread, both for adults and for children. People still meet for professional purposes and to maintain social contact, but this takes place on a small scale. Home delivery services have become quite normal. In short, tele-activities have deeply penetrated people's everyday life, while personal information systems (e.g. computers, multi-functional mobile phones) have become indispensable.

Neighbourhoods formed by tele-centres and tele-cottages are established. People live in these places that cater for a mix of functions, all on a small scale: living, working, shopping, and recreation. Children attend school locally. Residential areas are situated close to natural areas where recreation takes place. Consequently, recreation-related traffic is limited. The concept of 'connect globally, mobile locally' has been widely adopted as the new tele-lifetsyle in this modern era.

Meanwhile, promotion of Behavioural and Cultural Changes has successfully raised citizens' awareness regarding the necessity for sustainable living, and that collective well-being needs

to be achieved at the cost of individual affluence. Ethical and sustainable behaviour, for instance, has gained considerable support. Another example is that people are showing their willingness to take responsibility for the environment through the acceptance of higher costs.

Parallel to this development, the Kuala Lumpur government has imposed very high standards for emission, noise and safety regulations. The government also has the confidence to implement more restrictive policies. Area Pricing Schemes have been implemented extensively. Parking charges have been increased again. Clean Zone Areas or restricted private vehicle areas have been designated in many spots in city centres. All the efforts are aimed at discouraging the owning and usage of private vehicles.

For unavoidable physical movements, as well as conventional public transportation various new forms of travel alternatives have flourished, for example, the establishment of Vehicle Clubs and Community Travel Plans. These new forms of vehicle ownership and arrangements are between private and public modes. They have the benefits of both private and public transportation modes, for example, they are more flexible travel methods than public transport, less costly than private vehicles, provide access to various vehicles for different trips' purposes, etc. Government encourages the new means of travel which particularly focus on the usage of advanced and zero-emission vehicles. Grants are available for those pioneer entrepreneurs. In the meantime, for those who still need to travel to companies, facilities to encourage the usage of bicycle and ride-sharing matching services are readily available at almost companies' sites. All these are designated to provide alternatives to private vehicles and subsequently to lessen resistance to car restriction policies.

Simultaneously, cognitive-motivational strategies that are intended to change 'Behaviour and Culture' of the society are focused on gaining social acceptance of car restriction measures. Promotion of 'local destinations' and the usage of public transportation, non-motorised modes and alternative travel means are also continuing enthusiastically.

Feedback is keeping track of the continued research on social changes and mobility needs. One significant observation is that Kuala Lumpur has a segregated and polarised social structure, determined by the division of labour. On the one hand are the well-educated knowledge workers; on the other hand, the low-skilled working class who perform routine job. People who can keep up with the pace of development succeed in maintaining a high standard of living. People who cannot or will not keep up become poor and lose contact with the formal economy. They not only suffer from the status of being information disadvantaged, their basic mobility needs have also greatly deteriorated.

7.7.3.3 **Long-term Steps (from the Year 2015 to the Year 2020)**

Finally, from this point onwards, communication is predominantly computer-mediated. Tele-working and flexible working practices have taken root and appear to be here to stay. Because of the explosive development of sophisticated information and communications technology, IT literate employees do not need to commute on a daily basis any more. Kuala Lumpur citizens' shopping habits have changed dramatically. Daily subsistence goods are ordered through 'buy-net', an advanced tele-shopping service that organises distribution through specialised home delivery services. Tele-activities have penetrated every field of daily life.

The government actively stimulates local development to help create a de-centralised society. Communications infrastructure stretches out into the suburban areas, and indeed the entire agglomeration is highly urbanised in its new definition. Every neighbourhood has well-established tele-centres and other local services. Most citizens live in medium to low-density areas in single-family houses with garden, called tele-cottages. The sense of local community becomes very strong, in which local people co-operate closely on many levels. The environmental agenda becomes very important and local people have a strong commitment to sustainable tele-lifestyles and willingly accept the value of individual restriction for communal benefits. The result of this is a phenomenon of a close-knit community in the neighbourhood but with very few interactions between neighbourhoods.

Governmental regulations have made luxury consumption very expensive. Higher fuel prices and higher car ownership registration have been imposed to limit non-environmentally-friendly modes of transport. Areas Pricing Schemes and Clean Zones have been extended; higher parking fees and fewer parking spaces have been drastically imposed.

Other pull policies continue from the intermediate stage, with more effort being put into integration between alternative modes to ensure that a smooth journey can be made without using private vehicles.

All in all, an information society has come to exist at this point, with very rigorous car restriction measures in the city. However, there are still two areas in which the government has to push harder to guide the society towards sustainability.

First of all, with all the measures mentioned above, there is still no guarantee about the total reduction of traffic flow. There are trip substitutions as a result of communications technologies, but there are also unavoidable trip stimulations from the same sources. The extent of trip stimulations is very difficult to judge, as they are spontaneous and random in nature, with countless combinations of possibilities to make a trip. Desire to travel may be stimulated by seeing new places, meeting new acquaintances, joining new activities that have been seen on the computer screens; it may also be because of cheaper offers for leisure trips that have been advertised on websites; or it may simply be because there is extra time and money in this information era so that people would like to treat themselves to luxury travel. Long distance travel with higher value trips are expected to grow in this Image. Before the trip stimulation patterns can be systematically recorded and further measures taken, at this stage the Kuala Lumpur government will take steps to campaign on 'reducing the need to travel' and to strengthen the external cost that the whole society has to bear from travel.

The other area that government has to tackle is social inequality. There is an observation that information-illiterate groups have been pushed into deprived inner city areas and have suffered from this Image. They are in the position of being deprived of affordable

accessibility, yet gaining nothing from improvement in telecommunications technology. They are at a distinct disadvantage in everyday life, including their mobility needs. To soften these impacts, government has decided to spend and subsidise these disadvantaged groups in a two-pronged strategy, i.e. enhancing and increasing their knowledge of information technologies and pushing them into the mainstream of the tele-lifestyle, and making special discounted rates for them to use public transportation and other alternative travel means.

R&D on the information society and how to improve the mobility needs of society continues.

7.8 Responsibility for Change towards Sustainable Transport in Kuala Lumpur at Implementation Level

One of the issues raised earlier in this study is that the weak institutional structure contributes to the unsustainability trend and issues in the transport system in Kuala Lumpur. Firstly, there is no vision of or objectives for sustainable transport to which all the relevant institutions and organisations could refer; secondly, responsibility for transport issues have been scattered among many institutions, and most of the time they have been dealt with on an ad-hoc basis; thirdly, poorly refined responsibilities aggravate the institutional weaknesses and there is no sign of efforts to integrate the sustainable transport issues; fourthly, in relation to that, policy measures have never been put together to solve any issue mentioned in this study; and lastly, there is also no sign of co-ordination or links between institutions and organisations trying to deal with any of the matters mentioned above.

Institutions are an important determinant of opportunities to realise sustainable transport. (Rietveld, 2002). Judging from the present institutional problem in Kuala Lumpur, it is even more imperative to discuss and propose an arrangement for achieving the Images. However, a detailed change to the present institutional structure would cover a wide range of topics, such as legal, financial and administrative structures, etc. As a starting point towards sustainability, this study would like to focus on three aspects: (i) identification of the general stakeholders involved in sustainable transport which need to be linked together; (ii) urgent changes in institutional structure that should take place immediately; and (iii) proposal of the major stakeholders in each Image, who would initiate changes. These three aspects are necessary to give a broad idea of responsibility for the change towards sustainable transport in Kuala Lumpur.

7.8.1 The Various Stakeholders Involved in Sustainable Transport

As compiled in Table 7.6, there are multiple actors engaged in a sustainable transport system. They range from the global player to the local people, are constituted of formal and informal organisations and are involved in both public and private sectors.

Table 7.6 Various Actors Involved in Sustainable Transport in Kuala Lumpur

Public Sector	Relevant Institutions and Organisations
International & Regional Levels	UNDP (United Nations Development Programme) The Local Agenda 21 programme, UN-HABITAT (United Nations Human Settlement) WSIS (World Summit on the Information Society) International Institute for Sustainable Development (IISD) World Bank World Energy Council UNESCAP(United Nations Economic and Social Commission for Asia & the Pacific) ADB (Asia Development Bank)
National Level	***Main Land Transport Institutions*** Ministry of Transport (Road Transport Department) Ministry of Works (The Highway Planning Unit, Public Works Department) Ministry of Internal Affairs (Traffic Police Department) Ministry of Public Enterprise (Road Transport Licensing Board) Ministry of Housing and Local Government (Town and Country Planning Department) Department of Environment (Mobile Source Unit) Malaysian Road and Safety Council ***Other Major Supporting Institutions*** Business Council for Sustainable Development Intelligent Transport System Council Legal institutions (Regulations and rules) Ministry of Energy Ministry of Finance (Taxation) National Information Technology Council (NITC) ***'Sustainable Transport Council'*** *(note: an independent "Sustainable Transport Council " should be established at this level (which is not yet available), linking together the present ministries and departments, as well as other actors in this table and overseeing matters of sustainable transport in Malaysia)

Table 7.6 Various Actors Involved in Sustainable Transport in Kuala Lumpur (continued)

Public Sector	Relevant Institutions and Organisations
Local Level	Federal Territory Development & Klang Valley Planning Kuala Lumpur City Hall (*Urban Transportation Unit) Other local authorities *This unit has to re-structure (see below in section 9.2.2) and the researcher has suggested a change of name to Sustainable Urban Transport Unit
Private Sector	Relevant Business Organisations and Companies
Vehicle Manufacturers	Major foreign vehicle manufacturers (Honda, Toyota, Ford, Nissan etc.) Local vehicle manufacturers (Proton & Perudua)
Fuel Industry	Major global fuel companies (Shell, Esso, BP, etc.) Local fuel company (Petronas)
Traffic Equipment Industry	Vehicle telematics and infrastructure telematics (e.g. cruise control, parking aids, auto-sensor of roadside signboard, pollutant detectors, etc.)
Public Transport Operators	Bus operators: Cityliner & Intrakota KTM Train Light Rail Transit Monorail Taxi Rental vehicle companies Other new arrangements, such as vehicle-sharing services, vehicle clubs, community travel plans, etc.
Traveller Service Providers	Personal and public information and ticketing system providers: pagers, mobile phones, computers, information kiosks, etc.
E-entrepreneurs	Provide various digital forms of business area to replace conventional services and products. Literally involve every sector of the business community.
Media Industry	Via TV, radio, posters, newspapers and internet to dissemilate message and information about sustainable transport.
Others	Relevant activities and initiatives.
NGOs	Clean Air Asian Initiative Sustrans (Sustainable Transport Action Network for Asia & the Pacific) STUP (Asia Sustainable Urban Transport Project) *Sustainable Kuala Lumpur Initiative/ Sustainable Transport Kuala Lumpur (Not yet available) *The only NGO (Malaysia) that is relevant to sustainability has been set up in Penang state, the SPI (Sustainable Penang Initiative) and STEP (Sustainable Transport Environment Penang).
Academics & Education	Academic R&D in the subject of sustainable transport and the relevant sectors. Education and training programmes to promote sustainable transport
General Public	Every single effort towards sustainability in terms of changes in travel behaviour.

(Source: compiled and proposed by the researcher)

The list should be added to whenever new initiates or co-operative arrangements become involved (e.g. new international conventions or local community agendas). Nevertheless, the list is useless unless there is a link to bond all these stakeholders together strongly and work in the direction of sustainable transport. The responsibility for initiating the sustainable transport and establishing the linkage between these actors lies with different stakeholders in the different Images. Before we discuss these major stakeholders, however, there is a need for some urgent changes in the institutional structure for sustainable transport purposes.

7.8.2 The Urgently Changes in Institutional Structure for Sustainable Transport Purposes

The Malaysian experience in land transport has indicated that there are too many institutions that are involved in one way or another in the administration, management and planning of the industry (Abdullah, 1987). Every institution or department has their own policy objectives and they rarely seem to refer to each other. There are sometimes duplicating roles and function between these agencies, for example, duplication of responsibility for vehicle licensing between the Road Transport Licensing Board (Ministry of Public Enterprise) and the Ministry of Transport, and regulations enforcement between the Ministry of Internal Affairs and the Ministry of Transport. Most of the time there is no integration of institutions' roles when looking at transport issues that strongly relate to each other; for example, the air pollution issue has been dealt with primarily by the Department of Environment, the congestion issue by the Urban Transport Unit and the road accident issue by the Malaysian Road and Safety Council.

In this thesis, the transport issues that have been raised, reviewed and discussed have given a comprehensive picture of how serious the unsustainability trends will become for Kuala Lumpur. As mentioned in Section 4.3.1.2., Chapter 4, Kuala Lumpur is facing a tough challenge in tackling weaknesses found in both the developed and developing worlds. It needs to change, and change quickly, to rectify the already bad and worsening situation. Kuala Lumpur needs to grasp every existing opportunity now, and fully explore the present

infrastructures (road assets, rail-based system, information technology development, or any combination of these) to move in the direction of sustainability.

Among others, judging from the present situation, the existing institutional problem is a prominent obstacle in the path towards sustainability. The issues raised in this thesis are sufficient to justify the urgent to rearrangement of the institutional structures so that all the issues and policies may be dealt with in a coordinated and concurrent manner by one organisation. At the national level, the establishment of an independent 'Sustainable Transport Council'[80] placed under the Prime Minister's Department, would be a necessary step. The council needs to define the vision for and objectives of sustainable transport, oversee the whole spectrum of sustainable transport issues and integrate the entire sub-unit of transport-related institutions under its roof.

The next urgent change would be a re-examination of the issues and policies orientation at local level (i.e. the Urban Transport Unit in Kuala Lumpur). The unit should extend the urban transport issue from focusing solely on the congestion issue. The main goal has to be extended to cover all the sustainable transport objectives. It also needs a restructuring of its sub-unit so that every sustainable transport issue (air pollution, non-renewable energy conservation, congestion, accidents, social equity, etc.) comes under its umbrella. Together with the 'Sustainable Transport Council', the Urban Transport Unit should formulate Kuala Lumpur's sustainable transport direction, and work with other stakeholders towards it. It would also be useful if the name of the unit could change to 'Sustainable Urban Transport Unit'.

Besides these two institutional changes, another critical effort is needed to place emphasis on the research and development of sustainable transport in Malaysia and Kuala Lumpur. The researcher realises that in Malaysia and Kuala Lumpur there is a serious lack of basic data and information about transport systems and there is very little knowledge about or studies on sustainable transport. It is an imperative measure to establish quickly the human resources

[80] As sustainable transport is a sub-sector of sustainable development, it should ideally be placed under the Sustainable Development Council, if it were to be established in the future.

and to allocate financial resources for this aspect. R&D units are important supporting mechanisms for the Sustainable Transport Council and Sustainable Urban Transport Unit in Kuala Lumpur. It should be attached to these two units and also should be carried out at various levels in academic institutions. Details of priority themes for R&D should be established as soon as possible; the soft approach needs to be emphasized rather than just the conventional engineering and technology measures. There are other disciplines, such as human psychology (to influence Behavioural and Cultural Change), that need to be brought into R&D in transport policy.

Last but not least, it is important to encourage the formation of sustainable transport NGOs in Kuala Lumpur. The examples of SPI (Sustainable Penang Initiative) and STEP (Sustainable Transport Environment Penang) show that the general public can have great influence on state development planning processes[81].

The capacity and capability of local R&D and NGOs could be strengthened by the initiatives from Sustainable Transport Councils; assistance (financial, technical and other resources) should be sought from the relevant international and regional sustainable institutions, such as IISD, UNESCAP, ADB, etc.; and knowledge transfer and interaction between academic institutions, especially those that are advanced in exploring sustainable transport fields, should take place.

7.8.3 Major Stakeholders in the Images

Although all the actors listed in Table 7.5 are needed to contribute towards the achievement of sustainability, there are certain stakeholders that are more important than others in the different Images. At the implementation stage, it is very important to identify the

[81] One of the recent achievements of SPI is the establishment of sustainable indicators for Penang, and the Penang state government has used these indicators in the process of developing a strategic development plan over the next ten years

responsibilities of the main stakeholders that are able to initiate changes towards sustainability. The following discusses the major stakeholders for each Image accordingly.

Image I

The main stakeholders for this Image are the Sustainable Transport Council, Intelligent Transport System Council, Sustainable Urban Transport Unit and industry sector (technocrats).

The first and foremost initiative should come from the Sustainable Transport Council and Sustainable Urban Transport Unit. They will need to establish focus groups that involve vehicle manufacturers (global and local), the fuel industry and the traffic equipment industry, who would send out policy messages about the central ideas of the Images, and realistically set out the relevant regulations and standards. The ITS Council should be able to play a major role in advising the application of ITS strategies to achieve higher efficiency in Kuala Lumpur' s transport system. The commitment and support of the major vehicle manufacturers and component suppliers is crucial, and they have to be clearly informed about and guided in the direction of transport policy.

As the advanced automation and fuel technologies are in the hands of global vehicle manufacturers, the Image needs these industrial technocrats as major stakeholders to ensure materialisation. But the right environment has to be established for the Image. The responsibilities of the public sector should include lowering regulatory barriers, reducing institutional and financial risks, providing sufficient certainty and clarification of opportunities to stimulate accelerated investment in and deployment of new technologies and services. This level will need to involve both the Ministry of Finance and legal institutions, steered by the Sustainable Transport Council and Business Council for Sustainable Development at national level.

Once the foundations of Foresight Vehicle have been established, the market will take control of the success of the Image. It is therefore fair to say that technocrats from the private sector carry very important responsibilities for forming creative and attractive ways to replace traditional vehicles. This refers to cooperation and competition between vehicle manufacturers, fuel companies and traffic equipment companies to offer alternative technologies.

Besides the above major stakeholders, R&D from both the academic field and the industrial world should respond to the government signals and dynamically explore the relevant technologies.

In this Image, individuals have negligible influence on the initiatives of the Image. The role of the general public does not change much from its present trend, i.e. as consumers who receive policy messages and information from authorities and relevant sectors of industry. The establishment of the Image is, however, dependent upon the culture, attitude and change in perception of each individual towards environmentally friendly, advanced vehicles, after being persuaded by the government and vehicle industries.

Image II

The main stakeholders for this Image are the Sustainable Transport Council, Sustainable Urban Transport Unit, public transport operators and the transport service providers.

The first and foremost initiative again should come from the Sustainable Transport Council and Sustainable Urban Transport Unit, the government side. But this time the focus group will be on co-operation with public transport operators. If compared to Image I, the role of the Sustainable Urban Transport Unit is much more important than that of the Sustainable Transport Council. The Unit, assisted by national and regional authorities, bears responsibility for planning, monitoring, regulating and promoting the whole Extended Public

Transport System. The neighbourhood local government should also shoulder the total responsibility for ensuring that the land-use patterns are regulated in parallel with the progression of the public transport system.

Image II involves many transport operators (LRT, monorail, KTM train, electric bus, vehicle club, rental vehicle and taxi), so the proposed transport system needs an efficient, open and stimulating environment to encourage competition in a private market. The regulations, fares and catchment areas of competing transport operators have to be fairly treated. Local government also has to subsidise and fund new and creative forms of public transport system such as vehicles clubs, community travel plans, dial-a-ride services, etc.

Stakeholders in various private transport companies (mainly consisting of transport operators and information services providers) are, no doubt, the major players in Image II, who execute the policy measures accordingly. Their roles and responsibilities are, however, straightforward if coordination of routes, timetables, services and ticketing information among them can be carried out seamlessly. The key to successful implementation of Image II is therefore not as technologically challenging as in Image I, but it is dependent on how successfully the coordination among those stakeholders can be carried out to form a smooth overall network. An independent transport organisation representing the various transport operators is probably needed to see that the whole network operation has been treated fairly. It will also be useful to communicate with government.

At the individual level, people have far more pro-active responsibilities than in Image I. They can initiate community travel plans, car-sharing trips and vehicle ownership sharing schemes with their neighbours and colleagues. NGOs should play a significant role in promoting sustainable transport via public transport. The media industry has to play a role in influencing people's choice. Any effort from the other various actors to shift people from private vehicles to communal modes will contribute and decide the sustainable future of a transport system in Kuala Lumpur via the path of Image II.

Image III

Information Society is an Image that requires participation of all levels of the various stakeholders in a society. From global networks such as WSIS (World Summit on the Information Society) to local initiatives, all efforts are needed to co-operate in order to push the society to transform itself into an information-based one. However, to initiate the change, the researcher has identified five major stakeholders for the Image, i.e. the local governments (including Federal Territory Development & Klang Valley Planning Unit, the Kuala Lumpur City Hall and other neighbouring local authorities), the National Information Technology Council (NITC), e-entrepreneurs, environmental NGOs and the general public.

At the national level, The National Information Technology Council should initiate the change towards sustainable development via information technology. In the present circumstances of Malaysia and Kuala Lumpur, many efforts has been made to promote Information Society such as laying down the strategies of e-government, smart schools, e-commerce, etc. It just lacks emphasis on the linkages between these strategies and sustainable transport.

The major promoter and initiators in the context of the Kuala Lumpur sustainable transport Image should come from the local governments. Kuala Lumpur City Hall and its neighbouring authorities need to echo the efforts of federal government, picking up the Information Society agenda and stimulating and leading the local economy towards a new information era. The responsibilities include: (i) creating an informed, responsible and convivial context for the dynamics of this social and economic transformation to a knowledge-based industrial society; (ii) formulating strategies to campaign for the new modern lifestyle and modify travel behaviour of the general public; (iii) in relation to the second task, the third task is to be fully responsible for initiating and implementing the car-restriction measures in the local context. The Sustainable Urban Transport Unit under the local governments is the major player involved in outlining the policy packages.

Private sectors, and this refers to a wide range of e-entrepreneurs (not merely the transport sector), all carry huge responsibilities to help establish Image III. The contribution of the private sector is instrumental in creating the material conditions for people to be able to access information and value-added information services. They are responsible for the transformation into a knowledge-based industrial society by modifying the services and products they provide into electronic forms. They become part of the transformation itself by changing the companies' and employers' structures (work places, routines and management) into flexible styles.

If compared to the above two Images, every individual in society is the most important player in the realisation of the Image. It is worth noting that local influence rather than global pressure can transform a society into the proposed Image. The changes at the individual level, the awareness of environmental concerns, the urge to fit into the modern tele-lifestyle and the re-labelling of social status from traditional private vehicle ownership and use, are the keys to ensuring the success of the Image. Environmental NGOs in this context will play an important role in encouraging individual and community involvement for successful implementation of Image III. The media industry could help to promote public awareness of the path towards sustainability.

Besides these major stakeholders, important additional support should come from R&D. Intensive R&D has to take place to gain understanding of the mechanisms of Behavioural and Cultural Changes, their relationship with major elements in the Information Society and particularly impacts on travel patterns in Kuala Lumpur.

7.8.4 Conclusion

From the above discussion, it is clear that to initiate and establish an Image, a variety of stakeholders are involved. The private sector, government and community (individuals) should all be linked together to achieve sustainable transport.

Some urgent changes in institutional structures need to be made to integrate the various stakeholders, as well as to link the sustainable transport issues and policies together. A new organisation (the Sustainable Transport Council) needs to be established as soon as possible to oversee this matter, and the Urban Transport Unit that is attached to Kuala Lumpur City Hall needs to change its roles and functions (and name) to tackle the sustainable transport issue.

Generally, in the environment of Kuala Lumpur, the task of initiating change in all three images should come from government, either the Sustainable Transport Council, the National Information Technology Council, the Sustainable Urban Transport Unit or by co-operation between them. In all Images, it is also obvious that the initiation needs intensive involvement of the private sector from either technocrats, public transport operators or e-entrepreneurs. Government intervention is more important in the early stage of the Images' initiation, and then it is best to leave an Image in an open market competitive environment to become established (except for the necessary intervention to achieve social equity objectives). The power of individuals and NGOs to initiate change is most important in Image III, followed by Image II. However, the establishment of all Images must flow from and build on the awareness of individuals and groups in society. Last but not least, R&D is very important in building up the resources and knowledge capacity about sustainable transport in every Image, while local NGOs play an important role in representing the grass-root voices. Both R&D and NGOs urgently need to be strengthened to help the government and public move towards sustainability.

7.9 Inputs from Local Transport Experts in Policy Measures and Policy Packages Stage

Local transport experts commended the policy measures and policy packages in a two-tier context.

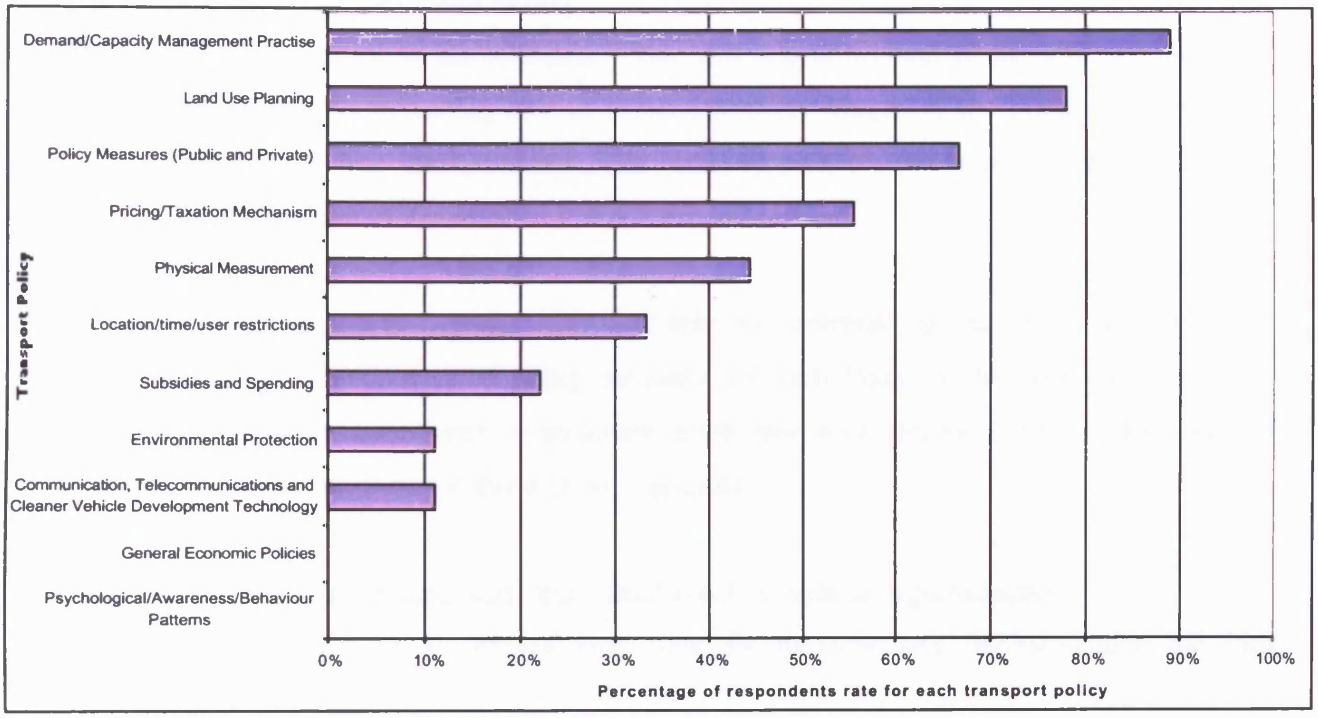
Firstly, they were asked to evaluate the most important of major transport policies for achieving a sustainable transport system in Kuala Lumpur in general terms, i.e. unrelated to any Image. The evaluation was carried out in the first interview when they had little idea of the Images. The purpose was to find out how to achieve a sustainable transport system, what type of policy the local transport experts considered viable without exposing themselves to the backcasting scenario approach.

