Chapter 3

Policy Combinations for Modal Shift

This chapter should be cited as
Kutani, T., Y. Sudo and Y. Li (2015), 'Policy Combinations for Modal Shift', in *Energy Efficiency Improvement in the Transport Sector through Transport Improvement and Smart Community*. ERIA Research Project Report 2014-31, Jakarta: ERIA, pp.29-63. Available at: http://www.eria.org/RPR_FY2014_No.31_Chapter_3.pdf

CHAPTER 3

POLICY COMBINATIONS FOR MODAL SHIFTS

1. Introduction

Traffic congestion is one of the common problems in urban cities of modern nations. The problem manifests itself as a country undergoes economic growth, which is often accompanied by mass motorisation. In developing cities, an increase in traffic volume is not considered a problem; on the contrary, it is viewed as a favourable phenomenon as it symbolises economic growth. There was a time when market mechanisms, i.e. the price of the car, curbed car use. However, as the population and personal income grow, more people become private cars owners.

This trend lasts until the disincentive—in the form of the number of hours spent stuck in traffic, the accompanying stress, as well as the environmental implications brought by too many vehicles—exceeds the incentive to buy and use a new private vehicle. Traffic congestion, if left unmitigated, negatively affects a country's economy, ecology, energy security, as well as individuals' mental health. While most public policymakers understand the urgency in averting the inefficiencies brought by traffic congestion, the irony is that quite a number of cities continue to suffer from such.

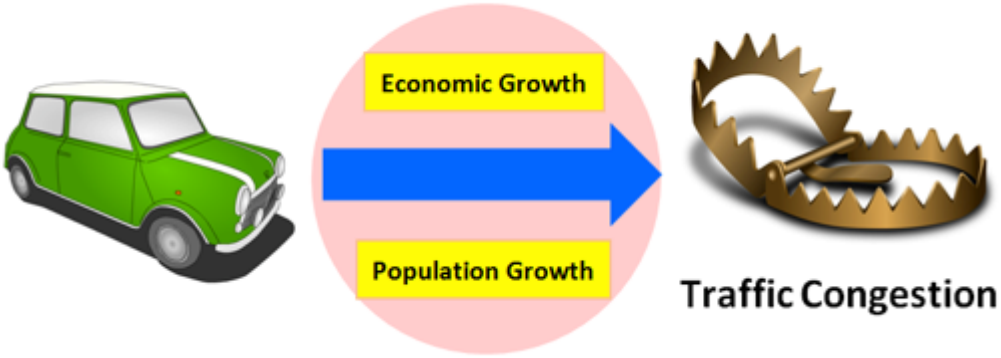
Why then do such transportation bottlenecks persist? The main reason is the tendency of stakeholders to do nothing until the consequences of the situation escalate. When the situation is not deemed serious enough, ordinary citizens will never raise their voices. Similarly, politicians are unlikely to tackle an issue that is a concern to only a few voters.

Past research studies noted that the problem with congestion is hard to resolve once they arise. For one, it is not easy to reduce the need to travel. People do not simply stop driving just because of traffic congestion. In this regard, this study has taken a look at several solutions to the traffic problems, and has identified two of what seem to be the most suitable frameworks. One is the 'advanced automobile society', which is characterised by optimisation of traffic flow and liquidity. This method aims to enable vehicles to move

as smoothly as possible via road reforms and the introduction of new technologies. This framework sees the increase in car use as an inevitable course of events and tries to tackle it from the perspective of road capacity adjustment and traffic efficiency.

The other is 'sustainable compact society with modal shift', which tries to control car use volume and shift it to other forms of transport. In both ways, the solution often results in a conflicting policy that further hinders the present traffic's function. For example, road widening and metro rail construction both hamper the existing traffic flow during the construction period. Besides, owing to the heavy traffic congestion, some transport systems such as buses without exclusive bus lanes do not function normally and will create dissatisfied bus users. This will eventually result in a recurring traffic congestion and an unpopular public transport system. In many situations, traffic congestion *per se* makes the congestion more intractable. Worse, most of the solutions require vast amounts of funds within a short period. Financial limitation can delay any resolution. Thus, some cities are mired in this 'traffic congestion trap' with the pain of serious economic loss.

Figure 3.1: Traffic Congestion Trap



Traffic Congestion Trap

1, We do nothing until the situation gets serious.

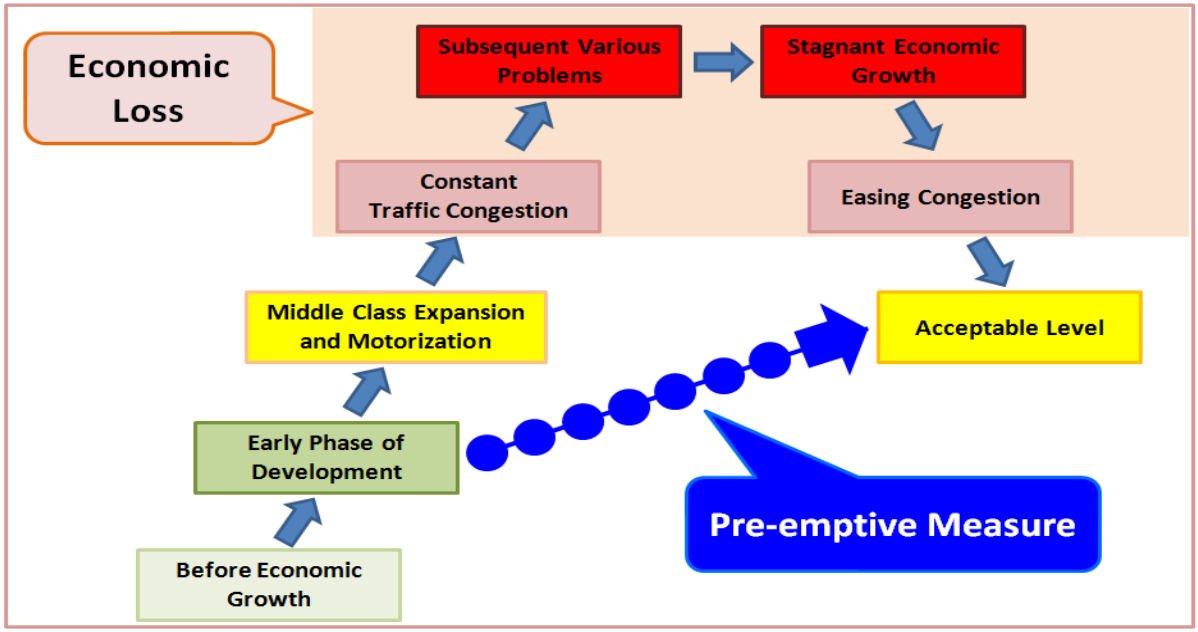
2, The problem is hard to resolve once it arises.