The result is shown in Figure 7.9 on next page. 'Demand/Capacity Management Practice' was deemed as the highest priority policy, and this was followed by 'Land-use Planning' and 'Policy Measures (Public and Private)'. 'Communication, Telecommunications and Cleaner Vehicle Development Technology', 'Psychological/Awareness/Behavioural Patterns' and 'General Economic Policies' received lowest priority as compared to others. The result shows that respondents put a high priority on conventional policy measures and shied away from unfamiliar or controversial ones.

When local transport experts were approached again about same question, but after they had been exposed to the three Images of the Future (in the workshop discussions), they had different thoughts about the policy measures. They unambiguously agreed that the scenario backcasting approach has a provided systematic, rational and creative way to formulate policy packages in response to different possibilities for the future.

Three sets of draft policy packages for each Image were presented to local transport experts, and they were asked to scrutinise, refine and validate the packages.

Figure 7.9 The Highest Priority Major Transport Policies to Achieve a Sustainable Transport System in Kuala Lumpur



Unfortunately, they did not comment on the policy measures and policy packages to the extent that was expected. They were more reserved and inarticulate in contributing their opinions in this stage. They managed to carry out their task of commenting mainly on a few points of the core policy measure and the main supporting measures for the three Images, but were not able to comment on the overall package for each Image. The researcher believes that three constraints had caused this:

1. It was very difficult for local transport experts to picture the complicated implications of each policy measure. They seemed to be lost when the discussion came to the point of looking at four or more policy measures and their synergetic effects or otherwise. Thing got worse when discussion was focused on new or unfamiliar policy measures.

2. Local transport experts (especially those from the public sector) did not like to be 'quoted' about future transport policies. They did not like to bear the responsibility of the consequences of their views.
3. Time constraints in the interview. This part was at the end of the interview, so there was very little remaining time as discussion of the Images of the Future tended to take much more time than expected. The local transport experts were also quite exhausted by this last part of interview.

In short, local transport experts were not able to contribute as much of their technical knowledge on the packaging of policy measures for each Image as had been initially hoped for. However, there were some of important points that were gleaned from the discussion of the Images of the Future (see Table 6.16 in Chapter 6)

Lastly, they made general comments that related to policy package implementation:

(i) There should be a different time scale for the schematic implementation for each policy package.
(ii) The financial resource implication of each policy package should be assessed.
(iii) Who would have responsibility to carry out each policy package should be established.

The first and last recommendations have been taken into account in the refinement of this chapter. The second recommendation will only be touched on generally in the achievement of targets of Images in Chapter 8. More detailed financial implications will apparently be needed when the three policy packages have been finalised and are ready for implementation in the real world, but this is beyond the context of this research exercise.

Table 7.7 on the next page summarises the important modifications adopted in this chapter as a result of local transport experts' views.

Table 7.7 Important Modifications Adopted at Chapter 7 in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their Views	Relevant Sections and Chapters
LTEs would like to see different time scales (and the sequencing) of schematic implementation of each policy package.	Policy packages confirmed to be done in step-by-step manner.	Sections 7.5.3, 7.6.3 and 7.7.3, Chapter 7.
LTEs wonder if targets in Image II could be achieved as planned without pricing mechanisms.	Addition of pricing mechanism measures to support policies in Image II.	Section 7.6, Chapter 7.
Questions about how to introduce the Information Society into local culture in a harmonious way.	Establishment of 'close-knit' community with plenty of opportunities for face-to-face interactions is important element in Information Society.	Section 7.7, Chapter 7.
Questions about substitution effects of telecommunication.	Emphasise on flexibility and choices provided by ICT, playing down the substitution effects.	Section 7.7, Chapter 7.
LTEs would like to know who has the responsibility for initiating and implementing the policy package.	Discussion of the topic of 'responsibility for change'.	Section 7.8, Chapter 7.

7.10 Conclusion for the Chapter

With the inputs from local transport experts, this chapter has presented policy packages that bridge the present to the future. There are obviously very clear differences in terms of policy path in the three distinctive Images of the Future. It adds value to a future study by providing a further step to the analysis of the schematic implementation of a policy package in an Image. The analysis gives an understanding of what will happen in a transport system scenario from the perspective of different timescale.

The results are not intended to end here; rather, these should inspire discussion about further intuitive creativity in developing new measures within this more systematic framework. Collections of packages could be extended or modified in each Image corresponding to new ideas and the synergetic impacts could then be further evaluated. The construction of this policy package is thus an iterative process that could go on over many cycles. This flexibility

to change according to external circumstances and new ideas or simply due to different political emphasis on a particular aspect is a major advantage of this methodology. Such a benefit will improve on the traditional transport policy formulation in a more creative, flexible and responsive way in the complex and quickly changing world.

In this study, assessment about these proposed policy packages in terms of their achievement of targets, major concerns and other implementation issues will be undertaken in Chapter 8. This should give more detailed insights for policy-makers about the direction of a vision and its implications, as well as understand and cautious for the challenges in much advanced.

CHAPTER EIGHT
DISCUSSION

8.0 Introduction

Three divergent Images and the associated policy packages have been presented in this study. As in any future study, it would be inappropriate for this work to conclude with any pretence at a definitive outcome for the future transport system. Instead, what is hugely beneficial for decision-makers is to have clearer ideas about these alternatives. In an attempt to connect the future Images to the decision-making process, this discussion chapter will cover two main areas:

- Assessing the achievement of the targets and highlighting of the implications of the three Images for the wider field of sustainable transport objectives.
- Evaluating the opportunities and risks that are attached to the Images. This discussion aims to give substantial insights into the Images with regard to these practical issues at implementation level.

Last but not least, this chapter makes concluding remarks about the basic conditions and common measures that should be followed in Kuala Lumpur. These are the key guidelines if the city decides to move towards sustainable transport, even if none of the Images in this study materialises due to political, institutional or other unforeseeable factors. These conclusions highlight the changes needed to combat the present unsustainable trend in Kuala Lumpur, a city which apparently faces transport policy dilemmas and seriously lags behind other cities in terms of a sustainable transport agenda.

Section 8.1 presents the process of target assessment and the achievement of targets and objectives for each Image; Section 8.2 highlights the opportunities exist as well as risks and uncertainty attached to strategic decisions at implementation level. Then, drawing conclusions from the research, Section 8.3 proposes basic conditions and common measures

for sustainable transport in Kuala Lumpur. Lastly, Section 8.4 summarises the assessment of the study by the local transport experts.

8.1 Achievement of Targets and Policy Packaging: an Iterative Process and a Relative Assessment

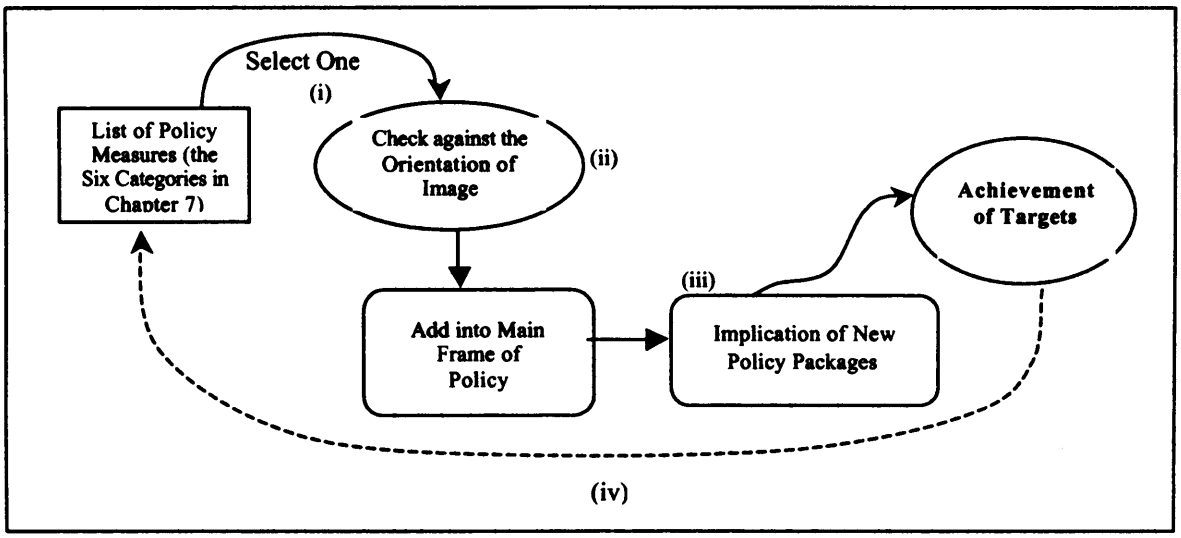
The policy packages that have been described in last chapter present three different paths towards targets in the Images of the Future. The process, as emphasised before, is an interactive procedure that involves brainstorming by local transport experts so that sensible and logical packaging for achievement of targets will emerge. The whole process of policy packaging and achievement of targets (especially discussion with local transport experts) does not always follow an orderly logical route, but to put it in a systematic way, as Figure 8.1 shows, they include:

(i) Selecting a policy measure to match with a main frame of policy package (look up the list of the available policy measures);
(ii) Examining whether the policy measure is consistent with the orientations of an Image;
(iii) Estimating the positive and negative implications which result from the new policy package;
(iv) Estimating the achievement of targets (reduced air pollution, enhanced public transport, modal shift towards public transport, etc.)
(v) Judging if any more effort could be made to develop the package; return to step (i).

For step (iii), a key feature in the consideration of packages and sequences of policy measures is the extent to which they interact, both positively and negatively (OECD, 2002). The positive interaction lies in the way in which implementation or strengthening of one policy measure prepares the way for implementation of another. The reference points of

discussion are based on Table 6.11, Chapter 6 (e.g. encouraging shorter trips, possible reduction of total travel, expected social changes, general perception of the policy measures, etc.).

Figure 8.1 Interactive Process of Policy Packaging



For step (iv), it was not possible to measure the assessment of achievement of targets quantitatively in this project. It would be ideal if the achievement of targets could be assessed by formulating and modelling in a mathematical way (See Future Research Agenda, Section 9.4, Chapter 9). However, due to the constraints of time, data and scope of this project, achievement of targets of the policy packages has been assessed by other means.

As described above, assessment is carried out qualitatively as a result of discussion of policy interaction and implications. Generally, a comparative or relative measurement has been made in both directions (see Figure 8.2):

(a) Horizontal comparison

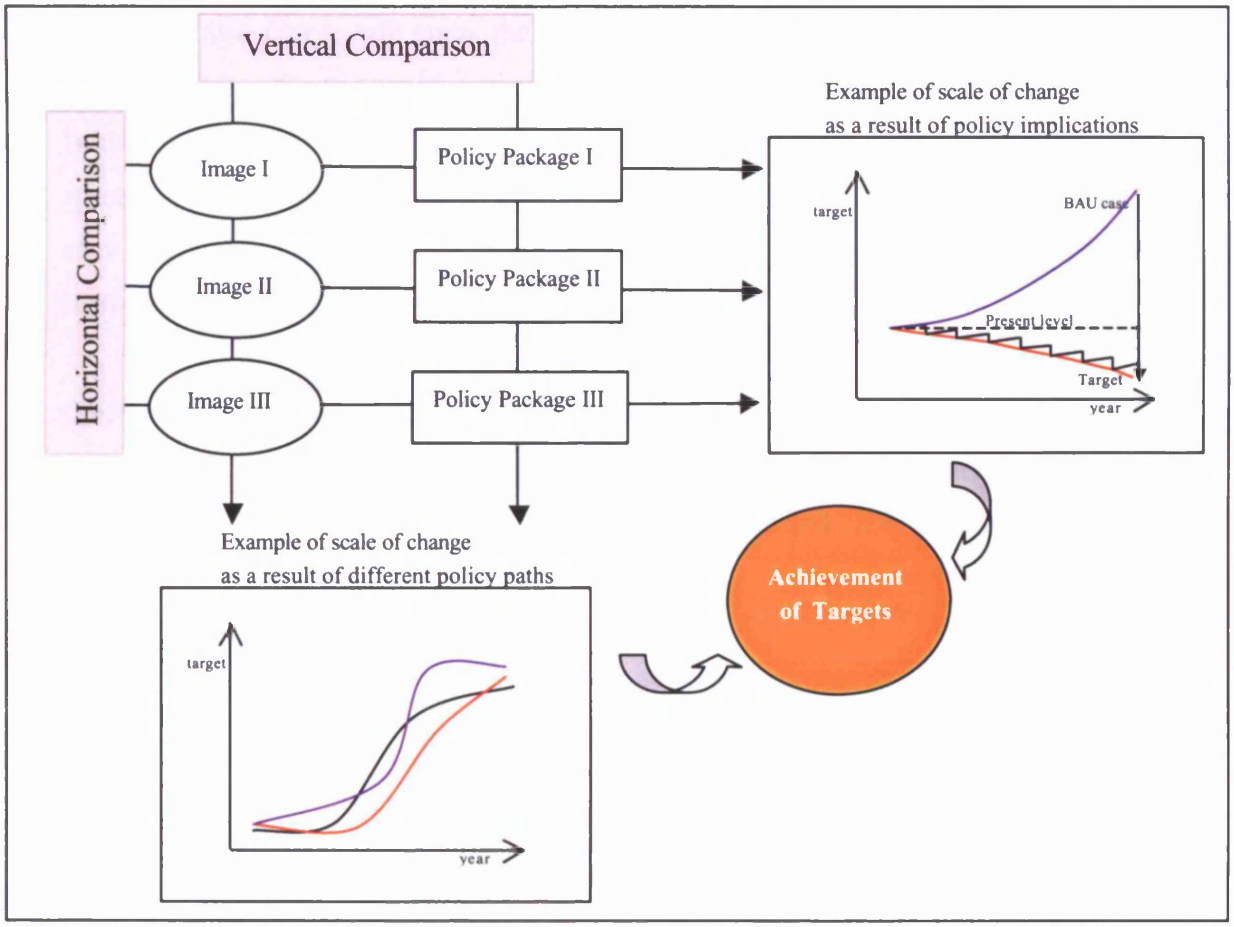
This refers to the discussions that focus on policy implications and their trigger mechanisms for achievement of targets in one particular Image. These include a comparison with the BAU case, an examination of achievement of targets according

to linear patterns (Table 5.9, Chapter 5) and an assessment of how far the deviation of achievement of targets would be observed in relative terms. For the purposes of easier communication, as well as to help the local transport experts gain greater appreciation of the method, relative measurement of achievement of targets has been used in most cases; for example, *50% of air pollution could be reduced as a result of the policy package by the year 2008.*

(b) Vertical comparison

Understandably, the achievement of targets will vary between each package. Vertical comparison refers to discussion that focuses on the relative achievements between policy packages for different Images. For example, achievement of targets of certain policy package that have a faster 'take-off' phase (refer to Figure 5.6, Chapter 5) could achieve greater change in a shorter time than others.

Figure 8.2 Relative Assessment of Achievement of Targets: Horizontal and Vertical Comparison



The considerations of these principles of comparison have enabled the achievement of the targets of the three packages to be analysed accordingly. The results of the assessment of the achievement of targets have been numbered to help readers to grasp the idea of analysis more easily; the figures for the achievement of targets are intended to show the relative measurement of an achievement, and therefore they should not be taken literally in terms of the mathematical accuracy of an assessment.

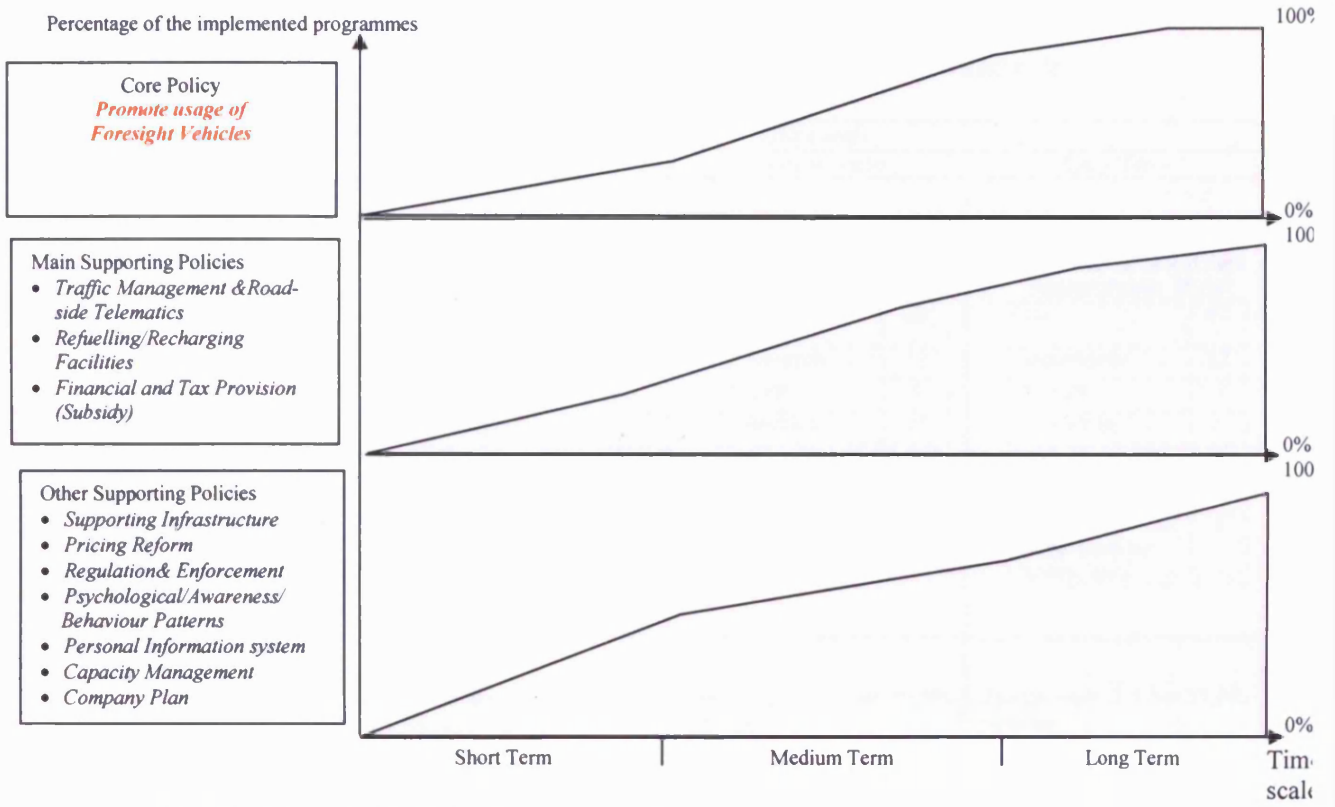
The achievements of targets by three policy packages are presented in the following sections, 8.1.1, 8.1.2 and 8.1.3.

8.1.1 The Achievement of Targets for Image I: Foresight Vehicles

Referring to the policy package for Image I, it presents an easy solution for policy-makers, the public and politicians, from the perspective that the least amount of change needs to be made, and also people will enjoy the freedom to live, stay and travel. The Foresight Vehicles Image could achieve several aspects of the sustainable transport objectives, such as air pollution reduction by shifting to alternative fuel and hybrid cars; providing more parking spaces and reducing congestion by encouraging smaller scale vehicles; reducing accident rates by integrating road-planning, safer car concept, awareness campaigns, tightened regulations and effective enforcement.

Corresponding to the schematic implementation of policy package in section 7.5.3, the evaluation of achievement of targets in short, medium and long terms could be found as below, and the summary of them are illustrated in Figure 8.3 and Table 8.1.

Figure 8.3 Achievement of Targets According to Schematic Implementation Programmes for Image I



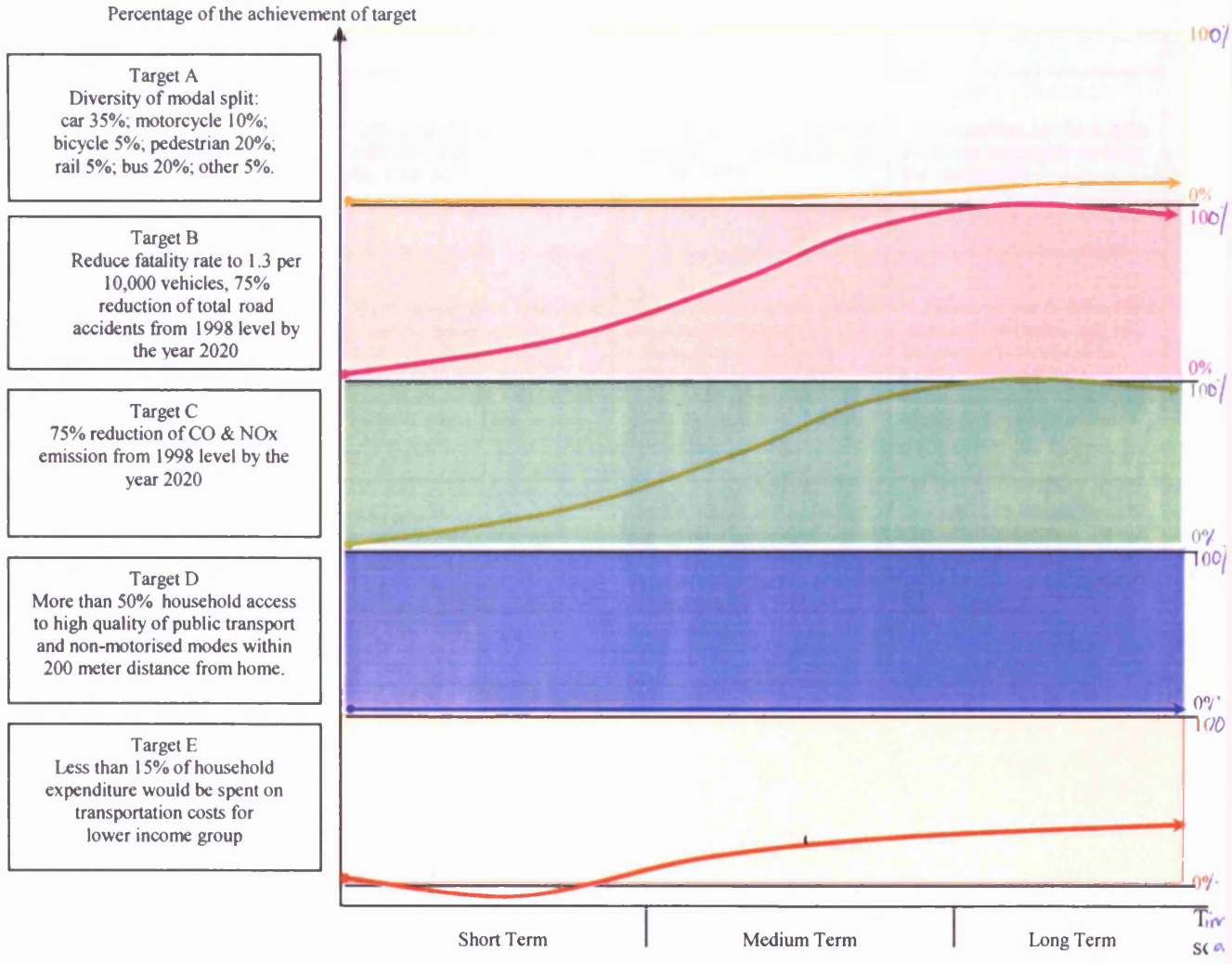


Table 8.1 IMAGE I: Estimated Achievement of Targets Vs. Timescale

TARGET		Time-scale		
		Short Term	Medium Term	Long Term
A	100% achievement of target equivalent to: Diversity of Modal Split Private: Public 45:55 car 35 motorcycle 10 bicycle 6 pedestrian 22 rail 5 bus 20 other paratransit (taxi/ carshare /jitney, etc.) 2	Diversity of Modal Split Private: Public 69:31 car 53 motorcycle 16 bicycle 3.6 pedestrian 11 rail 2 bus 14 other paratransit (taxi/ carshare /jitney, etc.) 0.5	Diversity of Modal Split Private: Public 76:24 car 58 motorcycle 18 bicycle 4 pedestrian 5 rail 3 bus 11.2 other paratransit (taxi/ carshare /jitney, etc.) 0.8	Diversity of Modal Split Private: Public 82:18 car 60 motorcycle 22 bicycle 5 pedestrian 1 rail 4 bus 7 other paratransit (taxi/ carshare jitney, etc.) 1
B	100% achievement of target equivalent to: Reduce fatality rate to 1.3 per 10,000 vehicles & 75% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 3.2 per 10,000 vehicles 35% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 1.3 per 10,000 vehicles 75% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 1.5 per 10,000 vehicles 70% reduction of total road accidents from 1998 level by the year 2020.
C	100% achievement of target equivalent to: 75% reduction of CO & NOx emission from 1998 level by the year 2020.	35% reduction of CO & NOx emission from 1998 level by the year 2020.	75% reduction of CO & NOx emission from 1998 level by the year 2020.	70% reduction of CO & NOx emission from 1998 level by the year 2020.
D	100% achievement of target equivalent to: More than 50% household access to high quality of public transport and non-motorised modes within 200 metre distance from home.	No improvement on the present situation (estimated just 10-15% household access to public transport and non-motorised modes within 200 metre distance from home).	No improvement on the present situation (estimated just 10-15% household access to public transport and non-motorised modes within 200 metre distance from home).	No improvement on the present situation (estimated just 10-15% household access to public transport and non-motorised modes within 200 metre distance from home).
E	100% achievement of target equivalent to: Less than 15% of household expenditure would be spent on transportation costs for lower income groups.	Worse than present trend (estimated that 30% of household expenditure would be spent on transportation costs for lower income groups)	Slightly improved, estimated that 25% of household expenditure would be spent on transportation costs for lower income groups	Improved. Estimated that 20%of household expenditure would be spent on transportation costs for lower income groups.