Source : Author.

It has to be remembered that traffic problems are a symbol of economic development and, in a sense, somewhat reasonable and 'structurally natural'. Hence, the remedy to the problem can often be stressful and detestable to car users. Car users may be like a child who is outraged when his parent takes away the candy he bought with money he saved up for a long time, because the candy is deemed detrimental to his health. Worse, some solutions entail actual economic loss in the short term.

In all these, one however needs to defy the normal development process and avoid the mistakes that some leading cities have made. As mentioned earlier, once a city gets into a bad traffic situation, it will be unnecessarily arduous even to take countermeasures. It would make sense instead to set up every pre-emptive measure possible in the early phase of economic development, before full-scale motorisation happens.

Figure 3.2: Concept of Pre-emptive Measures



Source : Author.

Pre-emptive measures are effective because they can make it possible to develop relevant measures unaffected by existing problems. In contrast, it is historically obvious that reactive measures entail a lot of difficulties. However, this does not mean that pre-emptive measures are less difficult than reactive measures. After all, pre-emptive measures are associated with different types of difficulty.

In the case of the reactive measures, citizens in cities are extremely fed up with road congestion and hungry for a magic bullet to solve the traffic situation. This particular state of mind plays a significant role when implementing the countermeasures.

Many will be willing to pay taxes for road widening or the introduction of public transport systems. In the pre-emptive case, such disposition or stance cannot be expected because people in this scenario have nothing to complain about with the current traffic situation. Thus, they might furiously oppose the imposition of taxes. Simply put, it is very difficult for the pre-emptive measures to acquire public sympathy.

Thus, to make people realise the gravity of the future traffic problems (in pre-emptive scenarios), the first step would be to raise awareness of the problem throughout the city. Since the correlation between GDP per capita and the private car ownership ratio is corroborated by numerous data, the future traffic problems are to some extent foreseeable. Based on the projected GDP per capita and population growth, the approximate number of cars and the timing of emergence and scale of the traffic problems in the future city may be calculated. Where possible, the economic loss or environmental impact brought by the traffic congestion should also be computed. These projections will not only contribute to raising awareness on problems but help as well in making a concrete plan for the pre-emptive measures. In any case, pre-emptive measures cannot be specific and persuasive enough without an explicit picture of the future traffic problem. Clear awareness of the problem itself is thus a must.

Only a few cities have succeeded in taking pre-emptive measures. However, most of the cities that have overcome seriously bad traffic situations are generally characterised by some sort of successful ‘modal shift’. Thus, this report will dissect the effective ways to realise the modal shift, especially for pre-emptive measures that were put in place through the introduction of a public transportation system. It will mainly focus on the policy aspect rather than operation, technique, or traffic engineering for when it comes to pre-emptive modal shift, a persistent policy stance is indispensable, and undoubtedly will be the key success factor.

2. Compact City and City Design

As mentioned in the previous section, two frameworks seem to offer the most suitable solution to traffic congestion: 'advanced automobile society' and 'sustainable compact society with modal shift'. Table 3.1 shows the typical features of each solution.

Table 3.1: Modal Shift and Automobile Society

	Modal Shift (Public Transport)	Modal Shift (Walking & Cycling)	Automobile Society
Density	High	Super High	Low
City Function	Centralised / Multi-core	Focused	Decentralised
Travel Distance	Medium	Short	All Distances
Required Road Capacity	Small / Medium	Small / Medium (+ Cycling Roads)	Large
Other Infrastructure	Efficient	Efficient	High Cost
Vulnerable Group	Residents out of Public Transportation Service Area	Elderly/ Suburban Residents	Low Income / Elderly/ Children / Disabled
Strong Points	Energy Efficient Eco-friendly Traffic Specialisation	Flexibility Low Stress Eco-friendly	Flexibility Low Stress
Weak Points	Urban Stress Less Privacy	Low Speed Distance Constraints Vulnerable to Weather Conditions	High Accident Risk Affected by Health Eco-unfriendly

Source: Author.

If a society shall depend only on private cars, it would have no choice but to keep the city area decentralised because even the largest capacity roads and leading-edge technology cannot prevent traffic congestion when a large number of citizens converge in the central area. It would be impractical to build parking spaces as this would mean having to accommodate millions of cars in a very limited area. As a result, the city would naturally sprawl out. Some automobile societies in the world (for example, Los Angeles) demonstrate the sprawl phenomenon and large road capacity. However, decentralisation is not always observed. As the population grows, many of these cities become exposed to the imperfections of the traffic system. In addition, the structure of the sprawling city is inconvenient from the aspect of investment cost. In sprawling cities, not only roads but also other infrastructure such as channels or electric cables require huge investment.

Since there exist certain limitations behind transport expansionist policies and economic inefficiency in automobile societies, this report will mainly cover the policies for compact societies with modal shifts. In practice, however, there is no pure and simple automobile society or compact society with modal shifts. The question is going to be where and when, or how much to take of each measure according to the situation of the city.

As each city has a different background and situation, there are a number of ways to implement modal shifts. In fact, various combinations of measures can be considered for each location's case. However, when implementing a modal shift in advance of all the measures, there is one indispensable variable: the existence of substitute goods. The underlying cause of traffic congestion is a relatively advanced travel demand. That is, to avoid or mitigate traffic congestion with a modal shift, the travel needs of people who have abandoned or refrained from purchasing private cars should be addressed by substitute goods.