8.1.1.1 Achievement of Targets (from the Year 2004 to the Year 2008)

At this stage, there is little change to the modal split from the present trend. Due to globalisation, various car models from all over the world have entered the Malaysian market. The modal split continues to be biased towards the car and the motorcycle. As transport policy has focused on achieving sustainability through foresight vehicles, less effort has been put into public transportation. Therefore public transportation and the non-motorised environment remain in similar situations without any improvement.

Accident and atmospheric pollution in Kuala Lumpur on the other hand has shown improvement, mainly due to target-setting and integrated policies to increase road safety. Stricter regulations for car safety (such as effective safety belts, safety helmets and child seats in cars) and effective enforcement have taken its effect. Advanced Traffic Management and Roadside Telematics schemes have ensured better planned and smoother traffic flows and hence reduced congestion and accidents effectively. Consequently, atmospheric pollution and energy consumption will also be reduced due to slowing the movement of vehicles. By the end of this period, fatality rates and levels of atmospheric pollution have been reduced to almost 35% from the1998 level, reaching nearly halfway towards the set targets.

In the social equity dimension, the introduction of foresight vehicles and associated policies have, however, undermined the mobility of lower-income groups. Lower income people continue to suffer from a poor-quality bus system and an expensive rail-based system. Most of them still depend on private vehicles from the lower end of the market for daily mobility but now have to pay extra due to car excise taxes. At this point, there is a trend which diverts from the target of 'less than 15% of household expenditure would be spent on transport costs for lower income groups', lower income people are spending more than 30% of their household income on transport costs. The foresight transport Image and policies have not benefited this group of people; instead they have increased the burden of their expenditure on transport costs. This situation should alarm the government.

8.1.1.2 Achievement of Target (from the Year 2009 to the Year 2014)

This is an exciting period for Kuala Lumpur as the situation regarding accidents and atmospheric pollution levels are improving tremendously.

Besides the much improved road-planning, regulation and enforcement, the collision warning/intervention and visual enhancement of ITS in vehicles have further increased safety on the roads. The cruise control and parking aids of ITS in vehicles have also helped. Most importantly, due to the continued campaign from the Road Safety Council, people have become aware of road safety targets and tend to practise careful driving to reduce the chance of accidents. Pedestrians and motorcyclists have been more respected as road users than before. At the same time, alternative fuel and hybrid engines reduce the atmospheric pollution levels on the road. As the numbers of foresight vehicles have increased drastically, the benefits of improved safety and clean air can be clearly observed on the roads.

These effects are augmented by the efficiency of advanced traffic management technologies. At this point, most of the sensitive areas (environmentally damaging, bottlenecks and safety black spots) have been identified and covered by traffic-signal controls and special detectors. Once a signal picks up a deteriorating condition on a road (either atmospheric pollution levels or delays in traffic) from these roadside telematics, the Traffic Control Centre will then respond in real time. They may reverse another lane for heavy traffic or reroute the drivers to an alternative road.

The Advanced Traveller Information System that is widely available to the public has also helped drivers and passengers to plan the journey in advance, and thus reduce the congestion level, energy consumption, atmospheric pollution and accidents.

Due to a seamless network of Foresight Vehicles, the Traveller Information System and advanced traffic management, we observe that both accident and atmospheric pollution conditions have nearly hit the targets. By the end of this period, the fatality rate and level of atmospheric pollution have been reduced to about 75% of the 1998 level.

Throughout this period, however, no improvement has been observed in public transportation and non-motorised modes. The Malaysian government and Kuala Lumpur authorities have argued that they have concentrated their financial resources into supporting the foresight vehicle policy, and at this stage, into fiscal incentives for advanced two-/three-wheelers.

In terms of the modal split, the new introduction of two-/three-wheelers does attract some attention and there is a slight shift in the modal split towards these modes. There are slight improvement in the modal share of taxis and other paratransits and the rail system, whereas buses and pedestrian modes decrease in this Image. The targets for diversity of modal split have not progressed as planned.

For lower income groups who have been the main users of traditional motorcycles and bicycles, the advanced two- and three-wheelers with heavily subsidised prices are opening up a new era for their sustainable mobility. Many of them very quickly take advantage of the scrappage bonus to get rid of their obsolete vehicles, then shift to these advanced, cheaper, cleaner and safer ones. They have spent less in transportation costs at the end of this period, improving the household expenditure on transport from more than 30% (in previous years) to about 25% now.

8.1.1.3 Achievement of Targets (from the Year 2015 to the Year 2020)

This is a phase of reaping the most benefit from the Foresight Vehicles Image and its policy package, when all the outlined policies have been put into operation comprehensively.

By the middle of this period, due to constant campaigns and integrated policies to tackle the issues of road safety and air pollution, both targets for accident levels and atmospheric pollution have been achieved - 75% reduction in the fatality rate per 10,000 motor vehicles from the 2002 level, and 75% reduction in atmospheric pollution from the 1997 level. The

technologically orientated transport policy package has proved able to tackle these two issues effectively.

However, due to greater safety, comfort, reliability together with sharply decreasing travel costs, and without any restrictive policy for private vehicle usage, there is an unavoidable trend of ever-rising vehicular volume on the roads of Kuala Lumpur. Consequently, there are signs of problematic traffic conditions (congestion, atmospheric pollution, accidents and energy consumption) at the end of this period. Both targets for accident levels and air pollution begin to slip slightly. This is a warning signal for government to explore further measures to counter these trends beyond the year 2020. How to maintain the level of achievement of targets and improve on other as-yet-unattainable ones (social distribution issues particularly) becomes the main issue. The restrictive pricing measures are discussed alongside further investment in automation technology research.

There is a total failure to achieve the target of provision of high-quality public transport and non-motorised modes. As people are getting away from public transportation, government becomes less and less interested in pouring new resources into this mode. Bus and rail systems are just monitored by the government to maintain reasonable standards.

The overall modal split is still overwhelmingly biased towards private vehicles rather than public ones (private: public 82:18). The modal split has shifted significantly in favour of two-/three-wheelers although the car still remains the dominant mode. Buses and pedestrians have declined substantially. The conclusion is that diversity in the modal split has not reached the planned target.

For the lower-income groups, household expenditure on transport costs has only slightly improved if compared to the middle years of this policy package programme, probably dropping from around 25% to about 23%. As the government is only subsidising the private vehicles for the very poor, this minor improvement is mainly due to the dropping prices of foresight vehicles. To achieve the 15% target, there is still plenty of room for improvement.

8.1.1.4 Rates of Change in Image I and Major Concerns to Achieve the Overall Sustainable Transport Objectives

In this Image, the rates of change (e.g. accident rates and pollution levels) are fast in the short and medium terms. In the first term, accident and pollution levels are optimistically estimated to improve even though many schemes are still at their infancy and at the pilot project stage, this is because efforts in setting the targets and putting policy measures together are enormous steps to take in order to improve the very bad present situation. Improvements are therefore relatively easy to achieve at this stage. As for the medium term, the rate of change reflects the establishment of the market for foresight vehicle. The rates of change slow down in the last term when the technologies reach their maturity and there will be fewer impacts than in the second term. Some adverse impacts may even be observed in last term due to rebound effects of total traffic growth.

To materialise the Image, initial costs (in the form of subsidy for new technology) of the scheme are high. Technological transfer from more advanced countries and manufacturers is needed, and therefore commitment from top-level politicians to continue to invest and negotiate with these global players over many years is required. The technological scenario needs a much wider range of R&D areas than just fuel and automobile technologies. Renewable energy resources, integrated road safety measures, marketing strategies and sustainable commercially viable vehicles (especially the two- and three-wheelers) are challenges to be faced. There should be a massive financial allocation for local R&D to update the relevant technologies. In addition, the cost of technology transition (for example, to change to adopting the natural gas-based vehicle, then to an electrical vehicle and finally to a renewable hydrogen vehicle in the distant future) is also huge. In a situation in which little revenue can be generated from the transport system itself, government has to bear a very significant cost burden in Image I.

Even though those barriers may be successfully overcome, the Foresight Vehicle Image has weaknesses in terms of rebound effects and social distribution issues.

According to this image, the latent ability of 'renewable hydrogen' technology is implied as a future solution, but this is beyond the study's time frame. In the very distant future, the Foresight Vehicle Image may have difficulty in preventing the recurrence of congestion if Kuala Lumpur's limited land resource is filled by ever-growing numbers of vehicles, no matter how small they are. The greatest latent threat in the Image results from the success itself – that the advanced private vehicles which run in the most efficient system actually stimulate more travel and more vehicle ownership. The risk of this rebound effect will be discussed further in section 8.2 below.

The next concern is to achieve social equity objective. The nature of the automobile orientated transportation system does not encourage individual interactions. Social cohesion is crumbling in this Image due to the decentralisation of physical land-use patterns, the distinct social-class labelling (based on automobile ownership) and also a huge lack of opportunity for people to contact each other in public domains. There will be people who have been excluded from the Image. The first category refers to those who cannot drive (i.e. children, the elderly, handicapped people), and the second category refers to those who prefer not to drive. The Image provides very little choice of alternative transportation, and the basic accessibility of these two groups has to be dependent on those who drive.

Preventative measures such as restrictive pricing policies may still need to be considered to control the ever-growing number of vehicles and their adverse effects. In addition, in this Image attention needs to be paid to the mobility of non-drivers; schemes from Image II such as vehicle clubs, neighbourhood travel plans etc. are good examples of what can be done.

8.1.2 The Achievement of Targets for Image II: Extended Public Transportation

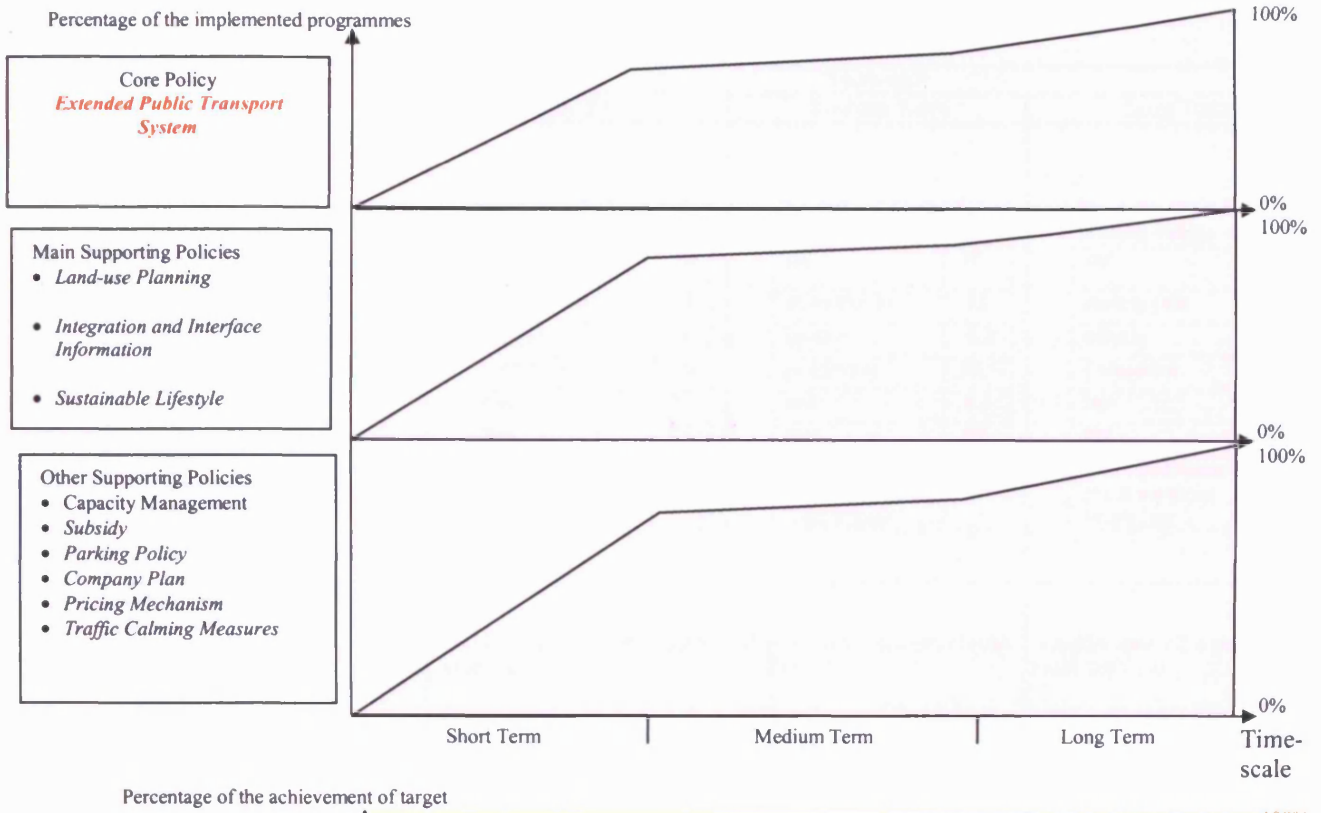
The Extended Public Transport Image provides a different alternative future that needs significant changes from the present transport, social and cultural policies. The image explores the possibility of successful sustainable transport via attractive, effective and personalised public transport alongside imperative and supportive measures but very few restrictive transport policies. By designing a mixed use of transport modes, especially via greater capacity in terms of buses and rail systems, road space could be more effectively used in this Image. Shorter trips and multi-purpose journeys could be observed due to high-density living conditions. More prudent attitudes and the habit of pre-arranging trips all contribute to more sustainable transport in the city. Hence, congestion, air pollution and dependence on private automobiles will be solved by these multi-pronged strategies.

Corresponding to the schematic implementation of policy package in section 7.6.3, the achievement of targets have been evaluated in short, medium and long terms, and the summary of them are illustrated in Figure 8.4 and Table 8.2.

8.1.2.1 Achievement of Targets (from the Year 2004 to the Year 2008)

The first obvious change is the major improvement in the public transportation system and non-motorised environment, associated with the efforts mentioned above. Indeed, enthusiastic efforts from the top level to pay attention to the extended public transportation system have induced intense public interest in these alternative modes. Taking advantage of a 'free-trial', they have started to pick up the idea of trying these modes. As a result of the media promotion, people have also begun to realise hat now they can choose the most cost- and energy-effective means of transport for a particular trip, with little inconvenience compared to using the private car or motorcycle.

Figure 8.4 Achievement of Targets According to Schematic Implementation Programmes for Image II



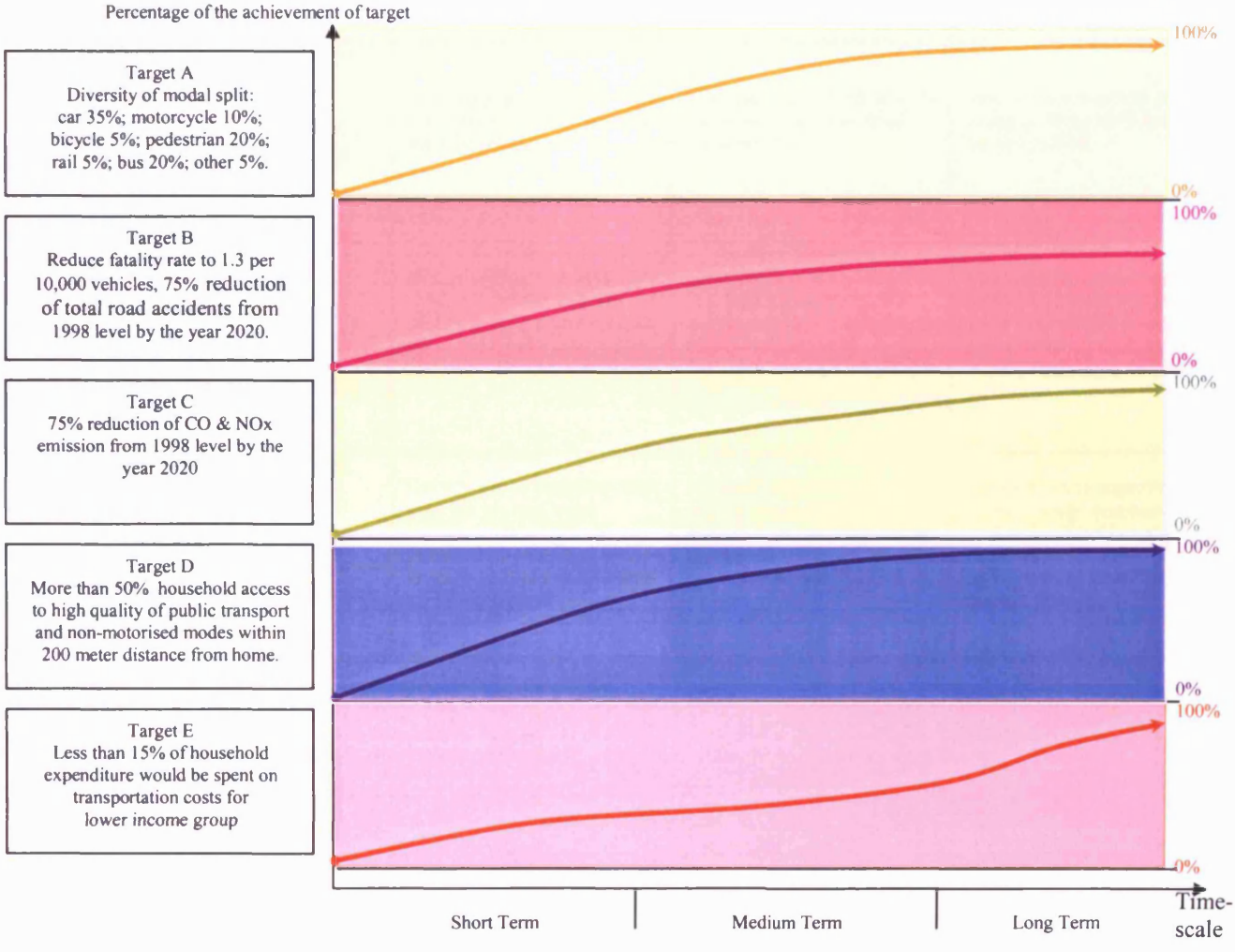


Table 8.2 IMAGE II: Estimated Target Achievements Vs. Timescale

TARGET		Time-scale		
		Short Term	Medium Term	Long Term
A	100% achievement of target equivalent to: Diversity of Modal Split Private: Public 45:55 car 35 motorcycle 10 bicycle 6 pedestrian 22 rail 5 bus 20 other paratransit (taxi/ carshare /jitney, etc.) 2	Diversity of Modal Split Private: Public 60:40 car 45 motorcycle 15 bicycle 3.8 pedestrian 15 rail 3.2 bus 17 other paratransit (taxi/ carshare /jitney, etc.) 1	Diversity of Modal Split Private: Public 50:50 car 38 motorcycle 12 bicycle 4.5 pedestrian 20.5 rail 4.5 bus 19 other paratransit (taxi/ carshare /jitney, etc.) 1.5	Diversity of Modal Split Private: Public 45:55 car 35 motorcycle 10 bicycle 6 pedestrian 22 rail 5 bus 20 other paratransit (taxi/ carshare jitney, etc.) 2
B	100% achievement of target equivalent to: Reduce fatality rate to 1.3 per 10,000 vehicles & 75% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 3.6 per 10,000 vehicles 30% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 2.2 per 10,000 vehicles 55% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 2.0 per 10,000 vehicles 60% reduction of total road accidents from 1998 level by the year 2020.
C	100% achievement of target equivalent to: 75% reduction of CO & NOx emission from 1998 level by the year 2020.	35% reduction of CO & NOx emission from 1998 level by the year 2020.	65% reduction of CO & NOx emission from 1998 level by the year 2020.	75% reduction of CO & NOx emission from 1998 level by the year 2020.
D	100% achievement of target equivalent to: More than 50% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 30% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 45% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 50% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.
E	100% achievement of target equivalent to: Less than 15% of household expenditure would be spent on transportation costs for lower income groups.	Circumstances improves more than the present trend (estimated that 22% of household expenditure would be spent on transportation costs for lower income groups).	Not much improvement at this stage (estimated than 21% of household expenditure would be spent on transportation costs for lower income groups).	Circumstances improve tremendously. (estimated that 17% of household expenditure would be spent on transportation costs for lower income groups).

Such enlightenment in people's minds has been reflected in a change in the modal split in Kuala Lumpur's transport system. The diversity of modal split starts to be seen. As a result of the better, safer and more friendly environment, people have begun to explore it by walking and cycling more. As a result of higher parking fees and the convenience of access by means of integrated, seamless public transport, private cars have been kept at home for certain trips. The newly created Vehicle Clubs have encouraged many young professional people to put off the idea of buying their first car. For the first time in Kuala Lumpur's transport history, there is a slowing down in the growth rate of private vehicles ownership.

For the lower income group, the implementation of this extended public transportation system is definitely a policy that benefits them. The improvement in public transportation and non-motorised environments is a direct gain for them. With these improvements, they can enjoy a high quality of accessibility to work and other travel purposes without the need to purchase, own and maintain private cars that are very expensive. Nevertheless, as the upgraded bus and rail systems have also increased the fares, there is still a lot of room for manoeuvre in achieving the target of *'less than 15% of household expenditure would be spent on transportation costs for lower income group'*. Direct subsidy for this group of people will be considered in the next phase.

All of the above-mentioned changes in travel behaviour have stabilised the atmospheric pollution conditions in Kuala Lumpur, improving them by nearly 50% over the present trend. Three factors contribute to the improvement: firstly, the slower growth rate of private vehicle purchase; secondly, the phasing out of old buses and the replacement with zero-emission buses; and thirdly, the poor end their practice of purchasing old, poorly maintained and highly polluting private vehicles and that, to a certain extent, helps clear the air in Kuala Lumpur.

The same factors, together with the new provision of safer cycle paths and pedestrian ways, contribute to the stabilization of accident conditions and fatality rates.

8.1.2.2 Achievement of Target (from the Year 2009 to the Year 2014)

The whole effort of the policy package has geared the transport system in Kuala Lumpur towards sustainability. There is no single target that has diverted from the objectives.

The gradually transformed compact city and TDA which is mainly supported by its extended public transportation, has presented a different Image from any that has ever existed before. It is a vibrant city, designed for the movement of people instead of cars. Kuala Lumpur's residents and visitors discover that there are many choices of transport mode to carry them from an origin to a destination. People choose the most suitable mode for a particular trip. As the Compact City is taking shape, the advanced, greener and safer two-/three-wheelers are becoming popular as they serve the purposes of short distance trips very well. Undoubtedly, there is an unprecedented diversity of transport modes running on the roads in Kuala Lumpur. At the end of this period, the progress towards 'diversity of modal split' is doing well and approaching the target.

With the newly established rail-based system, the substitution of old buses for zero-emission buses, the creation of cycle lanes and pedestrians paths, the target of 'high-quality of public transport and non-motorised environment' is a spot-on one. It is estimated that more than 45% households have accessed to high-quality public transport and non-motorised modes within a 200 metres distance from home, a tremendous success for this target.

The same three factors described before (refer to section 8.1.2.1 - more old buses have been replaced, more people go for extended public transport and fewer low maintenance vehicles are on the road) continue to contribute to the reduction of the levels of atmospheric pollution in Kuala Lumpur. These trends happen on a greater scale and therefore better results can be observed in this period. The estimated 65% reduction in CO & NOx emission from 1998 level by the year 2020 may be observed.

Meanwhile, due to high vehicle occupancy rate, the overall travel trip flows are reduced, and the accident situation in Kuala Lumpur has improved. However, the level of achievement is

not as good as for other targets. This is mainly due to tough competition for road space from the diversity of transport modes that are characterised by vulnerable two-/three-wheelers, pedestrians, cyclists, etc. The road space and priorities that are allocated to public transportation and non-motorised modes alone cannot effectively prevent accidents. Black spots such as the crossing points of various transport modes and pedestrians still need to be identified and improved.

Lastly, mobility for lower income people has improved as a result of greater opportunities to use pedestrian ways and bicycle lanes. However, due to the upgrading that corresponds to their new images, rail and bus fares have been increased and hence they are rising out of the bracket of lower-income affordability. The rented vehicles and Vehicle Clubs are also out of their reach. Subsidy has to be made available for this group. Even so, at this period local government encounters a bottleneck of stagnant development in the social equality dimension with little improvement. Furthermore, property prices have increased as a result of the Compact City and land use planning, and this has added a burden to the lower-income group.

8.1.2.3 Achievement of Targets (from the Year 2015 to the Year 2020)

At present, the whole extended public transportation system has materialised in Kuala Lumpur, and it is time to judge the final achievement of the targets. Overall, the policy package provides a near perfect achievement for all targets except 'the accident target'.

Extended public transportation has been a success due to the synergetic effects of the package. The strongest point is in the infrastructure and its information service. The compact city pattern has encouraged people to walk and cycle more rather than to drive, and to use public transportation rather than private vehicles. From the 'carrot and stick' perspective, on one hand, the Area Access Control, Rush Hour Charges and higher fuel prices have made private cars and motorcycles much less attractive; on the other hand, the efficient, value-added, personalised characteristic of extended public transportation is becoming more

popular. Moreover, social norms have changed so that people care more about environmental benefits and social equality, and relying on public transportation for mobility is considered a good practice for a sustainable lifestyle in modern times. All in all, the roles of public transport, alternative transport services and non-motorised modes have increased tremendously, diverting from the dominating private transport trend.

Hence, the modal split in Kuala Lumpur continues to diversify while people are increasingly appreciative of the transport choices that have been offered to them. By the end of this period, the target of 'diversity of modal split' is fully achieved. Modal split for private public reaches an unprecedented 45:55, where bus, rail, pedestrian, cyclist, other forms of public transport such as car-rental, two-/three-wheelers and all sorts of travel plans dominate the road spaces rather than private cars and motorcycles.