Substitute goods here generally mean the public transport system. Based on the outlook of the city, a concrete introduction plan—which includes the type of transport system and vehicle, as well as the timing—will be instituted. At this stage, the planner must address and identify the network route of the system, including the access and egress, transfer connections, and so on. Initial efforts to determine the whole route through simulation based on a city map will perhaps be in vain, noticing that a city without a public transport system is founded on the premise that one is essentially not to be contained.

This thus creates an enormous gap between the ideal situation and reality. For convenience, this gap shall be called 'disharmony between the city and transport system'. It can be loosely categorised into two general types: physical and economic. Physical disharmony is very simple. For example, even if the planner plans to have a bus route on a certain street, there are cases when the road is too narrow for buses to pass through (i.e. designed more for pedestrians). In this case, one finds that there is enough latent demand, but the system cannot function physically.

Economic disharmony, meanwhile, is exemplified by the case where the city planner wants to extend the route to a certain area, but the number of expected passengers is too few to be profitable.

Meanwhile, to evolve into a 'sustainable compact society with modal shift', it is the city—not the bus route—that must make drastic changes. This is because the transport

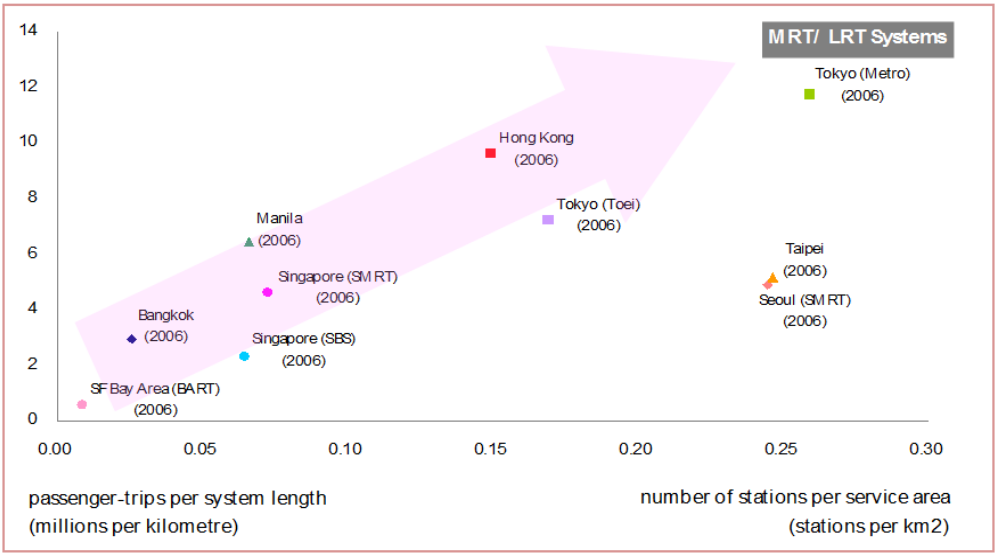
system may be beyond the scope of the city's original plans or might have spontaneously evolved without any intent or plan. Establishing a transport system plan is essentially synonymous with making a city plan.

Aside from resolving the disharmony between the transport system and city, city plans are requisites for another reason. A compact city model is immensely effective to prompt modal shifts in transport. In this context, a city plan is needed to convert a city to the more appropriate form that can accommodate modal shifts. Moreover, some traffic problems can be solved through city reforms. For example, putting homes and workplaces in close proximity to each other will readjust commuters' travel demand drastically. The redevelopment of slum areas and inhibiting city sprawl will also improve economic and energy efficiency.

A bold and clear vision of the city plan defines the strategy and design for its public transport system. As mentioned earlier, reactive measures are difficult not just because coping with a traffic problem becomes more challenging after it gets too serious, but partly because of the absence of a reliable city plan that covers the fundamentals of the transport plan. In a slightly extreme case, it might be reasonable for a policymaker to purposely adopt a do-nothing policy for areas that a city plan had designated as urbanisation control areas, and instead focus on developing an urbanisation promotion area so that more city dwellers will relocate their residence according to the strategy of the city plan. However, *posteriori* supportive measures often result in inconsistent stopgap actions. Without a city plan, while each tactical countermeasure might work independently, it will never be an essential or consistent measure. A reactive measure does not control the traffic; quite the reverse, it is controlled by traffic problems.

A compact city is the key success factor because first of all, its presence facilitates modal shifts. Generally, most people head for the central area of a city in the morning for work or study, and in the other direction in the evening. High population density in compact cities—because of the sheer volume of passengers—leads to higher frequency and better accessibility of the public transport system. Furthermore, a fulfilling transport network enhances the convenience of an area and attracts more and more people there. The relation between more passengers and an excellent transport system creates a kind of virtuous cycle of modal shifts and changes the transport structure of a city.

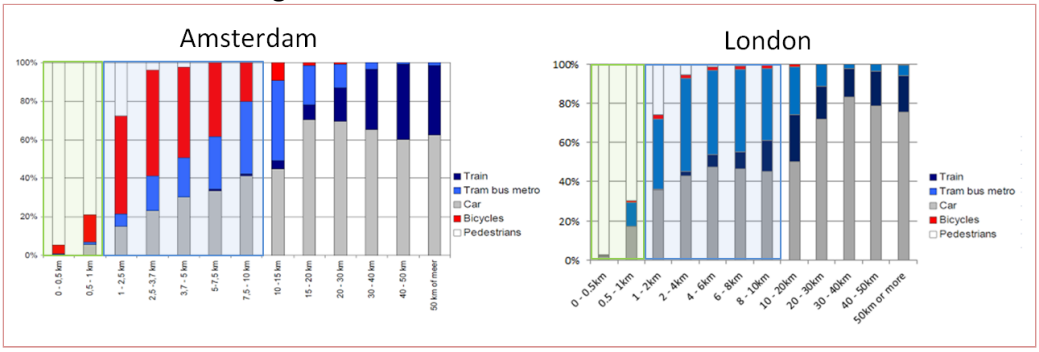
Figure 3.3: Accessibility and Modal Shift



Source: APERC, Urban Transport Energy Use in the APEC Region.

Another reason a compact city is a success factor in modal shifts is that it shortens the distance commuters have to travel. 'Compactifying' the city directly means the geological compression of each function of the city—that is to say, from house to school or from one office to another. This will help save energy in the transport sector. It also enables other types of modal shifts, particularly walking and cycling. Data show that if the conditions are right, people are likely to choose 'walking' and 'bicycling' when the travel distance is under 1 km and 10 km, respectively. The graph below shows the modal split for Amsterdam and London. The walking ratio is clearly high when the travel distance is within 1 km. In Amsterdam, the cycling ratio is also high within 10 km, while the public transport system is popular in London for within the 10-km distance. There are, of course, relevant conditions that explain the difference in results for the two cities: climatic variance such as the amount of rainfall in Amsterdam versus in London that makes one more conducive for biking or walking, preferences of residents for one mode of transport, amount of cycle roads or parking spaces, quality of walkways, etc.

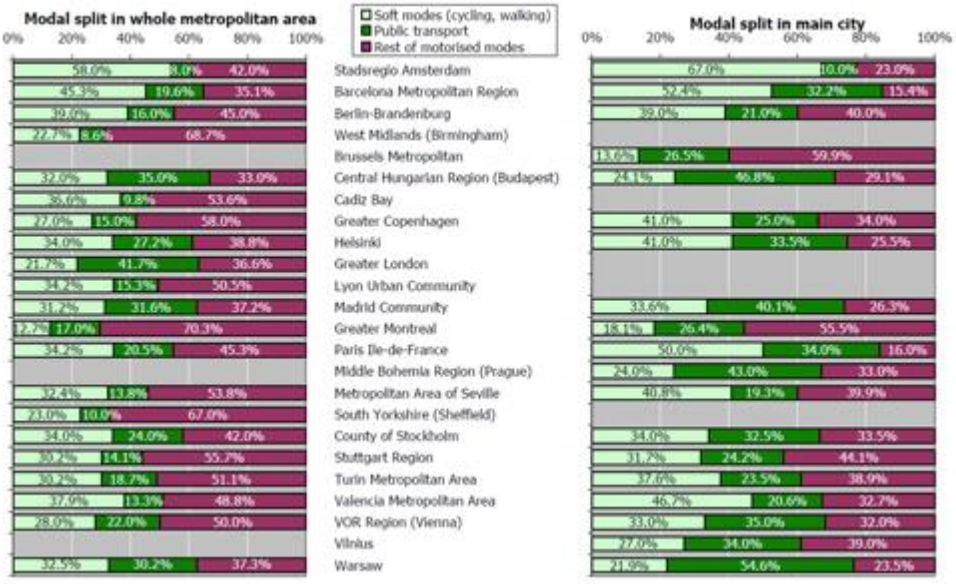
Figure 3.4: Modal Share of Amsterdam and London



Source: René Meijer, Traffic planning in Amsterdam, 2012.

The next graph approaches the subject from a different angle, showing that, without any known exception, modal shifts are more successful in the main or central city areas than in local or suburban zones of the city. This contributes to the profitability of investment and efficiency of public transport systems and other infrastructure such as walkways or cycling roads.

Figure 3.5: Modal Split in Metropolitan Areas and Main Cities



Source: EMTA, Barometer of public transport in European metropolitan areas.

In addition, a compact city is preferred from the perspective of other economic efficiency considerations. Cost of infrastructure development is determined by its scale—i.e. the area of paved roads or the length of water pipes or electric cables. This is not a one-off cost but a long-lasting imposition as it requires maintenance fees, which usually increase with age and wear. The same is true for rail tracks. A compact city will decrease these costs by narrowing down the area of development (Table 3.2). This will surely contribute to the productivity and competitiveness of businesses as well as help households in an area, thus resulting in a sustainable transport system reform.

Table 3.2: City Design and Public Service Cost

Public Services Capital Costs, Billions

	Dispersed	Compact	Difference
Roadways	$17.6	$11.2	$6.4 (-36%)
Transit	$6.8	6.2	0.6 (-9%)
Water and Wastewater	$5.5	$2.5	$3.0 (-54)
Fire Stations	$0.5	$0.3	$0.2 (-46%)
Recreation Centres	$1.1	$0.9	$0.2 (-19%)
Schools	$3.0	$2.2	$0.8 (-27%)
Totals	$34.5	$23.3	$11.2 (-33%)

Source: VTPI, Smart Growth Savings (2014).

One has to keep in mind that travel demand is generally not an essential demand—in the same way that shopping is not an essential demand. In the process of economic development, social division of labour has proceeded deeply. Unlike in olden times, today's people are unable to supply even essential commodities of life by themselves; everyone has become professionals who needs to travel to the offices to work as well as to move around to benefit from other professionals—benefits whose utility is much higher than the cost of travelling. Some people might like driving or shopping per se, but most just want to reach a destination or obtain something such that if it were possible to skip having to drive or get to a grocery store, many people would gladly do so. The purpose of a transport reform is to improve the efficiency of, or minimise, this extra process. A compact city aims to shorten the travel distance, which has to actualise the incorporation of professional people.

Nonetheless, however compact a community can be, it is impossible to rid city dwellers of all the travel demands because there are just too many professions in modern societies. For example, according to the Ministry of Labor of Japan, there are around 30,000

professions. In spite of the progress in information technology, the transfer of people or goods is indispensable in connecting these different parts and substantialise organically tied and highly divisional society. Ultimately, the question turns to: 'How can we travel more efficiently?' In this sense, modal shifts are a sophistication of society. Productivity is improved by mechanisation and upsizing. Like industrialisation, societies entrust their travel to professional drivers under the principle of division of labour. In this sense, driving a car is like city dwellers engaging in farming for fun. Both might be reasonable as a hobby. They are an interesting and healthy activity; however, few people would think of them as socially efficient endeavours.