The target of 'high-quality of public transport and non-motorised mode environments' is fully achieved. Provision of high-quality of public transport and non-motorised mode environments is indeed an intrinsic value of the policy package itself. It is hence logical to assume that once extended public transportation has been comprehensively implemented, the target of 'more than 50% household access to high-quality of public transport and non-motorised modes within a 200 metres distance from home' has also been achieved.

In terms of social equity, the far-reaching policy of 'discounted public transportation fare" for lower income groups has finally achieved its mobility objective. Taking advantage of this policy, it is a significant change for the poor to discard expensive, second-hand and low maintenance private vehicles and switch to public transportation. There is a dramatic target achievement of 'less than 15% of household expenditure would be spent on transportation costs for lower income group'. However, this policy has hence induced the 'subsidisation' status of transport system, which is different from the other two transport systems in the first and third Images.

The synergetic effects that are described above also contribute to the reduction of atmospheric pollution. The overall low travel trip flow due to high vehicle occupancy rates

has contributed to a major part of the pollution reduction. The phasing out of traditional old buses and the remarkable giving up of the polluting, second-hand and least well-maintained private vehicles by the poor are the other major factors. People have also become cautious about using their cars more than necessary due to higher fuel prices. The practice of reducing the need to travel has also helped to a certain extent to achieve target. All things considered, it may be observed that there is a '75% reduction of atmospheric pollution by the year 2020 from 1997 levels'.

Lastly, the accident situation in Kuala Lumpur is improving but the target of '75% reduction of the fatality rate per 10,000 motor vehicles from 2020 level' has not been achieved fully. As mentioned in Section 7.6.3.4 in the intermediate period, the complicated traffic flows by diverse transport modes on limited road spaces have increased the probability of accidents. The increase numbers of vulnerable pedestrians, cyclists and two-/three-wheeler public transport modes on the road have unavoidably increased the accident and fatality rates on the roads of Kuala Lumpur.

8.1.2.4 Rates of Change in Image II and Major Concerns to Achieve the Overall Sustainable Transport Objectives

With the potential of ongoing massive rail-based projects in Kuala Lumpur, this Image of the Future takes full advantages of present facilities. The implementation of measures is relatively easy to carry out and this could happen in a very short time. The unique feature of this Image is therefore that almost all measures (apart from restrictive policies) could be implemented from an early stage (i.e. the short-term period). The consequence of this advantage could be reflected in the achievement of targets, in which rates of changes toward sustainability happen much more quickly in the short term. This will provide enormous motivation for the general public and politicians to continue to pursue other measures in the later stages, as well as to increase the level of acceptance of the policy package. The rates of change slow down slightly in the second term, as major progress been achieved at an earlier stage, while measures at this stage are mainly to improve on those of the earlier stage. In the

last term, restricted policies and pricing mechanisms give the image another boost and achieve the full targets of modal split, air pollution reduction and high-quality public transport and non-motorised modes. The redirection of funds and provision of greater subsidy for lower income groups also help to achieve the social equity objective.

Image II seems able to achieve all the sustainable transport objectives if the Image would be materialised. The only concern is the cost involved in this Image. Usually the prospect of building a massive public transport system in a city will involve massive financial investment. In Kuala Lumpur's case, the greatest opportunity at present is that there is already new and modern rail-based public transport in place (the first light-rail transit line commenced operation in Sept 1998, but the whole plan has yet to finished). Therefore Image II still offers a very cost-effective way to utilise fully the present facilities, which is a very attractive option. However, to achieve the proposed extended public transportation system, there are inevitable initial costs involving modernising the bus technologies and incentives to encourage other transport businesses. Unlike the other two Images, in Image II government bears full responsibility for ensuring that it is a city run by collective modes of transport; therefore the cost implication of the transport system is huge. At least in the time-frame of the study, the transport system is subsidised. Whether the government is willing to commit thoroughly to a *subsidised* transport system to support efficient and high-quality public transport as the major transport infrastructure in Kuala Lumpur and its surrounding is the question associated with this Image.

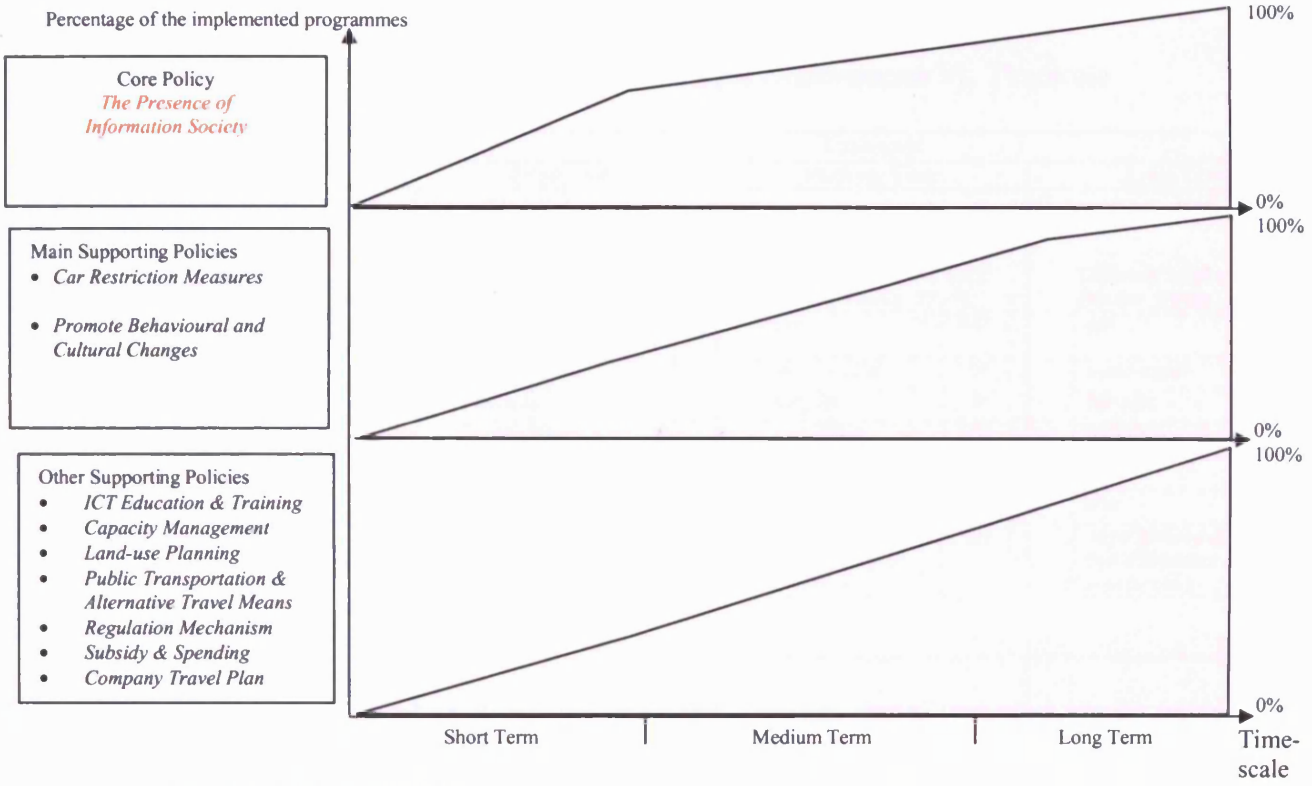
Apart from that, there should also be a special task force to look at the road safety issue, because of the increasing number of vulnerable road users associated with this Image, such as two-/three- wheelers, pedestrians and cyclists.

8.1.3 The Achievement of Targets for Image III: Information Society

Flexibility and choices provided by Information Society could open up a new path towards sustainability. The third image explores the benefits of tele-activities; the image gears the society towards a new lifestyle by fully utilizing tele-activities, adopting flexi-working patterns, gathering like-minded people from similar social classes in close-knit communities without the need to move due to work location. With the help of a restrictive transport policy and the pricing mechanism, sustainable transport aims could be achieved via dramatic changes in travel behaviour, land-use patterns and raised awareness of greener values. Congestion can be eased, air pollution will be tackled and quality of life should be improved significantly.

Corresponding to the schematic implementation of policy package in section 7.7.3, Figure 8.5 and Table 8.3. summaries the result of the evaluation targets achievement in short, medium and long terms timeframe.

Figure 8.5 Achievement of Targets According to Schematic Implementation Programmes for Image III



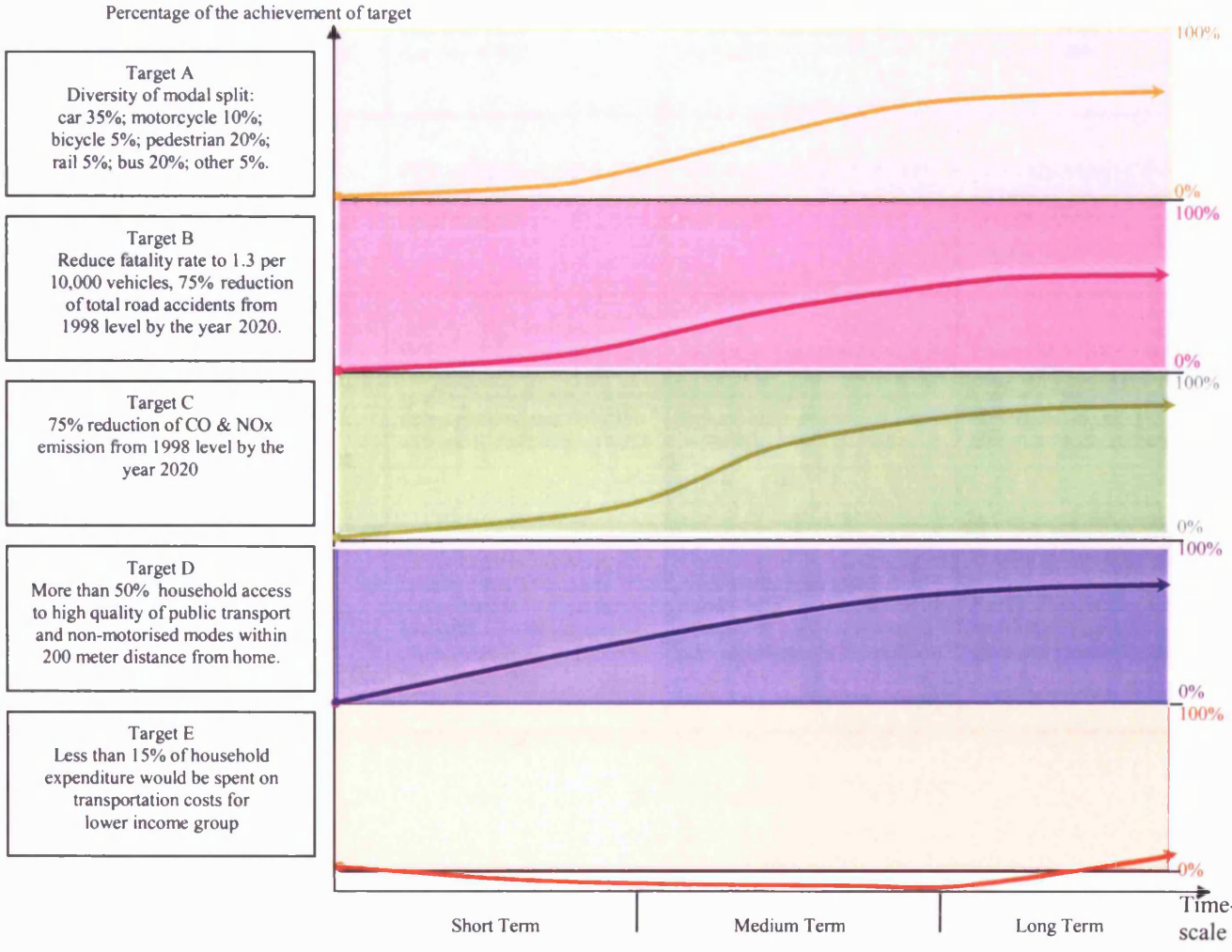


Table 8.3 IMAGE III: Estimated Target Achievements Vs. Timescale

TARGET		Time-scale		
		Short Term	Medium Term	Long Term
A	100% achievement of target equivalent to: Diversity of Modal Split Private: Public 45:55 car 35 motorcycle 10 bicycle 6 pedestrian 22 rail 5 bus 20 other paratransit (taxi/ carshare /jitney, etc.) 2	Diversity of Modal Split Private: Public 66:34 car 49 motorcycle 17 bicycle 3.7 pedestrian 12.5 rail 2 bus 15 other paratransit (taxi/ carshare /jitney, etc.) 0.8	Diversity of Modal Split Private: Public 59: 41 car 44 motorcycle 14 bicycle 4 pedestrian 15 rail 4 bus 16.5 other paratransit (taxi/ carshare /jitney, etc.) 1.5	Diversity of Modal Split Private: Public 55:45 car 42 motorcycle 13 Bicycle 4.8 Pedestrian 16 Rail 5 Bus 17.2 other paratransit (taxi/ carshare jitney, etc.) 2
B	100% achievement of target equivalent to: Reduce fatality rate to 1.3 per 10,000 vehicles & 75% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 3.5 per 10,000 vehicles 30% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 2.8 per 10,000 vehicles 45% reduction of total road accidents from 1998 level by the year 2020.	Fatality rate = 2.6 per 10,000 vehicles 50% reduction of total road accidents from 1998 level by the year 2020.
C	100% achievement of target equivalent to: 75% reduction of CO & NOx emission from 1998 level by the year 2020.	25% reduction of CO & NOx emission from 1998 level by the year 2020.	50% reduction of CO & NOx emission from 1998 level by the year 2020.	65% reduction of CO & NOx emission from 1998 level by the year 2020.
D	100% achievement of target equivalent to: More than 50% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 30% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 40% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.	Estimated that more than 45% household access to high-quality of public transport and non-motorised modes within 200 metre distance from home.
E	100% achievement of target equivalent to: Less than 15% of household expenditure would be spent on transportation costs for lower income groups.	Circumstances worse than the present trend (estimated that more than 30% of household expenditure would be spent on transportation costs for lower income groups).	Circumstances become worse at the middle of the phase,, and improve slightly at the end of the period (estimated that around 35% of household expenditure would be spent on transportation costs for lower income groups).	Circumstances improve only slightly.(estimated that 25% of household expenditure would be spent on transportation costs for lower income groups).

8.1.3.1 Achievement of Targets (from the Year 2004 to the Year 2008)

From the development of the information technology perspective, this phase is a very dramatic one as these technologies are so revolutionary that they tend to involve relatively small amounts of material and resources, and thereby permit substantial dematerialisation in many domains. On-line shopping, tele-banking, virtual holidays, paperless administration, e-cards and many other new ideas have flourished and bring with them a whole range of new ways of doing things and organising the structure of society.

However, from the sustainability point of view, this is still in the infant phase. Taking up the advantages offered by the information technologies, the Kuala Lumpur government is just testing the water with regard to several complementary strategies, e.g. pilot projects for car restriction measures. As the implementation scale of policies is not large, the rate of change is less dramatic than in Image I or Image II; nevertheless, the impacts on the targets have proved to be significant even at this stage.

The upgraded public transportation and non-motorised modes, the capacity management, the land-use changes and the massive campaigns on 'behavioural and cultural change' do produce results. Some people are attracted to the idea of tele-working, moving to tele-cottages in the outskirts and starting to practise tele-lifestyle, as advocated by their governments. People also use public transport more and cycle and walk more, although they have yet to give up their private vehicles at this point. Generally, there is also relatively high environmental awareness among citizens.

As a result, there is progress in achieving targets for modal split in Kuala Lumpur and the quality of public transportation and non-motorised modes. There are also improvements in the fatality rates and atmospheric pollution levels. Apart from the implications of changes in modal split, the improvements are also a result of increased consciousness and knowledge of these issues compared to the past, and are attributed to the cognitive motivational strategies on *what a sustainable society is* promoted by the Kuala Lumpur government.

There is a slight diversion from the target of household expenditure on transportation in lower income groups. Their life is less touched by the mainstream changes resulting from technological improvements, even though ICT education and training has been provided. The effect of education cannot be observed in the short term. Lower income groups are less concerned with tele-working, tele-shopping and other tele-activities. Although most of the people in this group enjoy the upgraded public transportation and non-motorised group, some of them have been affected by car-restriction zones by having to pay more to gain access to the areas. It is estimated that lower income people spend nearly 30% of household income on transport costs.

8.1.3.2 Achievement of Targets (from the Year 2009 to the Year 2014)

At this stage, many policy measures have been almost fully implemented. Generally, there is a sea change in people's lifestyle and social structure in response to the concept of the Information Society. In terms of the transport system, the initiatives from local government and the industrial revolutions have produced great effects on travel needs and transport patterns in Kuala Lumpur.

Although many people have shifted to a tele-lifestyle, total traffic flows do not decrease proportionally. However, congestion has been eased to a great extent, showing the effects of the flexible tele-lifestyle and the flexi-hour working scheme. The typical morning and late afternoon peak-hour blockages have disappeared altogether.

Public transportation and non-motorised modes have been improved to ensure an efficient, safe and pleasant environment at this stage, and are on the right track towards the target of high quality for these modes. It is estimated that more than 40% of households have accessed to high-quality public transport and non-motorised modes within a 200 metres distance of home

The synergetic effects from the policy package, i.e. higher quality of public transport and non-motorised modes, car restriction measures and grants to encourage alternative travel means, have seen the effects in the modal split. Kuala Lumpur's roads are less dominated by private vehicles. Rather, there are more public transportation, pedestrians, cyclists, dial-a-ride minibuses and advanced vehicles from vehicle clubs on the roads in Kuala Lumpur. As a result of the promotion of local destinations, and the proximity of nearly everything in the local neighbourhood, short-distance trips have increased tremendously. Consequently, walking and cycling, that suit the nature of short trips, have also increased. The target of diversity of modal split is progressing well in this policy package.

Atmospheric pollution levels in Kuala Lumpur have dropped significantly, mainly attributable to the Clean Zone policy. It has tackled the black spots of atmospheric pollution in the city and cleared the sky accordingly. Other places have generally experienced better air quality due to the tighter emission regulations. The slightly decreased traffic flow and mode shifting from private cars and motorcycles are other factors that contribute to the achievement of the target. By the end of this period, Kuala Lumpur has achieved about a 50% reduction of atmospheric pollution from the 1998 level.

On the other hand, safety issues have not improved as substantially as the pollution level. Tighter safety regulation is a major step towards reducing the fatality rate. Car restriction measures have somewhat improved the pedestrian and cycling safety in certain areas. But other than that, the target is still a long way from achieving the final score. Kuala Lumpur's roads are still dangerous as there is now a diversity of transport modes that run at different speeds and all competing for the limited road space. To effectively avoid collisions, there is a need to focus measures aiming to manage these modes on the roads, which is lacking in this policy package.

However, an unwanted impact resulting from this policy package lies in the issue of equity. The policy package has assumed that advanced telecommunications technology together with complementary strategies will provide a substitute for travel or encourage a switch to modes other than expensive private transport. Even though education and training are consistently

provided, nevertheless, there are still people who are falling behind the quickly progressing information society due to being information-illiterate. These people, usually the poorest in society, cannot benefit from advanced telecommunications technology, yet have to bear the expense of higher transport costs. They are not practising tele-working, tele-shopping, tele-banking, etc. and do not have on-line access to competitive prices for goods and services. They benefit overall from upgraded public transportation and non-motorised modes environments, but many of them are still reliant on their obsolete and poorly maintained private vehicles for their conventional lifestyle. They benefit very little from company travel plans and other alternative travel means. Area Pricing Schemes, tightened regulations, higher parking fees, etc. mean that they have to pay more to satisfy their mobility needs. There is a diversion from the social equity target showing that lower income group's household expenditure on transportation costs are getting higher and higher. The issue has to be tackled as soon as possible.

8.1.3.3 Achievement of Targets (from the Year 2015 to the Year 2020)

The Image has proved that information technology could have an enormous effect on travel behaviour changes. Together with clear support and commitment from local government and the general public, people are adopting a new lifestyle in this information society, with relatively high consciousness about the environment. Commuter journeys are replaced with electronic communications and there is a decrease in trips, vehicle kilometres and vehicle hours. However, there is still uncertainty about how far new travel trips would be stimulated in this Information Society Image. The net effect of travel reduction is therefore treated cautiously. This uncertainty has huge impacts on achievement of targets and holds back their full attainment.

Of the five targets, the atmospheric pollution target is the highest achievement in this policy package. There are a whole host of reasons for this: drastic measures on emissions regulation, Clean Zone policies, public awareness and expensive fuel prices have all contributed to this

achievement. These policies work together and tackle the atmospheric pollution issue vigorously. Nevertheless, the uncertainty about the total traffic stimulation that may subsequently cause deterioration in the atmospheric pollution level has led to reservations about the full achievement of this target. By the year 2020, the target has been attained with about a 65% reduction of atmospheric pollution from the 1998 level.

The second highest achievement is the target for high-quality public transportation and non-motorised modes environment. Providing high quality in these modes is an important complementary strategy in the policy package, but this priority is not as high as in Image II (Extended Public Transport). In this Image, the resources for these modes have been capped for the cost of necessary telecommunications equipment. Naturally, there is not the full achievement of this target, as can be found in Image II. It is estimated that there is more than 45% household access to high-quality of public transport and non-motorised modes within a 200 metres distance of home.

Next, the modal split diversity target is only halfway to being achieved. Again, although the modal split in Kuala Lumpur has diversified to a great extent, it is not as much as in Image II (Extended Public Transportation). This is due to: (i) the emphasis in this package is trip substitution rather than trip switching; (ii) as mentioned in above paragraph, the efforts put into the development of public transportation and other travel means are less than in Image II; (iii) the decentralised land-use pattern encourages more private vehicle use if physical movements are needed; (iv) although walking and cycling are increasingly important, they are limited mainly to trips within neighbourhoods due to the short distances. Beyond the neighbourhoods, the non-motorised modes are less perceived as good choices of transport modes; (v) the anti-dematerialisation emotion and travel stimulation from this Image itself will lead to private vehicle uses.

Road safety remains an area of concern. Although road safety is improving generally, the target is still a long way from being fully achieved. At the end of the period, the fatality rate per 10,000 motor vehicles has been reduced to about 50% from the 1998 level, leaving room for improvement in this aspect. The situation is improving especially in car restriction areas,

but accident black spots shift to dangerous junctions at which various modes of transport intermingle with each other. There are also greater numbers of increasingly vulnerable road users (especially children and the elderly) on the road, while traffic flows remain relatively high. There is the unknown factor of travel stimulation which adds to road safety pressures.

Finally, due to the new subsidy policy and special attention (education and training) paid to the social inequity issue imposed in the final period, there is a dramatic improvement in household expenditure on transport costs in lower income groups from that of the medium term. This group of people immediately benefit from the financial aids to their mobility. Having said that, by the end of the year 2020, this target is still considered to have failed and it does not improve greatly on the present trend. This is because the subsidy alone is not enough and cannot solve the problem of accessibility for the disadvantaged group in an information age. The prospect of solving the disparity between the information-illiterate and the information literate relies on 'time treatment'. The younger generation will pick up the information technologies via mainstream information education at school. In the distant future, information illiteracy will not exist and every single person will be on a level playing field with access to this knowledge and technology.

One point that is worth noting is that the disabled and elderly people can benefit a great deal from this Image as long as they are information literate and willing to use the technology. Their accessibility increases tremendously via telecommunications technology and that prevents them from being labelled as a disadvantaged group. This adds some merit to the social equity dimension of this Image.

8.1.3.4 Rates of Change in Image III and Major Concerns to Achieve the Overall Sustainable Transport Objectives

Information Society gives a new interpretation of 'accessibility'. The telecommunication technology allows people to reach inaccessible or isolated services and goods immediately,

overcoming the conventional physical barrier of mobility needs. Naturally, in this Image, the effects of the policy package could only be observed after the widespread participation in of tele-activities has taken root in the society. Land-use planning and behavioural, educational/ training and cultural changes also need a longer time to have an impact on travel patterns. Therefore, the rate of change is slower in the short and medium terms as compared to that of Image I and Image II.

Information Society certainly provides a right direction towards sustainability. Nevertheless, due to the uncertain element of the novel path of Information Society, particularly the effects of travel stimulation, public acceptance of the image and the desire to meet other people face-to-face rather than using telecommunications, there are about other issues associated with this Image (These issues will be further investigated in Section 8.2). For instance, targets of modal split and road safety are regarded as on the right track but slightly lagging behind the full achievement of targets. These could be rectified, depending on the feedback, once the image is adopted and implemented.

The major flaw of this Image is its weakness in achieving the social equity objective within the study timeframe. The accessibility (either via telecommunications or via conventional physical movement) of the Image has its limitations because not every segment of society would benefit from it. If Image I is biased towards those who can and those who want to drive, Image III tends to be beneficial to those who have access to telecommunications technology and those who want to use it. The poor and information-illiterate groups who have been pushed to the margins of development are a matter for concern, as is the possibility of refusal by certain information-literate groups to change their lifestyle.

A huge gap between social structures based on the degree of information literacy, and there will be very little interaction between them, is a major concern in this Image. Indeed, because of the fragmentation of the overall city pattern, there may also be very little contact, even between the neighbourhoods of the same social class. Therefore the social cohesion objective cannot be fully achieved. There is a phenomenon of a very close neighbourly community, but it is socially divisive across the whole spectrum of society.

Formal education, training programmes and widely available Internet access in schools, libraries and community centres are very essential to reduce the information gap between higher and lower income groups. Then, it is hope that those who refuse to use the technology will become fewer in the future[81]. Persistent commitment over a long period of time is the key to overcome the social equity issue in this Image.

8.1.4 Conclusion - the Achievement of Targets and Objectives by the Three Images

Taking into account the views and concerns raised by local transport experts, the above discussions have assessed and compared the levels of achievement of the sustainable transport targets and objectives in all three Images respectively. A summary of these conclusions is presented in Table 8.4.

Image II, Extended Public Transportation, is apparently the most well rounded Image, although there are concerns about improving the accident rate, as well as the question of subsidisation in the long term. Although Image I, Foresight Vehicle, can achieve quick and quite straightforward solutions to environmental issues, it does have major flaws in the social equity dimension and the latent threat of increased traffic in the future.

Image III, Information Society, has great potential in its flexible lifestyle and new accessibility choices via electronic forms to achieve sustainability, but it also needs to consider concerns about social equity issues, as well as making every effort to curb the uncertain outcomes.