To make traffic reforms more effective, policymakers should think about the city per se before turning to the transport policy. City reforms are one of the strong points of pre-emptive measures. Pre-emptive measures can tailor-fit the structure of a city with the transport system—something that is very difficult, if not impossible, to execute under reactive measures as such will cause a huge burden on the city's existing structure and economy. This may be one reason a metro rail is often preferred as a countermeasure—i.e. it can be built with little harmful effects on the existing social system.

3. Policy Analysis and Strategic Combination

Whether building a public transport system or making a city plan, it is a common fact that both require huge amounts of money. Securing financial resources for a project is one of two objectives of relevant policies. The other objective is to provide a strong incentive: In this case, the traffic congestion itself is naturally expected to cause modal shifts. After all, in today's post-motorisation societies, people are strongly motivated to grapple with traffic problems. It is this motivation that facilitates the modal shift immensely.

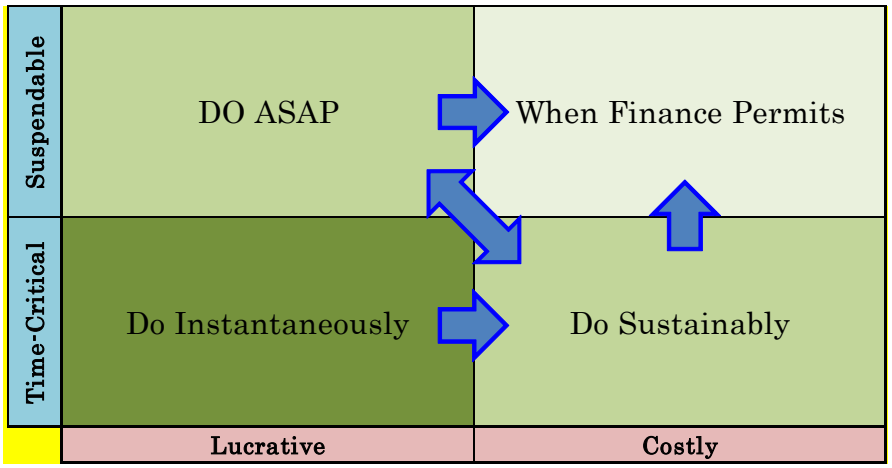
Typical options for the first objective—i.e. securing funds—are taxation and licensing systems, which usually also drive modal shifts because they increase the costs of car users.

Addressing transport problems requires a combination of policies. Measures do not have to be effected all at the same time, though. With sustainability in mind, these measures should be implemented gradually and at the right time (Figure 3.6). Although many factors determine the right timing of implementation (e.g. public opinion or

economic conditions), two indicators—cost and urgency—are critically associated with the sustainability of a plan. When financial support is not enough, implementing a costly project will be risky. In fact, financial sustainability is required not only for reforms in the transport sector. Securing financing for *any* project is always an absolute requirement from policymakers.

Meanwhile, acquiring a sense of urgency is one lesson that can be learned from past transport reform cases. What tends to be ignored in the reform process is the timing. Most cities caught in the congestion trap had not taken effective measures in advance. Urgency thus is key in discerning what measures should be taken pre-emptively.

Figure 3.6: Transport Measure Matrix



Source: Author.

Transport policies can be categorised according to their features (Table 3-3). Some policies directly affect travel demand whereas some deal with the problem by improving traffic liquidity. As there are multiple ways to resolve traffic issues, the most sensible goal is to target an efficient traffic system rather than aim for an extreme objective such as a total ban of car utilisation. Assuming that the goals are set at a reasonable level, a combination of policies is the best way to address existing transport issues.

Table 3.3: Categories of Transport Policy

Travel Demand		Traffic Liquidity	
Rid	Home Office Telephone Meetings	Road Capacity	Road Widening Increase Lanes
Reduce	Compact City Fuel Tax	Road Structure	Grade Separation Linearization
Substitute	Public Transport Walkway Arrangements Rental Cycles	Others	Drainage / ETC Parking Enforcement Strict Licensing Safety Rules
Time	Flextime System Equalize Vacations		

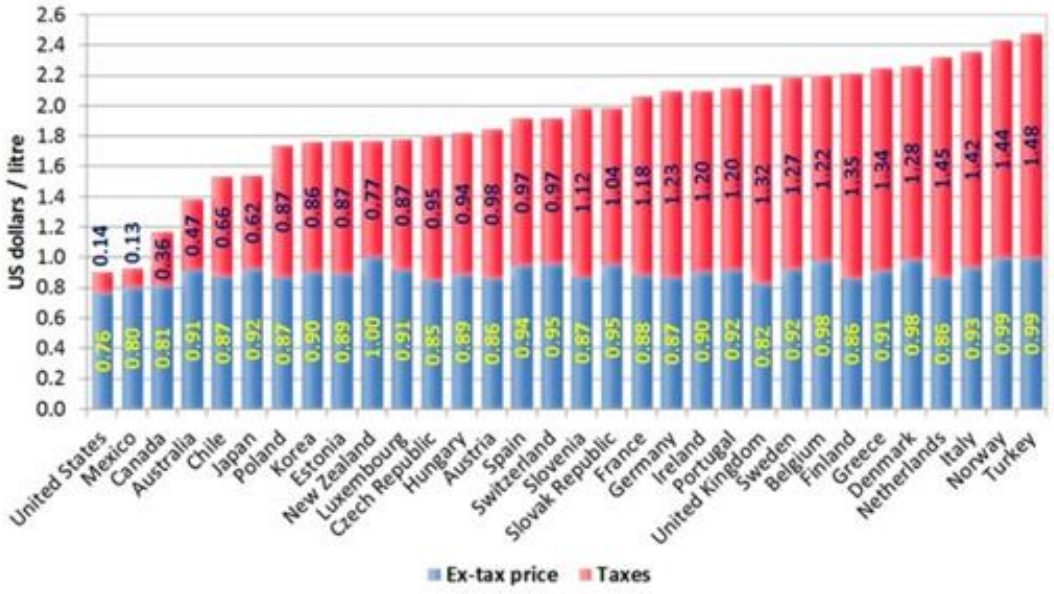
Source: Author.

In this section, some of these policies are identified and analysed from different angles such as cost, urgency, impact, and advantages/disadvantages. Again, the challenge here is how to combine varied measures to have the best mix of traffic solutions for the city.

3.1 Fuel Tax

Imposing an effective tax on gasoline and diesel is the most recommended measure. Rather than adopt one-off methods, a continual and specific duty is effective in driving modal shifts. Figure 3.7 shows the gas price and tax in several countries. Although tax rates differ from country to country, the average revenue from environment tax—90 percent of which comes from gasoline tax—represents about 2 percent to 2.5 percent of GDP.

Figure 3.7: Price and Tax of Gasoline



Source: International Energy Agency (IEA), Energy Prices and Taxes, 2nd Quarter 2014.

Fuel tax is tremendously effective in controlling the demand for fuel, too. According to an earlier study, the short-term price elasticity of gasoline is -0.13 to -0.26 percent. However, in the long term, it rises to -0.37 to -0.46. On the other hand, note that the short-term elasticity is not significantly high because cars are a type of quality good that only a few people will discard before the end of their life cycle because of high oil prices. In this light, gasoline tax ought to be introduced in advance. It goes without saying that the level of price elasticity is affected by related social circumstances, including the situation of substitute goods or traffic conditions.

Typical concerns around fuel tax are 'international competitiveness of the energy-intensive industry', 'management cost', and 'regressivity of taxation'. A decline in international competitiveness of certain industries is often regarded as a downside of fuel tax imposition; however, data do not show that competitiveness deteriorates in majority of countries. Most environmental taxes are imposed mainly on the household and transport sectors; the industrial sector is usually exempted from these. In other words, even if the competitiveness of a specific industry deteriorates, such does not directly mean a loss for the whole country. Management costs of tax reforms, meanwhile, are acceptably low. For instance, in Germany, the total management cost of tax system reform is said to be only 0.13 percent of its revenue. When introduced at the state level, total operating cost (including tax collection and project assessment) is about 0.9 percent of revenue.

Regressivity of taxes is also a point of dispute. Some data seem to show that fuel tax is regressive; some do not. To mitigate this regressivity, some researchers note that reducing other tax rates is effective. However, this particular study is adopting a different stance on the issue: It categorises private cars as luxury goods because their users are usually in the relatively wealthy strata of society. Therefore, this study states that (1) when a city has reasonable substitute goods for cars, the policymaker need not align the regressivity of the fuel tax, and (2) car users have the right to enjoy driving their cars freely at a cost commensurate with its luxury. Using the tax revenue as a financial source for modal shifts can contribute to fair income redistribution as it will benefit sectors of society who struggle financially.

3.2. Vehicle Tax

Vehicle tax is another main automobile-related tax that has been introduced in many countries. There are two key points on vehicle taxes: (i) the timing of imposition, i.e. whether at the time of acquisition only or a periodic imposition; and (ii) rate setting.

With regard to timing, a 'periodic and step-up' imposition is recommended because a one-time imposition will not incentivise car users to shift to other modes of transport. A one-time imposition sometimes encourages car owners to use their vehicle as long as possible as they feel that the car is all the more worth keeping for the cost they have paid. Step-up imposition, meanwhile, will discourage people to own the same car for a long time. This may not be favourable to owners considering the long life of durable items, but such scheme will facilitate modal shifts and encourage new technology that will contribute to energy efficiency. For example, Japan imposes a vehicle acquisition tax whereas the United States, United Kingdom, and Germany do not in principle, with some exceptions. What should be noted is that all these countries have in place a car ownership tax that is imposed periodically.

The table below shows the vehicle tax of private cars in the United Kingdom. There are 13 car emission bands, and the tax rate differs according to emission levels (Table 3.4). Other vehicles such as heavy goods vehicles or motorcycles also have several emission bands with their concomitant tax rates.

Table 3.4: Vehicle Tax in the United Kingdom

Car emission band		Standard Cost (£)	Cost for first year (£)
Band A	(up to 101 g/km)	0	0
Band B	(101-111 g/km)	20	0
Band C	(111-121 g/km)	30	0
Band D	(121-131 g/km)	105	0
Band E	(131-141 g/km)	125	125
Band F	(141- 151 g/km)	140	140
Band G	(151 to 166 g/km)	175	175
Band H	(166 to 176 g/km)	200	285
Band I	(176 to 186 g/km)	220	335
Band J	(186 to 201 g/km)	260	475
Band K	(201 to 226 g/km)	280	620
Band L	(226 to 256 g/km)	475	840
Band M	(Over 256 g/km)	490	1065

Source: Gov.UK, https://www.gov.uk/vehicle-tax-rate-tables

3.3 Congestion Charge

A toll charge is a type of duty that attempts to resolve traffic congestion by charging cars directly for use of public roads. The common aim of a toll charge is the optimisation of traffic volume. This is an effective way to control the traffic volume in some limited areas although its management method and cost are not as simple. When a road has several access points, all these points have to be managed or else car drivers would have a way to avoid paying the fee. This, thus, either increases the operating costs as it will mean having to install more toll gates or instituting efficient surveillance systems, or debases the accessibility of the area by blockading connecting passages.

In London's case, the congestion charge zone (Figure 3-8) was introduced in 2003. According to Transport for London, the imposition of the congestion charge drove 10 percent to 18 percent of the area's car drivers to switch to public transport in the first six months and resulted in a 10 percent reduction in the city's traffic volume between 2000 and 2012. It imposed a standard charge of £11.50 for each day, and total revenue went up to more than £200 million. More than half of the revenue was spent on running the toll system. While the operating cost is high, the operation also contributed to job security in the area.

One upside in this case is that drivers often welcome the charges. They generally detest the congestion, so some do support the charge system and are even willing to pay the toll in exchange for a comfortable road drive. In sum, this is a question of balancing toll rate and the severity of congestion. Theoretically, the rate should be increased until the target traffic liquidity improvement is obtained.