[81] A survey from the Oxford Internet Institute in the year 2003 concluded that the biggest difference between Internet users and non-users in the UK is age. Educational differences are less important. All youngsters, whether or not they are numerate or literate, appear able to use the Internet. Rose (2003) declared that more Britons will regularly use the Internet in a generations time.

Table 8.4 A Summary of the Achievements of Sustainable Transport Objectives by the Three Images of the Future

Bi-dimensional objectives of sustainable transport system in Kuala Lumpur	**Images of the Future**		
	Image I Foresight Vehicle	Image II Extended Public Transportation	Image III Information Society
Social Equity/Environmental • *Enhance Accessibility* • *Reduce Accident* • *Reduce Automobile Dependency* • *Increase Social Cohesion*	Able to improve accident situation but fails to achieve other aspects.	Able to make very positive changes in all aspects, but still need extra efforts to reduce accident rate.	Able to improve on all aspects, but the scale of change from present situation might not be as much as expected.
Economic Development/Environment • *Reduce Traffic Pollution* • *Reduce Congestion* • *Reduce Non-renewable Energy Consumption*	Able to achieve all the objectives.	Able to achieve all the objectives.	Able to improve on all aspects, but still need extra efforts to ensure that objectives of congestion and non-renewable energy consumption reductions could be fully achieved.
Economic Development/Social Equity • *Affordable Transport* • *Cost-effective Services* • *Support a Vibrant Economy* • *Accessibility by Public transport and Non-Motorised modes*	Able to support a vibrant economy and cover part of the 'affordable transport' objective, but fails to achieve others.	Able to achieve all the objectives, but some concern about achieving cost-effectiveness.	Able to provide transport system that is cost-effective and much accessibility by public transport and non-motorised modes, but unsure that a fully vibrant economy could be achieved. Needs enormous efforts to provide affordable transport for disadvantaged groups.

From the above discussion, it is also found that social equity objectives are much more difficult to achieve than the economic and environmental objectives in all Images. As a result of other changes to improve the environmental and economic aspects, there needs to be careful handling to soften the impacts on lower-income groups in a society. This is particularly important in the case of Kuala Lumpur, where social development urgently needs to be given a higher priority in the city's development agenda, at least according to the opinion of local transport experts and the researcher. Alongside every policy package, subsidies and spending (e.g. extra incentives), education (e.g. additional training programmes) and awareness campaigns should be allocated particularly for disadvantaged people in Kuala Lumpur. Social sustainability is not attained without a price, but it is

necessary in order to gain long-term benefits and overall comprehensive sustainability in a society.

All in all, the Images indicate alternative directions and opportunities for a sustainable future transport system, if their weaknesses could be tackled.

Although this is not the place to advocate any Image, it is interesting to know what local transport experts think about these Images. According to the survey's result, Image II is the one that is most desirable for the future for KL. This shows that local transport experts have a very good sense of how close the sustainability aims could come to be realised. However, all the transport experts think that no individual Image could develop without any intervention; the most likely Image to be expected in the future is Image I. This is not surprising, as Image I is the one that requires least change in people's present lifestyle, cultural beliefs and travel patterns. However, without clear vision, political will and proper planning, there is no chance that the present trend will achieve what is depicted in Image I, not to mention Image II or Image III, which require more dramatic changes at both strategic and grass-roots levels.

8.2 Important Insights to Increase the Chances of Successful Implementation – the Risks and Opportunities of the Images

A well thought-out strategy *does not guarantee* that it will be implemented (ECMT, 2002). Indeed, since the findings of the ECMT/OECD Strategy (1995), experiences from OECD countries have shown that the inherently multi-sectoral, integrated approach is certainly more easily discussed than implemented. Due to the complexities involved in actually implementing integrated policy strategies for sustainable travel, the implementation topic can be formidable, and sometimes it is not adequately considered when the strategies are defined.

The importance of strategy implementation in a policy study is gradually emphasised. Topics concerning barriers and issues of implementation, conditions for successful implementation

and implementation strategies have recently become integrated parts that are included in major transport policy studies at European level, for example DANTE (1997-1998), ECOCITY (2002-2004), EST (1994-2000), PROSPECTS (2000-2003), etc.

This point has also been raised by some of the local transport experts; they have required a discussion about Image implementation, they thought that it is an important element for consolidating the study. Besides identifying whose responsibility it is to initiate the change (which has been discussed in previous chapter), exploring the opportunities and risks of the Images will be a valuable resource for policy-makers.

Schwaab and Thielmann (2002) have stated that 'appropriateness, technical feasibility, financial feasibility, institutional feasibility and public acceptance' are important criteria for the successful implementation of policy measures. As other criteria have been discussed in other parts of the thesis[82], this section will focus on *technical feasibility* and *acceptance factors* to explore the opportunities exist in each Image and its policy package that are coherent with the Kuala Lumpur context. Technical feasibility and acceptance factors have been highlighted as key questions to be answered in the EST policy packages (OECD, 2002), and they are also worth discussing in this study too. Strategy decisions should also reflect risk and uncertainty (Dalal-Clayton and Bass, 2002), and these will be discussed from the perspective of the political risk (changes in government policy), risks in policy package implementation (contingency risk) and risk of rebound effect.

The discussions about these topics are intended to provide important and more detailed insights into the Images and policy packages at implementation level. The highlights of institutional requirements, opportunities and risks attached in each Image should prepare planners and policy-makers to think a step beyond the planning stage and decide how to materialise the Images realistically and increase the chance of successful operation at the implementation stage.

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[82] *Appropriateness* of transport policy has been considered in Chapter 7, when policy measures were packaged to suit the three Images for Kuala Lumpur. To a certain extent, *financial feasibility* of policy packages has been reflected in the discussion of 'cost-effective transport objective' in the previous section. The topic of *institutional feasibility* has been indirectly discussed in Section 9.1.

8.2.1 Implementation Opportunities – The Acceptance and Technical Feasibilities of Images

To initiate a change from the present situation, conditions of acceptance are very important for successful implementation. As discussed in the previous section, there are various stakeholders involved in each Image, and due to the conflict of interests, it is impossible to have unanimous agreement among the stakeholders to opt for any one Image. Nevertheless, as concluded from the previous section, political will (top-down) is the most influential factor to initiate the Image, and public involvement (bottom-up) is the most significant element to ensure that an Image will become well-established. Therefore, in this section, assessment of acceptance feasibility of the three Images is made by focusing on the rationales of political popularity and public acceptance.

In a developing nation like Malaysia, one realistic barrier to prevent an Image from being implemented is the technical difficulty. To adopt an Image, technological ability has to be assessed and relevant opportunities (e.g. present infrastructure) need to be explored and linked together. This assessment will seek the opportunity from the perspective of technological ability in Kuala Lumpur in consideration of its present development and potential.

8.2.1.1 Acceptance Feasibility

'Acceptance feasibility' evaluates the degree of acceptance when an Image is introduced in the real world, judging from the rationales of political popularity and public acceptance[83].

Image I will most probably gain the highest political support. The transport system is technologically driven and so it brings the image of glamour, prosperity and prestige to the

[83] Political popularity and public acceptance towards policy measures is also the first important question to be asked with regard to the EST's strategy (OECD, 2002). One of the EST team's conclusions about policy packaging concerns is about the acceptability of the strategies and their component instruments. It has been regarded as the most important challenge than the effectiveness of the instruments themselves.

city. To demonstrate that Kuala Lumpur has world-class status with an advanced transport system fits well with the ambition of Malaysia's enthusiastic, high-level politicians. Having opportunities to interact with global vehicle manufacturers for technological exchange and also to attract foreign investments also adds to the attractiveness of the Image. In addition, local vehicle manufacturers are not overlooked; rather, they have been given opportunities to explore new businesses and new markets. Politicians will be pleased with these features that could bring them more support from local business people. The general public should not have any problem in accepting the Image I either. Kuala Lumpur residents have shown unprecedented devotion to their private vehicles which convey the social status on them. Now the Image promises equal freedom and unrestricted accessibility as exist in the present scenario, but at the same time curbs the other transport problems (such as pollution, congestion and accidents). Therefore, it is reasonable to predict that the public will welcome the Image.

Image II will also receive political support but it may be with less enthusiasm than for Image I. The Image is in parallel with the recent efforts to establish the rail-based system in Kuala Lumpur, and so there is no conflict of policy messages and interests for politicians. The Image offers many attractive transport choices and only requires a limited amount of restrictions, which should be its strongest selling point for the public. The fact that this Image is also dealing well with resource distribution issues (social equity) could give politicians support from voters. However, there is always a risk of losing public support by diverging from people's present favourable transport modes. There will also be expected resistance from the local vehicle manufacturers and related businesses. Last but not least, the image of the city, although it is greener, it is much less glamorous than for Image I or Image III. As for the public, the same response may be expected from similar points of view. They will accept the Image very well from the point of view that public transportation has been upgraded to such an extent, with more choices of transport modes and a better environment. However, there will be inevitable resistance from the people who are more attached to their private vehicles. The Image also poses a risk of refusal from people who do not like the high-density living conditions and who perceive that their privacy may be intruded upon by such a

lifestyle (e.g. communal transport modes). Some preventative measures have to be taken to avoid and reduce the negative responses if the Image is to be adopted and implemented.

Image III, the Information Society needs the greatest commitment and political will to guide society down a different path to sustainability. But how shall the Image be received? Image III is the one that may make Kuala Lumpur decision-makers feel themselves to be in a dilemma. They will be very keen to adopt the changes brought about by the information technology (i.e. tele-lifestyle, tele-centres, tele-cottages, etc), very eager to explore the potential brought about by the Image and very enthusiastic about branding Kuala Lumpur as a sustainable and knowledge-based city. This part of the Image can be accepted very well as it does indeed correspond to the present MSC development as a result of the efforts from the highest governmental levels. Nevertheless, another central part of the Image, the strictest car restriction element of the three Images, will not be accepted easily. Politicians have to be reassured by other success stories before implementing these unpopular measures. Preventative strategies have to be arranged cautiously to ensure that there will be as little resistance as possible. Examples of these strategies include involving the public at a very early stage, implementing the measures gradually, having consistent policy messages, etc.

As for the general public, there will be a question mark over the acceptance level of Image III from the tele-lifestyle viewpoint and they will most likely reject the idea of car restriction measures in the Image. As there is not even one example to be shown of how transformation on such a scale could be a success, it is very difficult to judge the reactions of the public towards Information Society. The Image will greatly depend upon the success of the Behavioural and Cultural Change mechanism that is still not fully understood or used. Further research will have to be carried out for the purpose of filling these knowledge gaps at local level. One point worth noting is that whichever proposal for the cultural changes is adopted, it has to be harmonized with the local culture. For example, tele-village can be a perfect analogue of the *kampung* lifestyle and a sense of a close-knit community can be an analogue of the traditional *gotong-royong* atmosphere. To increase the possibility of public acceptance, Information Society has to be presented as a high-tech living style that perfectly suits the local environment.

8.2.1.2 Technical Feasibility

'Technical feasibility' evaluates the degree of difficulty in implementing an image in the real world from the perspective of technological ability.

Of the three Images, the Image of Foresight Vehicles is the most challenging in terms of technical feasibility. To materialise the Image, technologies of automation, fuel and telematics are three major areas that need to be tackled.

At present, the automobile and fuel technologies are mainly held by the major vehicle manufacturers, such as Honda, Toyota, GM, Chrysler, etc. Malaysia is still very backward and in a passive position (receiver) as regards these advanced technologies. Electric and gas-based transport modes were proposed in the Putrajaya Administrative Centre, but they have failed due to cost and technology constraints (AEC, 2003). Malaysia is simply lacking the necessary information and knowledge, including the technical data, design and applicability of these technologies. To initiate the Image, government has to play an active role in co-operating with global vehicle manufacturers for technology transfer purposes. One of the returns could be a large-scale pilot project as a test bed for them. Local R&D should be strongly encouraged and promoted to focus on these areas. Malaysian potential to move towards a gas-based transport technology lies in its 75 trillion cubic feet of natural gas reserves (EIA, 2003). Meanwhile, there are plenty of renewable resources such as solar energy and biomass. There is some local research going on about how to utilise renewable sources for transport purposes, but it is still in its infancy. Without far-sighted vision, comprehensive assistance and precise guidance, there is still a long way to go to overcome the technical difficulties.

Traffic management and roadside telematics are much less difficult to implement. The technology is mature and has been widely used in others countries. Indeed, features such as Real-Time Traffic Information have already been put into operation by Kuala Lumpur City

Hall. Extending the infrastructure to include parking, route guidance, driver information and safety/security systems is relatively easy.

Technical feasibility for Image II, the Extended Public Transportation, is the highest among the three Images. First of all, the massive rail-based system has been mostly laid down in Kuala Lumpur, overcoming the most difficult part of the technical problem. Then, technologies for CNG and electric buses are also very mature and readily available. Furthermore, the *Advanced Traveller Information System* should not have any problem in becoming established, considering that there are already technologies at hand such as smart cards, *Real Time Traffic Information*, mobile phones, etc. Indeed, Kuala Lumpur has just started to test the pilot project of 'Smart Taxipreneur', which involves 100 high-tech cabs equipped with GPS (global positioning system) receivers, web-based info-kiosks with smart-card terminals. They aim to beat the jams and arrive at pick-up points more quickly, provide access to information about attractions and events, and sell tickets, coupons and bookings, all from the comfort of the cab (The Star, 2004). Now it is just a matter of linking all the infrastructures and information into an integrated system, which is technically feasible.

Other measures in Image II do not involve many technical challenges and could be easily implemented.

The technical feasibility for Image III, the Information Society, is mid-way between Image I and Image II. It has more complicated technical issues than Image II, but they are less difficult to overcome than in Image I.

Unlike the automation and fuel technologies in Image I, information and communications is a general-purpose technology that applies across multiple development areas, in which most of the progress tends to involve relatively small amounts of material and resources, and therefore it is flourishing simultaneously at an unprecedentedly faster rate than ever before. In Malaysia's case, apart from the above factors, the technical feasibility is higher than for many other Asian countries because of the government's enormous efforts and enthusiastic commitment to this area. Frameworks for the Information Society are becoming established

at the moment. These include an ICT policy framework, IT Infrastructure, human resource development, e-government and public/private partnerships (Eighth Malaysia Plan, 2001-2005). According to a recent study carried out by UNDP, Malaysia holds most of the top positions for ICT indicators among Asian countries, showing its technical readiness to leap forward into the information age (UNDP, 2004).

In Image III, there is another aspect of Behavioural and Cultural Change that may need fresh efforts. Technically speaking, the soft approach of this social engineering method does not involve a 'high-tech' solution, but the complexity of the human behaviour mechanism is not easy to tackle. The difficulty comes from the gap in 'know-how' when pursuing sustainability via changes in social culture/ beliefs and individual behaviour. The OCED has started to look at these issues in its project *Individual Travel Behaviour (ITB) and Sustainable Consumption Patterns,* but knowledge about local and regional (Asian) or even developing countries in general is literally zero. If Image III is going to be implemented, Kuala Lumpur urgently needs to collect data, analyse the relevant information and generate workable strategies for this aspect.

8.2.2 Implementation Risk – Political Risk, Contingency Risk of Policy Package and Risk of Rebound Effect

For all the three Images in this future study, there are unavoidable risks of associated uncertainties at the implementation stage. This section will focus on four risk factors for each image:-

1. ***Political Risk***

   This refers to a risk that politics in Malaysia will develop in a way that makes it difficult for Images to be efficiently implemented. Political risks may be in many forms, for example, changes in government policy, economic instability, acts of terrorism, etc. We will only focus on the factor of 'changes in government policy' and will discuss the degree of political risk to which each image is exposed.

2. ***Contingency Risk of Policy Package***

This refers to the risk of not achieving the aims because one or more policies fail to be carried out. The risk exposure is high when the success of a policy package is highly reliant on policies that are contingent on each other, for example, the second policy depends on the first policy in order to be implemented.

3. ***Risk of Rebound Effect***

The risk of rebound effects occur when clean technologies create eco-efficiency gains but the gains are negated due to related increased consumption.

Besides these three types of risks, there is another risk associated with Images, i.e. the acceptance risk. This is the risk of not achieving the aims because people and stakeholders do not support the change and so try to find ways around it. Radical and unpopular policies tend to have a high acceptance risk at the implementation stage. This risk factor has been evaluated and discussed in the section 'acceptance feasibility' although from another angle of discussion. It is therefore not repeated here.

All the risks inherent in each image will be accordingly discussed below. Apart from these risks, however, it has to be noted that there are also other uncertainties attached to the Images, for example, whether institutional changes could be made to allow for the materialisation of Images, resource availability, sequence of changes according to the proposed time-scale, the feasibility for marketing hydrogen technology (for Image I), etc. These uncertainties are beyond the discussion of the thesis, but they should not be taken lightly in the real world.

IMAGE I

Image I is constructed under the external element of globalisation, in which the Image is hugely dependent on the development of global technological and economical trends. Multi-national corporations, in this case the global vehicle manufacturers, are the main players responsible for the materialisation of the Image I because they are the ones who control the

cost and technologies of the advanced vehicles. Widespread availability and affordability of these advanced vehicles could be achieved with little interference from government, and local people would have no hesitation in joining the trend towards advanced vehicles if the prices suited them. In other words, this is the Image that was least influenced by Malaysian government policy. Therefore it has very low political risk since changes in government policy have little influence on the Image.

On the other hand, it is also implies that the Kuala Lumpur government has limited control over the whole Image. Even though it could interfere in the market by kick-starting the use of such vehicles, there are only certain efforts and subsidies that they can afford. If technology prices are not reduced as planned, the cost factor will seriously jeopardize the Image. This has posed a different type of risk, the contingency risk, for the Image. Without the presence of advanced technology at affordable price, other policy measures will have negligible effects on overall sustainability aims. As these technologies are not even at hand locally, Kuala Lumpur needs global technical and financial aid and also advanced memoranda from foreign vehicle manufacturers about the agreements for the long-term technology transfer terms. Judging from present global car manufacturers' research and development, there is an inevitable change of direction towards the advanced car of the future, but whether it is at a marketable cost is another matter. Therefore the Image is regarded as being exposed to medium contingency risk.

The highest risk inherent in Image I is the rebound effect. As mentioned in several sections in this thesis, there is high uncertainty about the latent risk of ever-growing traffic that could offset the net effect brought about by technological improvements. If the effect does not occur in the study time-frame, the threat and risk to the Image will remain far into the future. To reduce the risk of rebound effects, the Image requires modified pricing structures to embody environmental and social externalities, which have been suggested as part of the policy package.

IMAGE II

Image II has been constructed against the background of the external elements of 'nationalisation' (select and pick) economy trends. In this Image, government plays a relatively important role in interfering in the market and ensuring that the public transport system has to be the prominent mode rather than the private one. The beneficial side of this Image is that it is most under the control of the transport sector of the Kuala Lumpur authority, as the suggested components are least influenced by foreign technologies, nor does it need to depend upon major social changes. It is really heavily reliant upon government initiatives to attract public to use communal modes. Nevertheless, at the same time, if government decides to change the policy direction, then the Image will in some way be affected by this political risk. Having said that, judging from the historical facts and the present work in Kuala Lumpur, the risk of changing policy should not be high. There are current efforts that are in parallel with the major elements of the Image, such as the rail-based public transport system; therefore conflict of policy message is reduced and the risk of contradictory interest is also low. This will enhance the workable probability of the Image. Therefore, even though government policy has a huge influence on decisions about the materialisation of the Image, it is sensible to consider that there is medium political risk for this Extended Public Transportation Image.

Extended Public Transport Image has a very low contingency risk. The policy package consists of policy measures that are barely contingent upon each other. The core ideas of the Image, i.e. rail, bus, vehicle club and non-motorised modes, could continue independently. This also applies to the two main supporting elements, i.e. 'Advanced Traveller Information System' and 'promotion of sustainable lifestyle', which could always be flexibly added on or taken out. The only risk might be the close relationship between land-use planning and the successful implementation of a public transport system. A change in the present dispersed nature of land use is needed to ensure that the public transport system could be efficiently developed.

Image II carries the lowest risk of rebound effect. There is no diverse trend of sustainability or negative effects from increased usage of public transport. If Image II were to be successfully implemented, the sustainability aims would come closer to being achieved in the future without any latent risk of the rebound effect. There is little doubt that a transport system that emphasises communal modes is on the right path to sustainability from this perspective.

IMAGE III

Generally, Image III has the highest level of uncertainty compared to the others.

First of all, the nature of the Image is one that is most beyond the control of the transport sector. The fact that the transport scenario is a subset of general social transformation from information technologies and Behavioural and Cultural Changes has placed the Image in a relatively weak position, as there is little the transport sector itself could do to take on a pro-active role to ensure the materialisation of the Image. The Image is highly dependent on government policy to act as a guide towards a sea change to a knowledge-based industry and e-lifestyle. In a developed country such as the UK or US, the prominent trends of e-commerce and ICT technology have not waited for government intervention to make progress, but the case is quite different in a developing country, such as Malaysia. Without a strong and helpful beginning, there is little chance that the country will leap into the information age. Therefore, a change of government policy from an enthusiastic state to an indifferent phase will create very high political risks for Image III.

A similar argument has exposed Image III to a high risk of contingency. Indeed, Image III has the highest contingency risk among the three Images; the policy measures are all very vulnerable to individual implementation. The Information Society has first to exist before behavioural and cultural changes can be used to shift people's attentions towards e-activities and e-lifestyles. The same principle applies to car restriction measures, in which the strictest

policies may not succeed without the choice of flexible lifestyles offered by Information Society. Again, without the support of other policies, it is very unlikely that Information Society will achieve sustainability. Studies have shown there is no evidence to prove that a significant reduction in physical travel resulted from implementation of information technology; this is because either the effect is negligible, or the effects have been offset by its travel stimulation.

Travel stimulation due to more leisure time, more interactions and network connections via e-mail and mobile phones, more desire to see other parts of the world as a result of looking at websites is another type of rebound effect from the Information Society. The researcher realises the associated risk and has proposed a reduction in the risk by imposing radical pricing and car restriction measures. Therefore, it is fair to say that the risk exposure from rebound effects is rated as medium.

In short, Image III has the highest risk factor and lowest confidence level. However, the potential of this Image to achieve absolute sustainability is also the highest one, if all the risk factors could be overcome successfully. Therefore, even though there is such a high risk, this Image is a very attractive option that should not be discarded straight away. Furthermore, the information and communications technologies are developing so quickly in Malaysia (Kuala Lumpur particularly) it will be a waste to miss this great opportunity to leap into a sustainable information society.

8.2.3 Conclusions about Opportunities and Risk of Images

Discussions of the opportunities and risks inherent in each Image at the implementation stage are summarised in Table 8.5 on next page.

Table 8.5 Summary of Opportunities and Risks of Images at the Implementation Stage

Opportunities & Risks of Images	Image I	Image II	Image III	
Opportunities				
Acceptance Feasibility -politically popular -public acceptance	 Very Positive Very Positive	 Positive Positive	*ICT* Very Positive Not Sure	*Car Restriction* Least Positive Least Positive
Technical Feasibility	Least Positive	Very Positive	Positive	
Risk Factors				
Political Risk	Low	Medium	High	
Contingency Risk	Medium	Low	High	
Risk of Rebound Effect	High	Low	Medium	

Image I has the greatest strength judged from the perspective of political popularity and general public acceptance, but it has the highest degree of technical difficulty to overcome (which is also associated with high cost of implementation). It also has the highest risk of 'rebound effect': carefully adjusting pricing structure would be one way to reduce the rebound effect for Image I, but then this may jeopardize a certain degree of acceptance of the Image.

Image II may be accepted well but its middle-path characteristic (moderate progress in technology, moderate changes in traveller behaviour, moderate economic growth, etc.) makes it less exciting and hence it may be less enthusiastically received than Image I. The advantage of it is that the Image has a relatively low risk exposure if compared to Images I and III.

Lastly, Image III is the one about which it is very difficult to draw conclusions. The car restriction elements receive the least acceptance, but the element of information technology should be politically popular and certainly may receive the same enthusiastic response as for Image I, but this may not be true from the viewpoint of the general public. Image III has a very high-risk exposure, mainly due to many uncertain factors intrinsically associated with the Image. The Information Society Image may be more certain and under control if those uncertainties were tackled accordingly, for example, obtaining support and commitment from

other sectors beyond the transport field; gaining more understanding about how the mechanism of behavioural and cultural change works, etc.

To reduce the risks and increase the level of acceptance of the policy package, the challenge is to *phase arrangements* and *carefully monitor the effects* of policy measures. As all the EST team (OECD, 2002) agreed, phasing arrangements allows progression to be made from the familiar to the unfamiliar, and from a low level of effectiveness to a much higher level of effectiveness. The sequencing of implementation, careful monitoring and appropriate adjustment of the vigour of policy package implementation will allow more stringent, unpopular or uncertain policy measures to be adopted by society more confidently.

Realizing that there is a gap between policy recommendations and their implementation, the above discussion of opportunities and risks is intended to provide more insight about the Images' implementation for decision-makers. As mentioned in Section 3.1, Chapter 3, scenario building is a method that has its key function in the '*imagining alternatives*' phase; it has to be noted that to comprehensively evaluate and assess the policy packages for the implementation phase in particular, there is a need to adopt other analytical tools (see Table 3.1, Chapter 3). For example, risk assessment or cost-benefit analysis or other similar decision-making tools should be used for the purpose. This subject will be given further consideration in the future research agenda, Section 9.4.2, Chapter 9.

At the implementation level, the Images and policy packages are also supposed to be used flexibly and should not be 'locked' into only one option. Decision-makers should be able to switch the option from one to the other whenever the social, economic and political circumstances in Malaysia and Kuala Lumpur change. Therefore, it is in the interests of decision-makers to comprehend the comprehensive risk analysis and the sequencing implementation of policy packages for Images, so that they may take advantage of them whenever a suitable situation occurs.

8.3 The Basic Conditions and Common Measures

8.3.1 Recommendations for Basic Conditions for the Sustainable Transport to Take Place in Kuala Lumpur.

The study has so far presented the alternative futures and revealed their differences in their levels of achievement of sustainability. At the implementation stage, the study has also discussed the responsibility of stakeholders and institutions as regards progress towards sustainable transport and the opportunities and risks of the Images. It is very clear that the future of the transport system in Kuala Lumpur can certainly be influenced, and the message is very clear that none of the Images can happen if efforts are not started now.