If modal shifts are to be driven by this duty, attention should be given to the side effects of the policy, including motorists' propensity to shift to exempted vehicles or disorderly street parking outside of the congestion zone. A situation where one countermeasure causes more or equally complicated problems should be avoided. In this case, policymakers should have an appropriate sense of purpose and be able to discern the pros and cons of each taxation.

Figure 3.8: Congestion Charge Zone in London

Source: Author.

3.4 Driving Licence

Most countries adopt a driving licence system. This requisite is rarely used as a measure for modal shifts. Thus, this is where the licence system in Japan differs from other countries. Its period of validity is relatively short (usually three years) compared to the 5 to 10 years or unlimited in many countries. While the short validity is often not welcomed by drivers, the frequent renewal requirements might be effective in three ways. First, the process of licence renewal itself can be an incentive for modal shifts. It prompts drivers to reconsider other transport alternatives other than their personal vehicles.

Second, it can be a source of revenue. Although the amount involved is not substantial, the collection can fund traffic reforms. For example, in Tokyo more than 8 billion yen (US$70 million) is collected from licence commission fees and related services. The amount is equivalent to about a fifth of the diesel tax revenue.

Lastly, the driving licence can be used as a means to improve the driving manners of car users. Refresher trainings can be used as a pre-requisite to the renewal process so as to evoke drivers' safety awareness. This would also be the perfect opportunity to remind drivers to avoid parking on the streets, or to give the right-of-way to public vehicles if bus rapid transit (BRT) or light rail transit runs in the city.

In sum, Tokyo's process exemplifies how its licensing system can be used for modal shifts. As maintaining the system involves a huge operating cost, it does make sense to maximise its latent capabilities.

3.5 Remove Obstacles on the Road

The Road Traffic Act lists what constitutes traffic violations. It is useless to enact a law in name only, so enforcement is important from a practical aspect. There are many violations, some affecting traffic liquidity, but those that most aggravate the traffic situation are 'traffic accidents' and 'street parking'.

Traffic accidents mostly occur because of drivers' mental and physical conditions—e.g. alcohol involvement, distraction or impatience—rather than technical or climatic factors. The number of road fatalities per number of motor vehicles is said to be lesser in frigid snowy areas despite the bad conditions such as frozen roads. According to the Saskatchewan Government Insurance data, 48 percent of collisions in urban areas are due to 'human causes'. The top three driver-caused actions are 'failing to yield', 'following too closely', and 'driving too fast'.

Meanwhile, 'driver's inattention', which is classified as a human condition, is the biggest factor in accidents. While driving too fast may be curbed by enforcing speed limits or imposing massive fines, it is not easy to handle the three human causes earlier mentioned. The second biggest cause is road conditions, including structure.

Although street parking is, as mentioned earlier, one of the significant causes of road congestion, this is easier to mitigate directly, unlike traffic accidents. Effective measures are already in place to curb street parking.

Parking facility management covers the two objectives of transport policies: securing financial sustainability and promoting modal shift. To effect modal shift, market mechanisms may not be as effective. Market mechanisms function beautifully when the aim is to achieve the optimal balance of demand and supply. However, it is not necessarily ideal when the objective is to effect transport reforms.

Table 3.5 shows the differences between conventional policies and the more-recent smart growth parking policies. Conventional parking policies are problematic as they tend to promote more car utilisation because free and abundant parking supply is nothing less than an incentive for car use. Smart growth policies, on the other hand, are much better in many ways. Although the nuance of 'optimal supply' is unclear, this study takes the term to means the optimal supply in terms of the principle of market competition. If so, another concept is recommended by this study: the optimal supply for traffic liquidity. All in all, both the parking supply and pricing scheme can control the inflow and internal traffic volume to some extent, but these must be supported by two other policies: street

parking crackdown and an advanced reservation system.

Table 3.5: Conventional and Smart Growth Parking Policies

Conventional Parking Policies	Smart Growth Parking Policies
Managed only for motorist convenience	Managed for transport system efficiency
Maximum parking supply	Optimal parking supply (not too little, not too much)
Prefers free parking	Prefers priced parking (user pays directly)
Dedicated parking facilities	Shared parking facilities
Favors lower-density, dispersed development	Favors compact development.

Source: Victoria Transport Policy Institute, https:www.vtpi.org/park_man.pdf#search='parking+report+problem+pdf'

Theoretically, the inflow and internal traffic volume (except passing and outgoing cars) can be managed by controlling the parking supply. After all, of what use is the car when there is no space to park around the destination? Under limited parking supply, some car drivers may need to use public transport or ask their acquaintance to give them a lift.

However, the principle behind the scheme cannot function without two supportive policies. When there are no parking lots, drivers resort to parking on the streets. Thus, there is a need to crack down on such parking violators to remove obstacles on the road and, more importantly, to control the oversupply of parked vehicles. In other words, parking supply plans and street parking management are inextricably interconnected. The oversupply of parking lots adds to traffic congestion, one of the typical external diseconomies. If it is difficult to control the number of parking lots due to a strong public backlash, then imposing a parking tax on parking space owners as an environmental tax may be an option. For example, employers in Nottingham (United Kingdom) that offer workplace parking spaces are required to apply for a Workplace Parking Levy licence and pay a fee. When the number of cars increases, it is structurally natural for the number of parking lots to increase to meet the demand; otherwise, drivers should find space to park on the streets. The purpose of a parking regulation here is not to minimise the traffic volume but to control it; to be exact, this is to ascertain that the traffic volume is proportionate to road capacity, lest the traffic flow slows down, causing harm to the economy.

Table 3.6: Parking and Traffic Volume and Parking Policies

Total Traffic Volume	Destination	Parking Demand
Passing Vehicle	Outside	No
Outflow Vehicle	Outside	No
Inflow Vehicle	Inside	Yes
Internal Vehicle	Inside	Yes

CONTROL

Parking Form	Price	Supply
Parking Lot	Regulation + Market Mechanisms	Control + Market Mechanisms
Street Parking	Free	Crackdown

Source: Author.