To achieve sustainable transport in Kuala Lumpur, it is imperative that both vision and Images are required to recognise the ramifications and with those, to intervene actively in shaping our future, and finally to give politics a future orientation. The present Kuala Lumpur transport system and policy indicate that they are apparently falling behind in the current global pursuit of sustainability for humanity. To enable any change to occur, the researcher has identified five basic conditions that have to be met in Kuala Lumpur. These conditions are necessary to provide the fundamental move towards sustainable transport. They have been mentioned in various sections in this thesis, but it is necessary to pull them together and highlight them again here to give the decision-makers a clear direction for the first move.

Table 8.6 Five Basic Conditions for a First Step towards Sustainable Transport in Kuala Lumpur

Establish the Vision of Sustainable Transport
Integrate Planning Strategies to link Multiple Dimensions
Adopt Visionary and Holistic Approaches
Assimilate Policy Messages of Sustainable Transport
Encourage Public Awareness & Involvement in Sustainable Transport

First condition: The need to have a vision of sustainable transport.

The Malaysian government and Kuala Lumpur authorities need to have clear long-term transport strategies linked to sustainability benefits, i.e. sustainable transport vision and targets have to be set. The vision needs to encompass the entire set of transport objectives for the environmental, economic and social dimensions and to apply them appropriately in the local environment. The long-term goals of sustainable development and sustainable transport that are defined in this study (see Chapter 4) are an example of such vision.

Second condition: The need to have the integrated planning that links transport with all three environmental/social/economic dimensions.

A paradigm shift to integrate multidisciplinary dimensions to look at sustainable transport issues from different angles and to provide different solutions is needed. The integration should refer to all fields of research and study, institutional structures as well as decision-making in transport policy[84]. The minimum effort should at least come from the Kuala Lumpur local authority, which urgently needs to widen the scope of transport planning from the traditional perspective of focusing solely on congestion issues. Broader social equity, environmental, economic and institutional issues should be taken into account in formulating policy measures (as discussed in Chapter 2). Related to this, it needs urgent action to make changes in present institutional structures (as suggested in Section 7.8, Chapter 7)

Third condition: The need to adopt a new visionary scenario approach.

Considering that the conventional extrapolative forecast method is unable to capture the complexity and uncertainty inherent in achieving a sustainable transport system in Kuala Lumpur, there is a need to adopt the method of a visionary scenario approach at the higher levels of the policy formulation process. Environmental/economic/social impacts of transportation-related decisions could be anticipated by adopting these far-sighted and long-

[84] In achieving sustainable transport, integration issues in policy, research and institutional structure have also been repeatedly emphasised in other advanced parts of the world, such as the ECMT-OECD project and European Transport White Paper. If compared to these advanced countries, the integration issue seriously lacks emphases in Malaysia and Kuala Lumpur, and the Kuala Lumpur authority has made very little effort to improve the present sectorally defined issues and institutionally defined policies.

term scenarios rather than the conventional extrapolative forecast method. The scenario approach helps to provide a useful alternative to those already available.

Fourth condition: The need to send the right policy message of sustainable transport to every level of society.

Clear sustainable transport policy messages need to be disseminated to the private sector and the general public so that they can be very certain about the government's long-term intentions regarding mode choice, gas-based fuels or any other relevant policy. Transport industries, such as vehicle manufacturers, public transport operators and land-use regulators especially, need to have very clear and consistent policy messages in order to work together towards sustainable transport.

Fifth condition: The need to promote public awareness and encourage public involvement in pursuing sustainable transport.

Public awareness of their unsustainable travel behaviour is very poor at the present. All individuals and communities have to be aware of their rights to the transport system in Kuala Lumpur, as well as their responsibilities to act as stewards of the environment. The public has to be given adequate and appropriate resources and information about the sustainable transport issues involved, and the positive development and negative impacts due to their choice of transport modes, chosen lifestyle and travel behaviour, etc. Communities have to be informed, citizens have to be involved and the future must be an informed transportation decision. This is important for the sustainable transport system to be accepted easily, to face fewer restraints and to have more chances of success. Children could be educated about the concept of sustainability (with transport as the main component). Basic understanding, knowledge and awareness about sustainable transport could be cultivated at a young age via the new syllabus in the formal education system.

The five conditions above should form the most basic steps towards sustainable transport in Kuala Lumpur. These foundations are also needed to act as the basis of any Image for sustainable transport to take place in Kuala Lumpur. Put in other words, even if none of the Images formulated in this study happens, any move towards these conditions could be regarded as an improvement on the present unsustainable situation.

8.3.2 Recommendations about the Common Transport Measures

In this last section of the discussion chapter, corresponding to the above basic conditions, the researcher believes that it is useful to highlight the common transport measures for Kuala Lumpur.

The search for common transport measures has been one of the researcher's focuses from the outset of this study. However, as the research continued, it became clear that a combination of measures is the most efficient means of bridging the gap between the present and an intended Image, as presented in Chapter 7. Having said that, in the world where many decisions are made beyond the control of the transport field, it may not be possible for the ideal approaches and means to be adopted. Therefore it is necessary to draw conclusions about some common transport measures as a guideline for policy decision-makers in Kuala Lumpur, regardless of which Image is adopted in the future. Together with the basic conditions (Section 8.3.1), these common policy measures are also a part of the answer to the question posed by many local transport experts, 'What if none of the Images happen?'

As shown in Table 8.7, the researcher has recommended four categories of common policy measures according to their implementation feasibility and the extent of impact. These common measures have existed in every Image, although each measure has varied emphases in different the Images.

Table 8.7 Suggestions for Common Policy Measures in Kuala Lumpur

Implementation	Impacts	Common Policy Measures	Category
Relatively easy to implement due to low cost, technical feasibility and greatest acceptance.	Immediate and significant effect on sustainable transport	• Promote non-motorised modes, i.e. pedestrian and cycling • Promote buses to increase the degree of integration in present system • Lowest cost measures including Transport Demand Management (TDM)	A
	Relatively slow but progressive effect on sustainable transport in the long term	• Integrate land-use planning and transport policy • Work on public awareness and education about the topic of sustainable transport • Encourage new and creative ideas about other means of travel choices: company/community travel plans, vehicle clubs, etc. • Research & Development in various aspects of sustainable transport	B
Relatively difficult to implement due to factors such as higher cost, technically more complicated or probably less acceptable	Immediate and dramatic effect on sustainable transport	• Private vehicle restriction scheme • Pricing mechanism e.g. congestion charge, taxation, etc. • Tightening the regulations & enhancing the enforcements, e.g. change emission standards to EURO3/EURO4.	C
	Relatively slow but progressive effect on sustainable transport in the long term	• Changing the design of car: smaller, lighter, safer and more environmentally friendly. • Climbing the ladder of fuel technology (i.e. from petrol to gas-based, then to electric-based and finally to the fuel-cell vehicles) • Huge investment in public transport • ICT to replace physical travel • Reverse people's perception of private vehicles and public transport	D

Category A refers to those relatively easy and quick solutions and could have immediate significant impact on improvement in the present transport system, i.e. encouraging pedestrians and cyclists, extending the affordable and high-quality bus services and implementing the least costly TDM. Implementing these measures would significantly improve the accessibility and quality of life, especially for lower income people, the elderly, women and children. Least costly TDM such as traffic-calming, pedestrianisation and parking management could all relieve the issues of congestion, accidents and air pollution to a certain degree very quickly.

Category B refers to those also relatively easy solutions but which are slower and have progressive impacts in the long term, such as land-use planning, awareness campaigns, R&D and encouraging various new businesses concerned with alternative travel means. These measures need consistent implementation over a long period of time and changes would be seen only gradually, but once an impact takes effect (e.g. public transport-oriented land-use patterns), it would have a more permanent and intense effect on sustainability via changes in passengers' travel behaviour towards the use of more sustainable transport modes.

Category C refers to those which are relatively difficult to implement but which could have immediate and dramatic impact, such as pricing mechanisms, vehicle restriction, regulation and enforcement. Congestion and air pollution could very dramatically improve via these measures in a short time. The modal split in implemented areas would see a change towards a more balanced pattern.

Lastly, Category D is those measures which are also relatively difficult to implement are relatively slower but have a progressively greater impact in the longer term, such as vehicle and fuel technologies, ICT and campaigns to change people's perception of private/public modes. These measures need long-term strategies to keep track of their effect on sustainability. In cases like vehicle/ fuel technologies and ICT, there need to be on-going efforts to update the technologies from time to time. As they are all costly and to a certain extent conflicting with each other, there is a need to sort out which long-term policy direction should be followed. It is quite impossible to have equal emphases concurrently on all measures in this category.

Ideally, the four categories of common policy measures will have a long-term and profound effect on Kuala Lumpur's sustainable transport system if they could be implemented together. As measures in Categories B and D need a long time for the effects on sustainable transport to be seen, they should begin as early as possible. Measures in Categories A and C could have immediate and significant effects on diverting the present unsustainable trend. When issues of congestion or air pollution need immediate action, measures in Category C will cause more dramatic improvements than Category A. However, when circumstances do

not allow either due to cost factors, technical difficulty or rejection by the public, the Kuala Lumpur authorities could at least adopt the measures in Categories A and B. These are the most necessary moves that Kuala Lumpur should adopt and could easily work on as a step towards achieving sustainable transport in the city. Whatever future evolves, it is important to implement these measures. But to achieve further progress towards sustainable transport, tougher decisions (C and D) have to be made, and there is no easy way out of the present unsustainable trend.

It should be emphasised again that a well-studied policy package is the most efficient way to work towards sustainable transport (as in Chapter 7). The common measures proposed here should be treated as basic and necessary key guidelines to support the implementation of a package of policy measures.

8.4 The Assessment of Local Transport Experts in the Study

After being involved in the whole process of the study, local transport experts were finally asked to evaluate the overall project from the perspective of its usefulness, appropriateness and the potential for implementation in Kuala Lumpur

Generally, local transport experts thought that the backcasting scenario methodology had provided a flexible solution in a complex, uncertain and quickly changing environment. Quoting the local transport experts' comments, its application to finding a future sustainable transport system in Kuala Lumpur is *'useful, innovative, an eye-opener, more focus and on the right track and provide new insights for transport policy making'*.

Compared to the conventional forecasting methodology, the backcasting scenario tool has been commended for its significant contribution in *'providing an overview picture of transport system, ability to bring together various variables in discussion, providing distinctive comparisons of scenarios and policy packages'*. Also, a respondent pointed out

that *'forecasting is expensive and time-consuming because it relies heavily on the good data collected from expensive survey. In practice, backcasting would be very useful even just judged in the economical sense'.* It is definitely a *'practical and valuable application'* to see the future transport system of Kuala Lumpur.

Nevertheless, there were also a few concerns about the tools and some questions were raised by local transport experts. Firstly, they asked for more evidence about supporting the usage of backcasting in relation to transportation planning in other countries and their success stories. Few respondents raised the issue of *'backcasting is not a commonly adopted approach and lacks analytical evaluations'*. Also, they required *'more relevance statistically for each Image instead of just "wish list"'*.

In addition, there are still some causes for concern about the study that nearly all the respondents asked about:

- What will we do when none of the Images happens?
- Can we look for a one-size-fits-all policy package?

There is no such thing as a one-size-fits-all policy package, but recommendations about basic conditions and common measures have been made to answer these questions posed by the local transport experts. These have been discussed and addressed in this chapter.

Finally, all respondents thought that this piece of work could make a very significant contribution towards sustainable transportation planning in Kuala Lumpur in terms of understanding problems and possible future Images.

Table 8.8 on the next page summarises the important modifications adopted in this chapter as a result of local transport experts' views.

Table 8.8 Important Modifications Adopted at Chapter 8 in this Thesis as a Result of Local Transport Experts' Views

Topics/Concerns/Views Raised by Local Transport Experts (LTEs) (Unexpected Results in Particular)	Result/Modifications Output as a Result of Their Views	Relevant Sections and Chapters
LTEs were optimistic that just by setting targets and putting policy packages together, i.e. paying attention to the transport issues in an integrated manner, many basic steps could be taken immediately.	The researcher has accepted this view and adjusted to a faster rate of change for achievement of targets in all Images, particularly in the short-term.	Sections 8.1.1.1, 8.1.2.1 and 8.1.3.1, Chapter 8.
LTEs were very optimistic about technological improvement (AT, ATT or ICT) to achieve sustainable transport objectives.	Reflected in achievement targets to reduce accidents and air pollution in Image I.	Section 8.1.1, Chapter 8.
LTEs think that the implication of information gap and therefore social inequality should be highlighted in Image III.	Reflected in the achievement of (social/economic) target in Image III.	Section 8.1.3, Chapter 8.
LTEs would like to compare the pros and cons of each package when they are implemented in Kuala Lumpur	Discussion of topics of overall achievement of objectives, opportunities and risks for three packages at implementation level.	Sections 8.1.4 and 8.2 Chapter 8
Search for one-size-fits-all policy package.	Proposal of common measures for sustainable transport in Kuala Lumpur.	Section 8.3.2, Chapter 8.

8.5 Conclusion of the Chapter

The study has provided a useful analytical framework of scenario backcasting to explore alternative futures for Kuala Lumpur's sustainable transport system. As an outcome of the method, the three Images and associated policy packages that allow structured discussions with local transport experts have been produced. The important topics, from conceptual ideas to the implementation stage of an alternative future, have been systematically discussed in this chapter. They include a wide variety of future transport issues, opportunities, implementation barriers and risks, organisation and institutional changes, etc. Valuable contributions from local transport experts based on their experience in Kuala Lumpur were taken into account in the discussion.

Sustainable transport in Kuala Lumpur is achievable, and there are various ways to attain it. The three Images proposed in the study are examples of alternatives. It has to be emphasised that particular transport issues in Kuala Lumpur, exceptional opportunities and the unique characteristic of its people and society all provide a great chance to make an enormous improvement to the present situation.

Transport issues in Kuala Lumpur are serious, and the level of seriousness should be sufficient to justify an urgent call for changes. However, the issues are *fortunately* not unsolvable. Quite the contrary, many issues in Kuala Lumpur could be improved very quickly, significantly and easily as there are so many basic steps which Kuala Lumpur has not as yet adopted. For example, there is no child-seat and test-and-maintenance regulations for passenger vehicles (safety issue); planning and regulations for pedestrian ways, cycle paths and public transportation are below standard (safety, congestion, social equity issues); emission regulations are much less stricter than for many countries in the similar development range (air pollution issue); enforcements do not work as well as they should (all issues), etc.

On the other hand, the Malaysian government has put enormous efforts into improving the quality of life of its people. These especially focus on the infrastructures of the capital city, Kuala Lumpur. Recent projects such as the modern rail-based system, Multi-media Super Corridor, Intelligent City-Cyberjaya, the newly set-up Intelligent Transport System and Traffic Control Room in Kuala Lumpur City Hall are all good resources and valuable assets to be further explored in order to integrate them with other policy measures to achieve maximum synergetic effects. The abundant natural resources of natural gas, solar energy and biomass are readily available to enable the country to diversify the non-renewable energy uses for the transport system. What is lacking at present is that these assets, resources and infrastructures have not been put together for good use or, in other words, there is a lack of vision about how to exploit these opportunities.

The study takes a big leap towards more significant changes and improvements, and imagines the sustainable future over a longer time-frame. It emphasises that the unsustainable transport issues could be resolved by unchaining the links between issues, by rectifying the weak organisational and institutional structure, by setting a clear vision, by fully utilising existing infrastructure, by strictly pursuing the paths towards objectives (and targets) and by exploring the opportunities from external forces rather than being influenced by them as in the past. The three Images presented in the study should widen the perceptions for high-level policy-makers so that they could at least consider alternative policy options for Kuala Lumpur on a long-term basis.

In addition, at the grass-root level Kuala Lumpur's citizens (or Malaysians in general) have tremendously positive attitudes towards change and are extremely fond of accepting new technologies. They are also in a way very obedient (either patriotic or loyal) to authority. In general, Asian society is less individualistic than the West. These unique characteristics could be used by policy-makers to successfully initiate *'top-down'* changes in the transport system. For example, to introduce Behavioural and Cultural Change strategies, including a change towards sustainable lifestyles, the promotion of the flexible working, the implementation of stricter pricing regulations, etc.

Images of the Future presented in this study do not promise magic solutions to provide sustainable transport in Kuala Lumpur. Indeed, in this chapter realistic barriers, risks and uncertainty in the Images have been highlighted at the implementation stage. However, with the opportunities the city possesses, Kuala Lumpur still stands a good chance of moving ahead towards a sustainable transport path. Changes have to start now: clear, long-term transport strategies linked to sustainability benefits, i.e. sustainable transport vision and targets, have to be established; a trend-breaking new approach (e.g. scenario backcasting) for formulating the paths towards the vision has to be adopted; the right signs have to be given to various stakeholders. At the very least, the Malaysian and Kuala Lumpur government should adopt the basic conditions and common measures that proposed in this chapter.

CHAPTER NINE
CONCLUSION

9.1 Concluding Remarks: Major Findings and the Significance of the Results in Achieving Research Objectives

This thesis is about future transportation policy in Kuala Lumpur. The main objective of this research is to find locally appropriate, long-term, sustainable transport policies for Kuala Lumpur. Corresponding to the original research objectives, the major findings of the study could be summarised in three parts: background study of urban transport trends and issues; backcasting scenario methodology; and analysis and recommendations at the implementation level.

9.1.1 Confirming the Unsustainable Transport Trends and Issues in Kuala Lumpur

This study has analysed the present trend of the transport system in Kuala Lumpur and examined its transport issues (in Chapter 2). Kuala Lumpur has experienced an unprecedentedly fast growth of private vehicle ownership and usage, and this auto-driven trend has caused concern about issues such as local pollution, congestion and accidents. Judging from the definition of sustainable transport in this study, the research has confirmed that these unsustainable transport issues exist in the city. Beside these prevalent problems, the study also reveals that the present transport trends have been unjustly biased against lower-income groups, who have to pay a very high price for their mobility needs; they are the main victims of the above transport issues, and at the same time they are also major contributors to the problems. Institutional problems such as lack of vision, unclear transport objectives, conflicting policy measures and rigid and outdated transportation planning processes are widening the extent of unsustainability, or are part of the problem.

It is obvious that the unsustainable transport issues have adverse impacts on all social, economic and environmental dimensions in Kuala Lumpur, and that has never been examined from such multiple perspectives until this study. The complexity and interrelated unsustainable transport issues and trends need a comprehensive approach to put a stop to the present vicious circle. This has induced the need to adopt scenario backcasting methodology for a sustainable transport system in Kuala Lumpur.

9.1.2 Developing a Framework of Backcasting Scenario Methodology for a Sustainable Transport System in Kuala Lumpur

The study has developed a framework to gear Kuala Lumpur towards a sustainable transport system, via backcasting scenario methodology. This is the synthesis part of the study in which the framework has referred to the formulation of Sustainable Transport Aims and Targets (in Chapters 4 and 5), Images of the Future (in Chapter 6) and Policy Packages (in Chapter 7). These four chapters are the central ideas of the thesis which have demonstrated how the new method could be applied in Kuala Lumpur to lead its transport system towards sustainability.

Sustainable Transport Goals and Targets

This section looked at the focus of a sustainable transport system in Kuala Lumpur. The central issues of the section are: what do we want to achieve from a so-called sustainable transport system? How do we measure it?

The search started by looking for an appropriate sustainable development concept for Kuala Lumpur. The conclusion drawn from this search is that it is characterised by modified growth, is techno-centric, and concerns contemporary poor people, ecosystem value and future generations. It has to cover the three dimensions of social, economic and environmental aspects with the final aim of reaching comprehensive sustainability.

The Foresight Vehicles Image emphasises the contributions of technological improvements to automation, fuels, vehicles and roadside telematics to achieve sustainability. This will happen in an Industrial Economic Environment, and the Image requires enormous enthusiasm and effort to be directed towards implementing techno-solutions and the most efficient road management. Advanced private vehicles are prevalent in the Kuala Lumpur transport system in this Image, as in the present situation. Travel patterns are not expected to change much at all.

The Extended Public Transportation Image represents another alternative sustainable transport system for Kuala Lumpur in a Transitional Economic Environment. The Image requires the firmest determination and unreserved commitment to change the present trend into a system of communal modes of transport. Every effort has to be made to make Kuala Lumpur's public transportation system a seamless network in terms of accessibility. Technology and telecommunications are helping to shape the Image in which their application is focused on every form of public transport and passenger information system. Culture, behaviour and travel patterns of people in Kuala Lumpur are required to change significantly.

The Information Society Image explores the potential and opportunities for a knowledge-based environment to achieve sustainability in transport terms. With the background of a Knowledge Economic Environment, the future of Kuala Lumpur is transformed into an e-lifestyle, in which most everyday activities could be accessed, conducted and carried on via on-line and broadband facilities. To achieve sustainability, it is the flexibility and extra choice of the new accessibility provided by information technology upon which this Image depends. The Image requires a dramatic change in people's perception of the transport system; a sea change from an individualistic society into a collection of many close-knit community units, and a sense of toleration towards the strictest measures for the sake of social and environmental goals.

Policy Packages

The framework of scenario backcasting continues in Chapter 6 where it sets up the process of packaging policy measures for the Images (see Chapter 7). The results are the proposed policy packages for each Image, presented as a clear description of the policy measures and their characteristics respectively.

These policy packages have been further analysed in terms of immediate, intermediate and long-term steps. The proposed step-by-step introduction and implementation of policy measures gives a realistic picture of how to bridge the present and the future. The step-by-step policy packages provide a sense of *workable* measures in one Image and avoid an overwhelming negative feeling towards the whole package; more importantly, they also allow deeper and more detailed analysis of how the relationships occur among policy measures at different stages. The key feature is to arrange the policy measures in a logical and sequencing manner to build up the interaction between them.

The study has thus demonstrated how a transport system could become sustainable via different paths and by what means an Image could achieve sustainability. Chapter 7 also highlights the urgent need for institution changes for achieving sustainable transport and discusses the major stakeholders' responsibilities for initiating and establishing each Image.

9.1.3 Discussion at the Implementation Stage and Recommendations for the Basic Conditions and Common Measures

Closely following the development of steps in a policy package, the achievement of policy targets in an Image has been assessed relatively against the implementation timescales. In Chapter 8, the study has highlighted how differently the three Images may be achieved in the targets and also the broader sense of sustainable transport aims, the strengths and weaknesses

at the implementation level. Having understood all the differences, the study turns to look for the basic conditions and common measures for all Images, whichever is adopted in the future holds. Section 8.3 has drawn together these recommendations for a more sustainable transport system in Kuala Lumpur; this should be a minimum guide to start steering the city in the direction of sustainability, even if none of the Images synthesized in this study is adopted for Kuala Lumpur in the future

Conclusion

The study has hence developed an understanding of the current transport situation and the future vision for Kuala Lumpur; developed a framework of a scenario approach to transport policy-making; proposed and validated the targets, future Images and the sustainable transport policy packages; analysed the strengths and weaknesses of Images at the implementation stages and identified the basic conditions and common sustainable transport policy measures for Kuala Lumpur. Therefore the study has concluded that it has significantly achieved the research objectives (set out in Section 1.4 in Chapter 1).

As one of the conclusions in Chapter 8 states, it is imperative that the current transport issues should be dealt with swiftly. In this last chapter, it has to be stressed again that the seriousness of the issues and the worsening unsustainability trends are such that urgent change should take place immediately. Immediate changes should include setting up a sustainable transport vision, employing a new trend-breaking method to make robust strategic choices, rearranging (and adding to) the weak structure of organisations and institutions, proactively progressing towards sustainability rather than being influenced by external factors.

The study certainly cannot provide the last word on sustainable transport in Kuala Lumpur. Indeed, it is the author's hope that this scenario planning study could stimulate discussions and (it is hoped) action towards the understanding and adoption of the concept of sustainable

transport in Kuala Lumpur and the application of backcasting scenario in the sustainable urban planning field.

9.2 Contributions of this Thesis

As mentioned before, Kuala Lumpur is facing critical, unsustainable, urban transport issues, yet the city seriously lags behind in pursuing the sustainable transport agenda: there is, therefore, an urgent need to have this research carried out. The study contributes to the sustainable urban transport field in seven ways:

An Innovative Alternative Method for Urban Transport System in Kuala Lumpur

The backcasting scenario is a relatively new method in the transport planning field. The study has proved that this innovative method may also be successfully applied at the city level. It provides an alternative means to promote an integrated perspective on the sustainable future, and inspire creative and coherent solutions. The application of backcasting scenario building in Kuala Lumpur is useful to inspire new ideas; as one of the comments put forward by local transport experts stated that it could, '*provide new insights for transport policy making*'. Apart from that, the application of this method to a city should be beneficial to other urban transport studies. This particularly refers to the analytical framework of methodology that is presented in this study. Cities in developing countries that face similar unsustainable transport issues should benefit the most from this exercise.

An Example of a Holistic Approach to Urban Transport Study

The study has adopted a holistic approach to view urban transport issues that in some way are connected to each other. This approach helps to overcome the present weakness that confines the perspective of issues to the sectoral view. The study provides an analysis of cross-sectoral

issues in Kuala Lumpur, giving an example of how the unsustainable trends could be diverted by linking the issues together and concurrently solving the problem. The holistic sense adopted in the study extends from the issues to the policy packages, whereby the policy measures are grouped together for optimum synergetic effects to achieve sustainable transport objectives. The study hopes to have positive effects in encouraging policy integration at the city level.

An Inclusive Analysis of Urban Transport

The methodology applied in the study allows an inclusive analysis, i.e. taking into account the external and internal factors that have huge influences on transport policies in Kuala Lumpur. This is aimed at tackling the weakness of conventional exploration forecasting methods which have limitations when analysing many variables (particularly the external factors). This study has shown its strength in handling the unpredictable and complicated *economic environments* of the future, and taking them into account in order to formulate long-term strategic transport policies. The inclusive analysis also applies to exploration of the potential of uncommon strategies, e.g. the use of the Behavioural and Cultural Changes strategy in terms of its greatest impact on transport in Kuala Lumpur: this could hardly be given the same weight using any conventional methods.

Providing a Large-Scale Change in the Kuala Lumpur Urban Transport System

Unlike all other transport studies carried out on Kuala Lumpur, this study provides a view of large-scale of change in the transport system in the city. The study aimed to bring the urban transport system in Kuala Lumpur to the point of achieving considerably advanced progress in sustainability rather than slight improvement in the present system. By doing that, the method also opens up many creative choices and alternatives that have never been considered before, and it is to be hoped that novel insights into future studies on transport policies in Kuala Lumpur have been gained.

Managing Long-term Changes in a Step-wise Manner

Not only does the study allow for large-scale changes in the Kuala Lumpur urban transport system, it also deliberately attempts to bring about long-term changes in a step-by-step manner. Each policy package has shown its implementation would work in the short, medium and long terms. Thus, it **offers a model for navigating the journey in a forward-looking and adaptive way. The schematic implementation of policy packages will benefit policy-makers in understanding that the scale of changes corresponde to time, that it is incremental, modular and evolutionary**. Hence, the large-scale changes towards the final sustainable transport objectives are sound less frightening or remote.

Allowing Involvement of Local Transport Experts

Another important contribution of the study is that it allows involvement of local transport experts. Besides validating the steps taken in the methodology, the involvement allows the formation of locally appropriate and realistic transport scenarios and policies. The interactions between the researcher and the local transport experts also provided valuable lessons for developing ideas by working with each other; promoting the sustainable transport concepts among professionals; educating about the necessary paradigm shift towards the sustainability, as well as assimilating the results of this study.

Enriching Literature Resources in the Subject of Sustainable Transport in Kuala Lumpur

The study has accomplished the challenging task of attaining a sustainable transport system in Kuala Lumpur by means of a detailed examination from the starting point of general sustainable development concepts and setting up sustainable transport targets and working towards them. It demonstrates that the tough mission of achieving sustainable transport in Kuala Lumpur is workable. It is hoped that the whole study, particularly the formation of sustainable development and sustainable transport concepts, objectives and targets (which

were agreed by local transport experts), could stimulate more discussion about and encourage more research interest in sustainable transport field in Malaysia.

9.3 Limitations of this Thesis

There are some unavoidable limitations existing in this study. There are two types; the first one refers to the nature of the research methodology itself, and the second one is the difficulties faced by the researcher in carrying out the method.

9.3.1 The Nature of the Backcasting Scenario Method (the Subjectivity) that is Used in the Study

This study is an example of a qualitative anticipatory scenario exercise. As mentioned before, the choice of this method for the study is because it could capture and analyse the complexity of the real world, and it suited the purpose of the study, as the transport trends in Kuala Lumpur are contributing to the transport problems or they will actually become a problem in themself. The advantages of this type of research method are, of course, that it is a trend-breaking tool and it can stimulate creative and flexible solutions to the difficult problems of transport systems. It is a novel method that could bring the transport system in Kuala Lumpur into a new era of sustainability in the future, which cannot be fulfilled according to the on-going trends.

However, there is a debatable aspect of the method itself, and the researcher found that the intrinsically subjective characteristics of the method have contributed to some limitations of the study.

Contrary to forecasting methodology which relies heavily on causal determinism (for example, future transport demand patterns using mathematical models), backcasting does not strongly emphasise the historical and present data and causal models to build future ones. This method allows more room for a range of variables (internal and external) to interact flexibly, thus allowing problem identification and solution-seeking. This cannot be completely predicted by a causal model. Scenarios also distance us from the present – by moving forwards and backwards in time, the scenarios allow the impossible-to-change present to open up to transformation, constructed by frameworks and choices. This again cannot be achieved by other methods. Indeed, as viewed by Geurs and van Wee (2004), *'the use of very operationalised, complex, theoretical explanations may diminish the (backcasting) role of fantasy, imagination and intuition'*. However, this intrinsic characteristic of backcasting has also exposed its vulnerability when it faces the test of objectivity. The researcher has tried to tackle the issue of subjectivity and the question of validity by strengthening the justifications in the study in several ways, such as validation by local transport experts and documentation analysis. However, it is fair to say that the study can never be as objective as one using forecasting methodology.

The objectivity of scenario building would be enhanced if it were integrated with other quantitative analysis and evaluation tools. In the case of this study, a more detailed analysis of which was hampered by time and data constraints, it is hoped that future research could be done to tackle this weakness.

9.3.2 The Difficulties Faced in Carrying Out the Research Method

The second type of limitation of this study is due to several difficulties faced by the researcher when carrying out the research, as outlined below:

- **The challenge of building a future which is creative and imaginative, yet realistic and plausible.**

The study is a challenge which tests one's creativity and imagination, i.e. the creation of a transport system that goes beyond the present practice and knowledge, by looking at the transport issues from unconventional angles and trying to propose solutions that did not previously exist. The desirable alternative sustainable futures are radically different from the situation we experience now, and the tensions occur when the imagined transport system has to be linked to the present real world. The difficulty faced, therefore, is to spot the emerging issues correctly, to judge the possible impacts of innovations sensibly and to consider the patterns in trends of change rationally.

- **The limitation of a single researcher playing multiple roles in scenario building**

In relation to the above difficulty, the limitation of this study is due to the fact that the researcher has carried out the whole research single-handedly. As the alternative futures involve many professions such as technocrats, transport producers, innovators, environmentalists, sociologists and politicians (some are more influential than others in a particular Image), the difficulty that the researcher encountered was to play multiple roles in the process of scenario backcasting methodology.

- **The imperfection of local transport inputs**

As mentioned in previous chapters, as much as the local transport experts had helped and contributed significant inputs to the study, there were several factors that deterred them from further inputs. The difficulties they faced in playing their role in the study included slight confusion over the subtle concept of sustainability (e.g. desired or practical targets); an uneasiness about committing their professional opinions with regard to the policy measures, especially the new measures; feeling at a loss to some extent when more than four or five policy measures were grouped together; and insufficient time for further discussion in the allocated workshop sessions.

- **The complexity of multi-disciplinary subjects involved in the study**

As the project went on, it became very obvious that there were multi-disciplinary subjects involved in the study, as is reflected by the complexity a transport system in the real world. This contributes to one of the reasons that the selected transport experts were unable to put

forward further inputs, as they all came from the background of the transport profession. The complexity of multi-disciplinary subjects involved in the study has also stretched the ability of the researcher to absorb all the know-how in the allocated timescale. The limitation of this study may be shown in its naivety in certain aspects (sociology, political science, marketing strategies, etc.) that are beyond the detailed knowledge of the researcher.

- **The Operational Problem**

The last limitation of the study is the lack of ability to tackle thoroughly the implementation in the real world of the sustainable transport system proposed in the three Images. Apart from several points raised in Chapter 8 at the implementation stage, operational tasks of how to make sure that things change (e.g. to restructure institutions successfully or to change people's perception and behaviour), are beyond the context of the study. This is, however, a very important stage from which to move towards sustainable transport and obviously actions are needed both in the transport and non-transport (social value, lifestyle, technology) sectors. Decision-makers need to think beyond this study's scope and pay attention to operational problems.

All in all, there is clearly some cause for concern because of the above limitations in the study, but these limitations do not affect the fundamental working principles of the backcasting scenario framework. As for the second type of limitation, concerns could be tackled; similar research could improve upon this study and be accomplished in a shorter time if, ideally, in future it were carried out by a varied group of relevant professionals. Alternatively, by learning lessons from this exercise, the study may attract a variety of people (preferably decision-makers) from different disciplines who are sufficiently interested in Kuala Lumpur's transport system to attend brainstorming sessions.

9.4 Future Research Agenda

There are three main agendas for future research to be recommended, namely the research direction of sustainable transport in Kuala Lumpur, the improvement in scenario backcasting methodology in this study, and convergent development paths for global sustainability. The first research agenda is about a call for urgent research on various topics concerning the transport system in Kuala Lumpur; the second agenda is about the improvement of the methodology's applications and its future prospects at city level; and the last agenda is about the subject of bridging developing countries and developed countries towards a final goal of sustainability.

9.4.1 Research Direction of Sustainable Transport System in Kuala Lumpur

It is rather a shame to see a unique post-colonial vibrant city which is full of character, in this case Kuala Lumpur, lose its charm and suffer from the adverse impacts of transport. In the attempt to reach the status of a developed state, Kuala Lumpur needs to learn the lessons from historical mistakes made by many of the developed world's cities. Malaysians have to realise that current private vehicle ownership and use should not be labelled as progress, and that congestion should not be related to the city's prosperity. Better quality of life in the transport sense is the achievement of sustainable transport objectives that requires a wider perspective. This includes positive improvement in all economic, social and environmental dimensions or, at least, does not jeopardize the well-being of the contemporary generation, endanger our ecological system or threaten the intra-generational benefits.

The first recommendation for the transport system in Kuala Lumpur is therefore to make an urgent paradigm shift towards sustainable transport. In response to this call, the researcher would like to raise various research interests related to sustainable transport. The country and the city seriously lag behind the global trend towards sustainability and any relevant research will help to fill the void. However, in particular, there are several important research areas on which the researcher would like to focus further:

1. A detailed study is required of the potential and feasibility of alternative fuels (natural gas and renewable energy) in the transport system of Malaysia. This research would cover the interdisciplinary areas of energy, environment and transport technologies. At present, the general and brief guidelines provided by the Ministry of Energy are not substantially sufficient to formulate concrete future policy directions for alternative fuel technologies in Malaysia. Without a clear message, industrial sectors will have difficulty in responding, and the general public will also be confused about how to change towards sustainable transport.
2. A detailed study about the strategy of Behavioural and Cultural Change (BCC). BCC, together with other transport strategies, offers great potential to lead a society towards sustainability; it is not costly nor does it requires "high-tech" solutions. BCC towards sustainable transport is a newly recognised research field at international level (see Section 6.2.3.2, Chapter 6). In Malaysia and Kuala Lumpur, it is a non-existent topic. It is difficult to transfer the knowledge and experience of BCC due to the inherent characteristics of the strategy. It is worth integrating social and educational psychologies into the transport sector to analyse positive steps towards sustainability for the city.
3. The impacts of tele-activities on people's lifestyle, for example, their choices regarding work, shopping, learning, banking, leisure, etc. are now immense and will be even greater in the future. These choices and flexibilities offered by tele-activities are no doubt breaking the rules of traditional theories of land-use and transport planning. Yet there are still many uncertainties that exist when analysing the implications of tele-activities. As the Malaysian government invests enormous resources into the tele-communications technology, and aims to transform Kuala Lumpur into an *intelligent capital city* in the future, it is very important to further investigate this area. Deeper insights need to be gained into the impacts of tele-activities on Kuala Lumpur's land-use pattern, people's travel behaviour and trip modifications.

9.4.2 The Improvements in Scenario Backcasting Methodology in this Study

To strengthen this research project, it is believed that there are three possible areas of improvement, which would be worth considering in further research. These are:

1. ***Strengthen the process of policy packaging and implication analysis.***

In scrutinising the challenges in implementing sustainable travel policies in urban areas, ECMT (2002) stresses that sustainability requires policy-making for urban travel to be viewed in a holistic sense: planning for transport, land-use and the environment should no longer be undertaken in isolation one from other; policies targeting particular transport system elements and modes should be considered as an ensemble, their relative impacts determining the 'right' combination for the sustainable policy package.

In this study, three integrated policy packages have been proposed to match the Images. As described in Chapter 7, to set up the policy package, reference has been made to understanding the links with or implications of policy measures for sustainable transport objectives or targets. Apart from Banister and Marshall's study (2000), the UTOPIA project (1998-2001) and EST (OECD, 2002), which analyse and provide insights for policy packaging, most of the studies focus on analysing a single policy measure and provide little information on achieving synergetic effects between policy measures. For example, the study by Schwaab and Thielmann (2002) (see Appendix G) does not greatly help when it comes to packaging policy measures. Even when combinations of policy measures are analysed, most of the synergetic effects of packaging measures are qualitative in their nature; moreover, not every implication of policy packaging is explicitly analysed.

Conceptually, if the relationships between each policy measure could be articulated, and the implications could be explicitly related to each transport objective, this could provide useful background information for policy packaging according to an agreed objective. This would also allow the modification of policy packaging to take place easily and flexibly.

To achieve policy integration and coordination and allow the policy implementation to be carried on flexibly, it therefore necessitates an *in-depth understanding of the impacts of different types of policy measures and their potential for effectiveness when packaged together.* Future research is needed to examine how to maximise synergetic effects and minimise negative conflicts in policy measures and their wider implications (either positive or negative effects on social, environmental, economic and institutional aspects). It would also be very helpful if such a study could quantitatively evaluate the impact of synergetic effects.

In relation to that, confidence in the ability of the proposed policy packages to achieve the policy targets may be greater if each policy measure could be associated with quantifiable implications. In this study, achievement of targets has been measured only in relative terms, which compare the relative performance associated with different scenarios and policy packages. If interactions between policy measures could be understood and quantified, it is possible to measure achievement of targets based on mathematical modelling, thus providing more accurate quantitative measurement.

2. *Improving the quality of inputs from expertise*

The backcasting scenario methodology is an actor-oriented exercise, in which the inputs and validations by local transport experts (in this study) play an important role. How to strengthen the process of inputs from experts is an important research agenda for improving the quality of scenario backcasting methodology. As mentioned before, one of the limitations encountered in this research is that there are some deficiencies in the inputs from local transport experts. From the lessons learned in this study, these are the directions that further research should take to enhance the effectiveness of the scenario backcasting methodology.

- Who should be invited to the brainstorming and validation process?
  - Multi-disciplinary experts, decision-makers, the same group of experts in every data inquiry and validation process throughout the research.

- Means of data enquiry and validation:
  - Structured brainstorming, follow-up workshop discussions, special workshop discussions focusing on particular unresolved issues.
- Preparation before brainstorming:
  - In relation to the concerns of means of date enquiry, it has to be stressed that it is relatively difficult to have spontaneous brainstorming in the Malaysian culture. Advanced preparations (time, resources, materials, questions for participants) are required to allow for a more effective discussion.
  - It is also useful to provide training for participants beforehand to familiarise himself or herself with the trend-breaking thinking
- Techniques for successful brainstorming and workshop discussion:
  - Elaborate interesting ideas
  - Inspire 'out-of-box' ideas
  - Wildcards?
- Timing:
  - Reserve more time to discuss policy packaging, interaction between policy measures and target achievement.
  - Allocate special workshop to discuss only these topics.

The above are only a few suggestions from the overall expertise input mechanism that should be further investigated. The arts of debate, participation, prioritization, communication and consensus-building are all relevant skills that are required to strengthen the effectiveness of expertise input and consequently improve the scenario building methodology.

3. *Further analysis of the Images and policy packages for implementation stage and links to other analytical tools*

This research agenda is to enable the extension of the study. Several important topics at the implementation stage have been discussed in Chapter 9. However, to ensure a full operation of policy packages, it needs further detailed study at the implementation stage to recognise practical issues, such as:

- The integration of institutional factors (and other responsible parties), which directly links to
- The financial and legislative resources.
- Assessment of whether the proposed policy packages contribute to or counteract other relevant sectors.
- Measures to resolve conflict and enhance the complementary objectives and policies between organisations.

Technically speaking, this research agenda is not aimed at improving backcasting scenario methodology by itself; however, by analysing the implementation stage of Images and policy packages, and showing the continuity of the method, this research agenda complements the unfinished business of backcasting scenario methodology at the implementation stage. This, in a way, helps to solidify the application function of backcasting scenario methodology in the full cycle of formulating sustainable transport policies.

In regard to the above research agenda, scenario backcasting methodology should be integrated with other policy and decision-making analytical tools, Strategy Impact Assessment, Risk Assessment, Multi-criteria Analysis, Composite Analysis, Cost-Benefit Analysis are all examples that could be integrated into the scenario backcasting methodology.

Recognizing that scenario backcasting is not intended to replace quantitative planning, but that instead it is intended to augment traditional planning techniques, it is helpful to establish the links between the scenario backcasting methodology and quantitative tools (Zegras et al., 2004), for example, a more sophisticated travel behaviour modelling analysis or a macro-economic quantitative analysis at the implementation and monitoring stage.

These areas of research are important to consolidate the application of scenario backcasting methodology in the sustainability field.

From this study, the researcher has found that scenario backcasting is an extremely useful method for inspiring creative ideas and also structurally analysing alternative sustainable policy options at a city level. Apart from that, the researcher strongly believes that the methodology's potential is much greater than its present usage (energy and transport in particular). Beyond the transportation-planning field, there are great possibilities to extend its application to cover other sectors of a city system in the context of sustainability, for example, recycling policies, natural resource management, sustainable tourism policies, etc. These sectors share similar characteristics with sustainable transport policy planning, i.e. attainment of a far-reaching goal; they involve complex problems that affect many sectors and levels of society; and an important factor in the problems is the matter of *externalities*.

Indeed, from the researcher's point of view, apart from other applications, the scenario backcasting methodology may demonstrate its greatest potential if it is used to analyse several major components of a city system under one study with the objective of comprehensive sustainable development. As the researcher discovered in this study, many decisions about transport policy are made outside the transport system, and many policy measures are interrelated. It would be worthwhile to involve all levels to envisage the future sustainable city in which they would like to live, and then work together towards the sustainable future in an interdisciplinary study. Such a study is worthy of further research.

9.4.3 Convergent Development Paths to Bridge the North and the South to Achieve Sustainability

This last research agenda is about the underlying theory of the study, global sustainable development in general.

The sustainable development goal that underpins the study was originally based on the perspective of Southern countries, and was then adjusted to suit Malaysia's stage of development. One of the findings regarding the appropriate concept of sustainable

development for Malaysia (and other second-tier Newly Industrialising Countries) is that it may be suitable to follow a middle path between the Southern and Northern choices of development. However, what the exact direction of the development path should be remains unanswered. This question is not only related to Malaysia; indeed, to achieve global sustainability, it is better for every country to have a clear idea of their appropriate development path.

From a wider perspective, it is imperative to conduct further research on the topic of convergent means between the Southern and Northern countries towards global sustainability. In this sense, fossil fuel consumption and CO_2 emissions receive much more attention than others. For example, works on the 1992 United Nations Framework Convention on Climate Change and the Kyoto Protocol 1997 (United Nations, 2002), and the United Nations Framework Convention for 'Contraction and Convergence' model [UNFCC&C] (Website of GCI, 2003) propose negotiation so that policies and measures can be internationally organised at rates that avoid dangerous global climate change.

Apart from the issues of fossil fuel consumption and CO_2 emissions, it would be beneficial to analyse a wider range of development paths that could integrate social, economic and environmental sustainability in a global manner, and suggest a general direction for sustainable development strategic for different regions and then the countries between regions, to achieve the convergence of global sustainability. Such research would be useful to guide the formulation of frameworks and strategies for sustainable development at national level and to carry them out with clear prioritization in their national development agendas. Thus it would help to ensure that both Northern and Southern countries were working harmoniously towards the convergence of global sustainability.

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Business Council for Sustainable Development in Malaysia
Website http://www.bcsdm.com.my

California Fuel Cell Partnership
Website http://www.fuelcellpartnership.org/index.html

Cities 21 Joint Project
Website http://www.clean-air-asia.com

CITYNET project
Website http://www.cit-net-ap.org

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Website http://www.cyberjaya-msc.com/html/cyberjaya_technology.htm

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Website http://www.statistics.gov.my/

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Website http://www.lutr.net

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Website http://www.epu.jpm.my/

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Website http://www.epommweb.org/

EST (1994-2000)
Environmentally Sustainable Transport. OECD's project.
Website http://www.oecd.org/env/ccst/est

FLEXIMODO: European Awareness Scenario Workshop Program
Website http://www.cordis.lu/tdsp/en/fleximod/index.htm

Future Techniques
Website http://ag.arizona.edu/future/fut/smtech.html

Global Commons Institute (GCI)
http://www.gci.org.uk/

IISD, Sustainable Development Gateway, International Institute for Sustainable Development contains case studies and other resources developed by members of the Sustainable Development Communications Network (SDCN).
Website http://www.iisd.org/default.asp

INFOPOLIS Project
http://www.ul.ie/~infopolis/

Introduction To Future Studies by Groff L.& Smoker P.
Website http://www.csudh.edu/global_options/IntroFS.HTML

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Melbourne 2030 Planning for Sustainable Growth
(sub-sector – Sustainable Transport)
http://www.dse.vic.gov.au/melbourne2030online/content/strategic_framework.html

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http://www.oecd.org//env/consumption/scp24a.htm

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Website http://users.ox.ac.uk/~oxis/index.html

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Procedures for Recommending Optimal Sustainable Planning of European City Transport System. Project was funded by European Commission: Environmental and Sustainable Development RTD Programme (FP5)
Website http://www.lutr.net

PTI's Traveling with Success: How Local Governments (US) Use Intelligent Transportation Systems
http://pti.nw.dc.us/task_forces/transportation/docs/success/transpub.htm

The Road Safety Research Centre or RSRC, Malaysia.
http://www.eng.upm.edu.my/webrsrc/

SCENESUSTECH (Scenarios for a sustainable society: car transport systems and the sociology of embedded technologies) The project is funded by the European Commission under the Targeted Socio-Economic Research Programme (TSER). The project runs from 1998 until 2000.
Website http://www.tcd.ie/erc/cars/index.html

SUTRA Project
Website http://www.lutr.net/

Sustainable Penang Initiative, an NGO organisation for sustainable development in Penang State, Malaysia.
Website http://www.iog.ca/publications/spi.pdf

SUTP-Asia Project
Website http://www.sutp.org

Taking Steps: A Community Action Guide to People-Centred, Equitable and Sustainable Urban Transport Sustainable Transport Action Network for Asia and the Pacific, by Barter, P. and Raad, T.
Website http://www.geocities.com/sustrannet/

TAPESTRY – Campaigns Solutions for Transport
(TAPESTRY is the acronym for a collaborative research project with the objective of improving the knowledge and understanding of how effective communication programmes or campaigns can be developed to support and encourage sustainable travel behaviour throughout Europe)
Website http://www.eu-tapestry.org

TELLUS-Bringing CIVITAS Onto the Road (2002-2006)
A transport project in 5 European Cities promoting integrated policy measures
http://www.tellus-cities.net/

TERM 2001 (Transport and Environment Reporting Mechanism) project
Website http://themes.eea.eu.int/Sectors_and_activities/transport/indicators

The Ministry of Energy, Water and Communication Malaysia
http://www.ktkm.gov.my

The South Centre
Website http://www.southcentre.org

The Sustainable Development Timeline
Website http://www.iisd.org/timeline/

The Volvo Safety Concept Car
http://www.driveandstayalive.com/articles%20and%20topics/test%20drives/td-volvo-scc.htm

The TOOLBOX – EU SAVE-II Programme (Community's Non-technological Action on Energy Efficiency)
Website http://www.mobilitymanagement.be/english/index.htm

Transportation Association of Canada
Website www.tac-atc.ca, also available at VTPI www.vtpi.org

Travel Smart Project
Western Australian community-based program that encourages people to use alternatives to travelling in their private car
Website http://www.dpi.wa.gov.au/travelsmart/

UK's White Paper "Future of Transport"
Website http://www.dft.gov.uk/strategy/futureoftransport/

Urban Transportation Department, Kuala Lumpur City Hall.
Website http://www.jpbdbkl.gov.my/eng/

US Department of Energy Guidance for Alternative Fuels' Vehicles
http://www.eere.energy.gov/cleancities/

US's The National Renewable Energy Laboratory (NREL)
Website http://www.nrel.gov/about.html

USEPA Commuter Choice Program
Website http://www.epa.gov/oms/traq

UTOPIA Project
Website http://www.utopia-eu.com/
Utopia (Urban Transports: Options for Propulsion systems and Instruments for Analysis) is a project to aim at compiling and analysing introduction methods on a European scale.

VTPI.(2001) "Location Efficient Development." Online TDM Encyclopedia Website
http://ww.vtpi.org

World Business Council for Sustainable Development
http://www.wbcsd.org

World Summit on Sustainable Development 2002
Website http://www.johannesburgsummit.org/

APPENDIX A Outline of Backcasting Method by Robinson

Step 1: Determine objectives
(a) describe purpose of analysis
(b) determine temporal, spatial and substantive scope of analysis
(c) decide number and type of scenarios

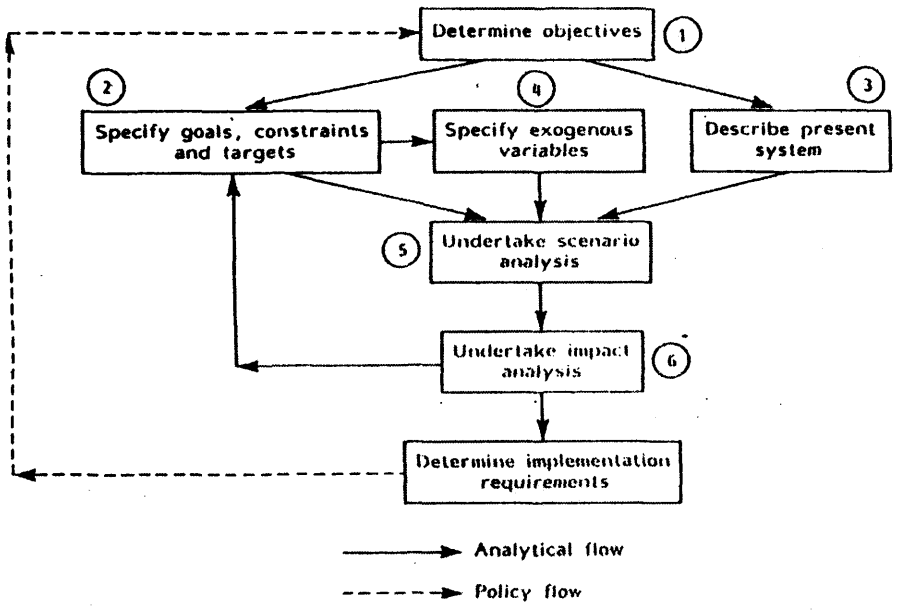
Step 2: Specify goals, constraints and targets
(a) set goals, constraints and targets for scenario analysis
(b) set goals, constraints and targets for exogenous variables

Step 3: Describe present system
(a) outline physical consumption and production processes

Step 4: Specify exogenous variables
(a) develop description of exogenous variables
(b) specify external inputs to scenario analysis

Step 5: Undertake scenario analysis
(a) choose scenario generation approach
(b) analyse future consumption and production processes at the end-point and mid-points
(c) develop scenario(s)
(d) iterate as required to achieve internal consistency

Step 6: Undertake impact analysis
(a) consolidate scenario results
(b) analyse social, economic and environmental impacts
(c) compare results of step 6(a) and 6(b) with step 2
(d) iterate analysis (steps 2, 4 and 5) as required to ensure consistency between goals and results



Source: Robinson, J (1990)

APPENDIX B Questionnaire Survey I

Transport System of Kuala Lumpur – Present's Trends and Issues and the Future Targets

Objectives:-

I. To have an initial survey by a small group of experts to establish key road transport policy trends and issues in Kuala Lumpur &

II. To have face-to-face interviews with officials involved in road industrial decision-making processes and transport planners to discuss the future transport scenarios in Malaysia, particularly Kuala Lumpur

III. To refine the policy scenarios building methodology.

Section A :- Interviewee and Company Profile

Name :_____

Position :_____

Company:_____

Telephone:_____

Fax :_____

Email Address:_____

Address :_____

Willingness to be further involved in this research by contributing opinions and information in next interview : Yes_____ No_____

Section B : Background of the Study

1. What do you regard as the major road transport issues in Kuala Lumpur? Please state the three most important road transport issues only.

   A) _____

   B) _____

   C) _____

2. Why do think that these issues exist in Kuala Lumpur?

   _____

   _____

   _____

   _____

   _____

2. From your understanding, what are the existing urban transport policies that try to tackle the above transport problems? How useful are these transport policies? Please give appropriate assessment of each transport policy by using the indicators below.

Transport Issues	Existing Policies to tackle these transport issues	Assessments of the usefulness of transport policies*
A	1	
	2	
	3	
B	1	
	2	
	3	
C	1	
	2	
	3	

[*Indicators :- I-most useful, II-moderately useful, III- less useful]

Please elaborate the reasons if you think that the present policy measures are less useful in tackling the transport issues_____

_____

_____

3. In relation to the transport issues in Question 1, do you think that present transport trends (including the present transportation organisations and their methods of policy formulation) are contributing to these problems? (Please tick √ in appropriate column)

Yes ☐

No ☐

If yes, please specify how do they contribute to transport problems?

_____

_____

_____

_____

4. If the Integrated Public Transportation in Kuala Lumpur were to be completely implemented in the near future, do you think that it would solve most of the existing transport problems in Kuala Lumpur?

Yes ☐

No ☐

Please further explain your answer.

Because_____

_____

_____

_____

_____

5. Do you think that **appropriate concerns** have been put into all economic, environmental and social dimensions when Integrated Public Transportation policy is introduced in Kuala Lumpur?

(Please tick √ in appropriate columns)

Dimensions	Various Issues	Yes	No
Economic and development	Government involvement and funding		
	Economic viability in KL		
	Broader development issues such as changing lifestyle, rising education and civil awareness level and modernisation.		
	Congestion		
Environmental	Local and regional impacts of atmospheric emissions, noise and land space use		
	Global impacts of atmospheric emissions/ global warming issue and energy consumption		
Social	Accessibility for non-drivers and the poor		
	Vulnerability of road users to accidents		
	Intrusion in community		

6. What are your opinions about the urban transport issues in Kuala Lumpur in future, say in the year 2020? Please state the three most important road transport issues that you can foresee.

A) _____

_____

B) _____

_____

C) _____

_____

Please also give your suggestions for tackling these transport issues.

Future Transport Issues	Your suggestions for tackling these transport issues
A	
B	
C	

Section C : Project's Target

A more sustainable transport system is one that provides affordable access to all levels of community and does so in an economically viable, environmentally sound and equitable manner. In this project, a backcasting approach has been applied to shape transport policy development for future goals, i.e. sustainable transport policy for Kuala Lumpur in the year 2020. In order to achieve sustainable transport goal, potential targets of sustainable transport system need to be set. At this stage, this interview is focusing on refining potential targets proposed by the researcher. The link between these proposed targets (in the form of indicator) and sustainable transport objectives are shown in the figure on the next page.

Please comment on the appropriateness of these targets for achieving sustainable transport aim by considering :-

(a) The degree of sufficiency for each target to achieve the sustainable transport aim: sufficient, too tough or too soft.

(b) The changes or modifications that are needed for each target to achieve the sustainable transport aim. Do you think that these targets are achieveable in terms of the concept of sustainable transport system? In other words, if these targets have been achieved, does it means that the sustainable transport has been achieved? If not, please suggest the alternative, intermediate and/or additional targets.

(c) The difficulties faced for each target to achieve the sustainable transport aim. Do you think that these targets are appropriate to help to explain how change occurs through time? Are they understandable by potential users? Is there any ambiguity?

(d) Please circle the code number of targets (in the second column of the table below) that are relatively important for achieving sustainable transport aim.

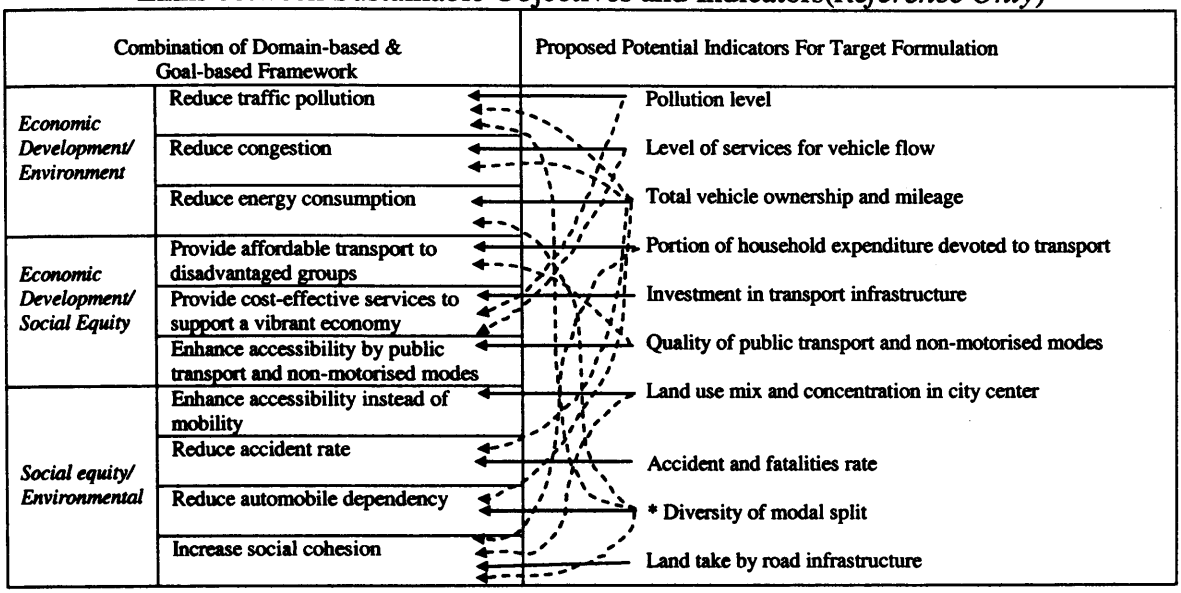
Sustainable Transport Aim

A transport system that provides affordable access to all levels of community and does so in an economically viable, environmentally sound and equitable manner

⇓

(d) No.	Selected Targets	(a) Too Tough/ Sufficient / Too Soft	(b) Changes needed	(c) Difficulties faced
T1	Total vehicle ownership and mileage will not continue to grow from the year 2000			
T2	Ratio for private/public 30: 70 Target of various modes in % of passenger trip will be discussed with local transport experts after confirming the above ratio			
T3	Less than 15% of household expenditure would be spending on transportation cost for lower income groups.			
T4	Reduce the road transport expenditure to 7.5% of the total development expenditure by the year 2020.			
T5	Reduce fatality rate to 1.3 per 10,000 vehicles 75% reduction of total road accident from 1998 level by the year 2020.			
T6	75% reduction of CO emission from 1998 level by the year 2020 75% reduction of NOx emission from 1998 level by the year 2020			
T7	Relief from traffic congestion to the Level of Service (LOS) to reach C-B			
T8	More than 50% household access to high quality of public transport and non-motorised modes within 200 meter distance from home.			
T9	High density, mix use and concentrated land use patterns			
T10	No further land to be used for road purposes than that approved in the year 2000			

Links between Sustainable Objectives and Indicators(*Reference Only*)



(Symbol : ←——— indicators directly relate to sustainable transport objectives

←- - - - - - indicators that indirectly relate to sustainable transport objectives

* this modal split indicator will be further refined for a more detailed diversity of % of passenger trip for each mode)

Section D : Policy and Measurements

Eleven major types of policy have also been identified at this stage for the purposes of achieving sustainable transportation aims. Please rate the priority of these 11 major types of policy to achieve sustainable transport system in local environment, namely Kuala Lumpur.

Policy Measurements	Appropriateness and Feasibility of Policy Measurement*
Demand/Capacity Management Practice	
Pricing/Taxation Mechanism	
Land Use Planning	
Communication, Telecommunications and Cleaner Vehicle Development Technology	
Policy Measures (Public and Private)	
Physical Measurement	
Subsidies and Spending	
Location/time/user restrictions	
Psychological/Awareness/ Behavioural Patterns	
Environmental Protection	
General Economic Policies	

[* A- the highest priority, B-considerably importance, C-less significance]

Other suggestions and opinions

_____

_____

_____

_____

_____

_____

_____

APPENDIX C List of Interviewees and Agencies Contacted During the First Period of Fieldwork

List A: Government Organisations and Other Transportation Companies

No	Organisation	Contact No.	Address	Remark
1.	En Zulkifil Othman (KTMB/ rail) Ministry of Transport	tel : 03-2539453 /54 fax : 03-2531585	Ministry of Transport Malaysia Wisma Semantan, 2dn Floor, Block B, Jalan Gelenggang, 50490 Kuala Lumpur	Land transport Authority
2.	En. Othman Sulaiman (Land transport) Ministry of Transport	tel : 03-2539453 ext 3003 fax : 03-2524594	Ministry of Transport Malaysia Wisma Semantan, 2dn Floor, Block B, Jalan Gelenggang, 50490 Kuala Lumpur	Land transport Authority
3.	Mr Stephen Tan/ Mr. Nun/ Dr Leong Urban Transport Department Kuala Lumpur City Hall	tel : 03-2925418 fax : 03-2939245	Tingkat 19, Menara Tun Razak, Jalan Raja Laut, 50350 Kuala Lumpur	Land transport Authority
4.	En Kamaruzaman Hj Hussen The Federal territory Development and Klang Valley Planning Division Prime Minister Department	Tel : 03-2922466 ext 123 Fax : 03-2918780 Email : zaman@hotmail.com	Tingkat 5, Wisma PKNS, Jalan Raja Laut, 50674 Kuala Lumpur	The most relevant Land transport Authority

No	Organisation	Contact No.	Address	Remark
5.	En. Mohd. Hider Yusoff @ Othman (Commuter Unit) KTM Berhad	tel : 03-2757215 fax : 03-2736527 email : hider@ktmb.com.my	Jalan Sultan Hishamuddin, 50621 Kuala Lumpur	Rail Authority
6.	Mr Ooi Peng Hong (PLUS) Pengurusan Lebuhraya Berhad	tel : 03-7838833	10th Floor, Menara Dua, Faber Tower, Jalan Desa Bahagia, Taman Desa, 58100 Kuala Lumpur	Highway Authority
7.	Mohd Ali bin Mohd Rijal Sistem Transit Aliran Ringan Sdn Bhd (STAR)	tel : 03-4973732 fax : 03-4942554	Star Point, Jalan Ampang, P O Box 39, 68000 Ampang, Selangor	Light Rail Transit Authority
8.	Ms. Sharifah Intrakota Consolidated Bhd	tel : 03-7172727 fax :03-718 88716	Lot 29399, Pesiaran Zaaba Taman Tun Dr. Ismail, 60000 Kuala Lumpur	Klang Valley Main Bus Operator
9.	En. Norhassan Ismail Pengurusan LRT Sdn. Bhd (PUTRA)	Tel : 03-4698228 Fax :03-4697774	No 1, Jalan PJU, 1E/46, off-Jalan Lapangan Terbang, 47301, Petaling Jaya	Light Rail Transit Authority
10.	Pak May Sdn Bhd. (Cityliner)	Not Available	Not Available	Klang Valley Main Bus Operator

APPENDIX D Questionnaire Survey II

A Discussion on Future Sustainable Transportation Images for Kuala Lumpur

The objectives of the discussion:

1. To present the research project to local transport experts
2. To invite the local transport experts to contribute their opinions regarding the future sustainable transport Images and transport policies.
3. To seek experts' judgments of the proposed future sustainable transport Images and transport policies in Kuala Lumpur.

A brief outline of the research project will be presented by using overhead projector, estimated to last about 20 minutes. It will explain the background of the study by presenting unsustainable transport trends and issues and the need for a new approach to formulate future transport policy. Then, there will be three main parts of the presentation, i.e. concepts of sustainability and objectives of sustainable transportation applied in this study, the Images of the Future and the Policy Packages.

This is to give a whole picture of the research project to the panel. Then the panel will be given the opportunity to formulate arguments in their own words for the project. The panel's tasks are to judge the logicality of the transport Image formulation and to improve the three proposed scenario descriptions (Images of the Future) and their policy packages. Lastly, the panel will evaluate the whole study in general.

This questionnaire has been set in the same structure and it acted as guidance for discussion.

Interviewee and Company Profile:

Name :_____

Position :_____

Company :_____

Telephone/Fax:_____

Email Address:_____

Mailing Add :_____

Willingness to be further involved in this project by contributing opinions and information via email communication in the near future:

Yes_____ No _____

Sustainable Goals and Sustainable Transport Objectives

1. Do you agree that the defined sustainable goals and sustainable transport concepts are appropriate to apply in Kuala Lumpur?

Agree ☐

Not Sure ☐

Do not Agree ☐

2. On a scale 1 (lowest priority) to 10 (highest priority), please state the priority of each of the ten identified sustainable transport objectives in Kuala Lumpur according to your personal view:-

Sustainable Transport Objectives	
Reduce traffic pollution	
Reduce congestion	
Reduce energy consumption	
Provide affordable transport to disadvantaged groups	
Provide cost-effective services	
Enhance accessibility by public transport and non-motorised modes	
Enhance accessibility instead of mobility	
Reduce accident rate	
Reduce automobile dependency	
Increase social cohesion	

3. Please comment on any complementary or conflicting relationships between the above in the context of Kuala Lumpur.

The Building of Future Sustainable Transport Images for Kuala Lumpur

1. Please comment on the selections of external elements for building the Images in this project. Please tick (√) in the appropriate box.

INDICATORS:
Score 5 indicates that the element is very relevant, essential and most appropriately selected
Score 4 indicates that the element is relevant, essential and appropriately selected
Score 3 indicates that the element is relevant, essential but not sure that if it needs to be selected
Score 2 indicates that the element is relevant but not essentially be selected.
Score 1 indicates that the element is irrelevant and should not be selected.

External elements I

The prevalence of global industry strategy

(globalisation-industry economy & localization-information economy)

1	2	3	4	5

External elements II

The degrees of Malaysian economic growth

1	2	3	4	5

External elements III

The future Malaysian employment structure

1	2	3	4	5

2. Please judge the rationality of the three alternative economy situations (Industry Economy Environment/ Transition Economy Environment/ Knowledge Economy Environment) - the combination of these external elements.

1	2	3	4	5

Indicators:
Score 5 indicates the alternatives most rationally formed
Score 4 indicates that there are very rationally formed
Score 3 indicates that there are quite rationally formed
Score 2 indicates that there are less rationally formed
Score 1 indicates that there are not rationally formed

3. Please give other comments on the selection of external elements and their combination to form the alternative economy situations.

_____

_____

_____

_____

_____

4. Please comment on the selections of strategic elements for building the Images in this project. Please tick (√) in the appropriate box.

INDICATORS:
Score 5 indicates that the element is very relevant, essential and most appropriately selected
Score 4 indicates that the element is relevant, essential and appropriately selected
Score 3 indicates that the element is relevant, essential but not sure that if it needs to be selected
Score 2 indicates that the element is relevant but not essentially be selected.
Score 1 indicates that the element is irrelevant and should not be selected.

Main Strategic Element

Information technology and technology

(Automation technologies, advanced transport telecommunications and telecommunication technologies)

1	2	3	4	5

Secondary Main Strategic Elements

Behaviour and Cultural Change

(Car preference to non-car preference, adoption new lifestyle and new idea and toleration of rigorous economic instrument)

1	2	3	4	5

5. Please give other comments on the selection of strategic elements

Comments on Three Future Sustainable Transport Images for Kuala Lumpur

1. Can the three images be sufficiently distinguished to establish the three different policy packages?

   Very Sufficient ☐

   Sufficient ☐

   Not sufficient ☐

   Not very Sure ☐

2. Which Image is likely to happen in the future if the existing trend is followed without any intervention? Please tick (√) in the appropriate box.

   Image I Foresight Transportation ☐

   Image II Extended Public Transportation ☐

   Image III Information Society ☐

3. Which image is most desirable in the future for sustainable transport Image in Kuala Lumpur? Please tick (√) in the appropriate box.

   Image I Foresight Transportation ☐

   Image II Extended Public Transportation ☐

   Image III Information Society ☐

4. Other comments about the Images

_____

_____

_____

_____

_____

_____

_____

_____

_____

For the following questions 5, 6 & 7, please refer to the following score charts

Score 5 indicates that the Image could achieve the targets
Score 4 indicates that the Image could work closely towards the targets
Score 3 indicates that the Image could work towards the targets
Score 2 indicates that the Image would have no effect on the targets
Score 1 indicates that the Image would divert from the targets.

5. Please comment on the environmental target achievement (reduce air and noise pollution, reduce energy consumption and reduce the use of land from adverse impacts) for these three Images. Please tick (√) in the appropriate boxes.

Foresight Transportation	[1]	[2]	[3]	[4]	[5]
Extended Public Tran.	[1]	[2]	[3]	[4]	[5]
Information Society	[1]	[2]	[3]	[4]	[5]

Other comments:-_____

_____

_____

_____

6. Please comment on the social equity target achievement (provide affordable transport system to majority of people, protect poor and vulnerable groups of people from discrimination of transport system) for these three Images. Please tick (√) in the appropriate boxes.

Foresight Transportation	1	2	3	4	5
Extended Public Tran.	1	2	3	4	5
Information Society	1	2	3	4	5

Other comments:-_____

_____

_____

7. Please comment on the economic viability target achievement (reduce congestion and relief from accident risk) for these three Images. Please tick (√) in the appropriate boxes.

Foresight Transportation	1	2	3	4	5
Extended Public Tran.	1	2	3	4	5
Information Society	1	2	3	4	5

Other comments:-_____

_____

_____

_____

_____

Comments on Policy Packages of the three Images

1. In relation to the three Images discussed in the presentation, please suggest policy measures that will achieve sustainable transport objectives for each Image

Image I :

_____

_____

_____

Image II :

_____

_____

_____

Image III :

_____

_____

_____

2. Referring to the enclosed policy packages for the Images, please comment on each of the package:-

Image I :

_____

_____

_____

Image II :

_____

_____

_____

Image III :

_____

_____

_____

3. Other comments of formulating policy measures in scenario backcasting methodology. _____

Evaluate the whole project

1. Please comment on the usefulness of *backcasting scenario building methodology* in this project to achieve sustainable transportation objective.

1	2	3	4	5

Score 5 indicates the backcasting methodology is very useful and score 1 indicates that it is useless. Please tick (√) in the appropriate box.

2. Please compare and comment on the backcasting scenario building methodology and forecasting methodology in exploring future opportunities and policy options in transport planning field.

_____

_____

_____

_____

_____

3. Please comment on the significant contributions of this project towards sustainable transportation planning (understanding of problems and possible future Images) in Kuala Lumpur.

1	2	3	4	5

Score 5 indicates the project has very significant contributions and score 1 indicates that it is insignificant. Please tick (√) in the appropriate box.

4. Other comments about the project.

_____

_____

_____

_____

Workshop 4

En. Kamaruzaman b. Hussen (Transport) Miss Lim Siew Chin (Landuse) Ms. Halina Bt. Jamil Mr. Hasnol Zam Zam Ahmad	Federal Territory Development & Klang Valley Planning Prime Minister's Department Blok B3, Aras 4 Pusat Pentadbiran Kerajaan Persekutuan 62502 Putrajaya, Malaysia.	88887593 zaman@bkwp.jpm.my 88887594 sclim99@bkwp.jpm.my	Klang Valley development unit, include land use, transport and environmental aspects. Main unit in planning and policies decision-maker for the relevant subjects in Klang Valley.

Workshop 5 (Carried out separately)

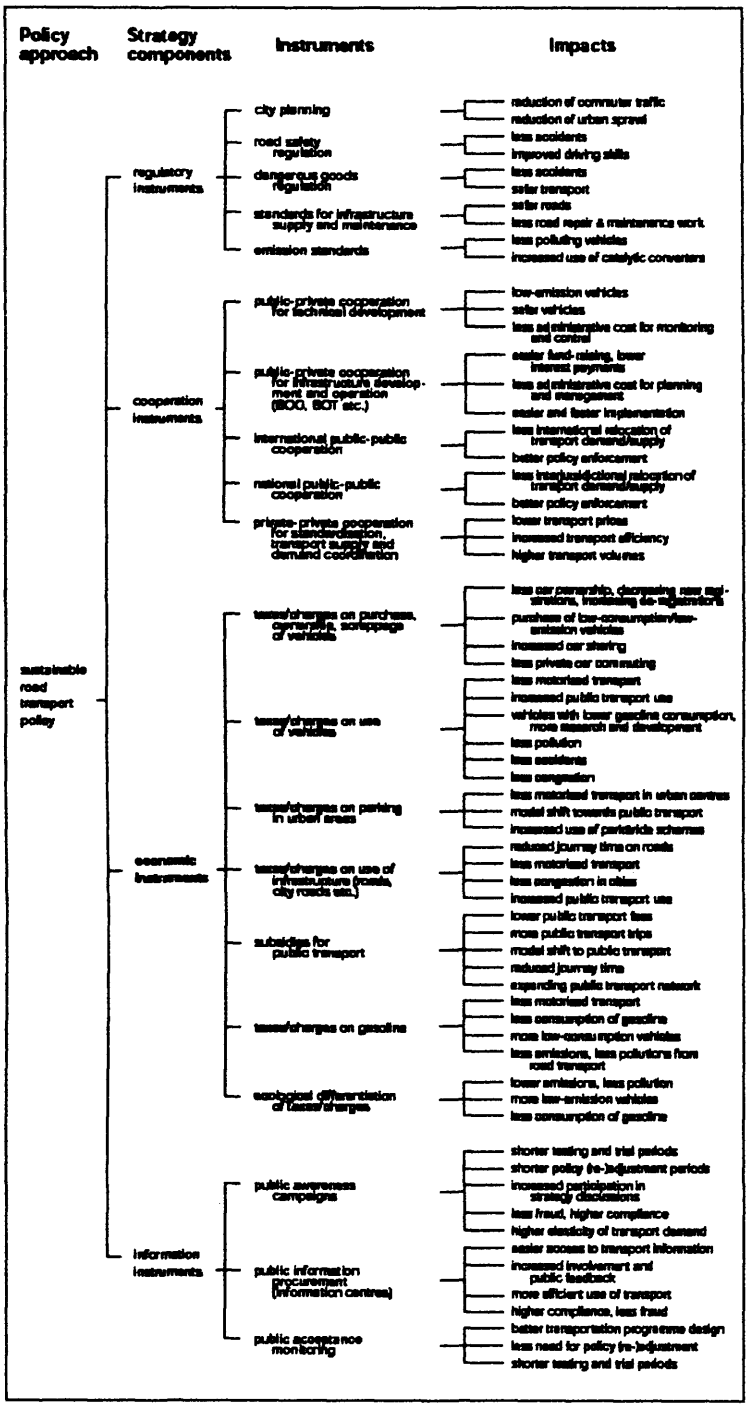
Dr. Paul Barter (At Brickfield)	Dr. Paul Barter Visiting Fellow, Dept of Geography, National University of Singapore 1 Arts Link, Singapore 117570	Tel: +65-8743860 Fax: +65-777 3091 Email: geobpa@nus.edu.sg	Academic interested in land transport system in Kuala Lumpur and other Asian countries.
Assoc. Prof. Mohamed Talhah Idrus and his assistants (Environmental aspect – Planning)	Room 012 Block B, School of HBP, USM 11800 Penang, Malaysia	Tel : 604-6577888 ext 3741 Fax: 604-6576523 Email: mtalhah@usm.my	Academic interested in environmental aspect and land transport system in Kuala Lumpur and other cities in Malaysia.

Appendix F Indicators Framework

Framework	Advantages	Disadvantages
Domain-based frameworks It starts with the key dimensions of sustainability (environment, economy, and society) and then identifies indicators for each.	It is most effective for ensuring coverage of the dimensions of sustainability. It can also be modified to add categories for linkages among the three domains (e.g. environment-economy) and thereby accentuate the integrative aspect of sustainability.	It does not directly link indicators with sustainability goals
Goal-based frameworks It requires the identification of sustainability goals for a community and then creates one or more indicators for each goal or combination of goals.	Directly links indicators to goals, and thus could reduce the number of indicators that have to be considered to only relating to specified sustainability goals. It also helps in evaluating whether indicators are showing movement towards or away from sustainability.	The framework is fairly a simple one that does not capture some of the complex interrelationships among the various dimensions of sustainability.
Sectoral frameworks It develops indicators of sustainability for each sector over which municipal government typically has responsibility, such as housing, transportation, environmental etc.	The sectors can be tied o individual government departments, making it easier to determine accountability for particular problems revealed from the indicators.	It is not very effective for showing linkages across different areas as it compartmentalizes the indicators into specific areas.
Issue frameworks It is organised around a list of the key sustainability issues in the community, such as air pollution, waste management, education and etc.	It is readily understandable by public and easy to construct.	The issues are typically identified in a "shotgun" manner, who no attempt to match indicators with sustainability goals or ensure coverage of the three dimensions of sustainability.
Causal frameworks It goes beyond the taxonomic approaches of the preceding framework by introducing the notion of cause and effect relationship.	A causal framework has the significant advantages of being able to suggest why certain indicators are rising or falling and to show whether or not policy interventions are having an impact.	It is not very easy to identify the complex relationships between human activity stressors and environmental conditions.
Combination frameworks This refers to a type of framework bringing together two or more of the individual frameworks.	Overcoming many of the disadvantages of individual frameworks and consolidate the advantages of several individual frameworks.	

(Source: MacLaren, 1996)

APPENDIX G Strategy Tree for a Sustainable Road Transport Policy



(Source: Schwaab and Thielmann, 2002)