An advanced reservation system for the parking system is another option. As mentioned earlier, traffic reforms are determined by a combination of various measures. When other factors do not work enough to control traffic volume, then regulating the number of parking lots may be the other recourse.

However, one may ask: Is this really the case? Even if drivers are unsure of finding a vacant parking lot, they will not be deterred from driving around in search of one. They will keep driving all over town looking for a parking space in vain while emitting carbon dioxide, or make a queue for a parking space, thus contributing to the area's traffic congestion (Figure 3.9).

Figure 3.9: Long Lines for Parking

Source: Author.

When people travel to other cities, they feel secure when they have reserved a hotel room in advance. This early arrangement allows them to adjust their travel plans in cases where, for example, they cannot find a room to book. Such efficient booking option would not be possible had there been no advanced reservation system in place. In the same vein, control over the supply of parking spaces, including their pricing schemes, would work only when those on the demand side are aware of these. For example, perhaps a few car users will choose not to pay the parking fee and will rather drive back home if they find the fee to be more expensive than expected (or conversely, demand can increase if the parking

fees are discounted). Disclosure and sharing of information, thus, are important in filling the gap between demand and supply.

The financial aspect is a very important consideration in policy or enforcement regulations. Although many governments try to cut operating costs by outsourcing some enforcement activities to private companies, the related expenditure still exceeds the income. Such is the case of a municipal government in the United Kingdom, as seen in its annual report in the table below. Data show that the total profit comes mainly from the income from parking fees. Note too that the enforcement cost is relatively high, mainly because of the cost of maintaining a pool of parking lot keepers and traffic wardens assigned to search for street-parking violators. Despite the cost, there is no reason to refrain from enforcing parking rules. The question though is how to make a sustainable policy mix whose expenditure is tolerable from a long-term perspective. In this sense, relying only on enforcement seems to be financially risky.

Table 3.7: Parking and Transport Income and Expenditure in Durham

	Income (£)	Expenditure (£)
Administration	0	468,475
Enforcement	644,468	842,810
On and Off Street Parking	2,061,578	438,152
Road User Charge and Access Management	2,650	52,717
Park and Ride	866,215	1,332,268
Total	£3,574,911	£3,134,422

Source: Durham Gov.UK, Parking & Transport Infrastructure Annual Report 2013/2014.

The issue regarding parking systems clearly demonstrates an important point. It seems that limiting the number of parking lots will never work out on its own. The regulation appears to have a latent ability to inhibit traffic volume, but this will simply increase street parking when no crackdown campaign against street parking violators is undertaken. This illustrates the importance of a combination of right policies and the downside of evaluating the effects of a policy on its own.

Getting the right mix of policies, though, can have its synergistic effects. For example, policymakers can facilitate the wide use of parking reservation systems by

dictating that such process be taught in driving schools. In addition, the same directive can also instruct the school to suggest the use of public transportation systems in cases where the car user cannot make a space reservation. The point here is that policymakers should consider all the opportunities available to be able to arrive at the 'right mix' of policy actions.

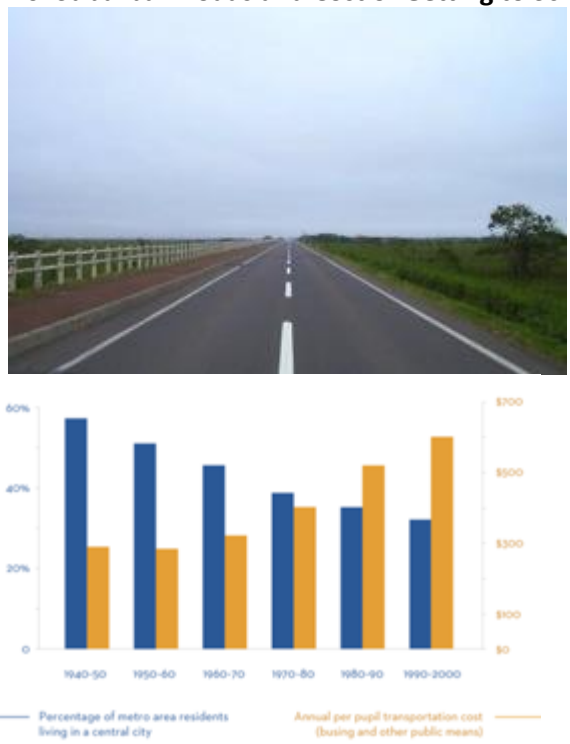
3.6 Compact City

The second part of this paper has explained why creating a compact city is important. Yet, people have reasons for preferring to live in suburban areas: low stress, tranquil environment, and affordable land prices, to name three. This brings to fore two questions: Are there policies that support the development of a compact city? Conversely, are there economic incentives that promote the sprawling society instead?

Data in the previous section of this paper (Figures 3-2 and 3-10) indicate that a low population density in suburban areas will increase the cost of infrastructure. To promote a compact city and a shift in modes of transport, the government may consider introducing a different pricing scheme that imposes more charges on users in low-density areas. For example, the pricing schemes of water and sewage systems or electricity may reflect the extra cost following the beneficiaries pay principle. After all, the leisurely life in suburban areas, just like owning a private car, carries hidden costs because it entails extra infrastructure investment. Similarly, the government may also consider introducing suburban road taxes or reduce the fixed assets taxes in central areas.

There too is the concept of residential liquidity—i.e. promoting rented accommodations and supplying rental houses will be an important policy. Whether to impose a heavy tax on home purchases or not is a question with no ready answer yet. That is, while a tax on home purchase can be a disincentive for future home buyers, it can likewise incentivise existing homeowners to keep their homes longer simply because of the costs paid.

Figure 3.10: Suburban Roads and Cost of Getting to School



Source: Per Square Mile, http://persquaremile.com/category/sprawl

3.7 Other Policies

Although several policies here have been discussed, these are just the tip of the iceberg, so to speak. There remain many more transport policies that can be considered. Some of the important ones will be summarised below.

Table 3-8 lists the 'Rid' policies—policies that eradicate the extra need to travel directly and whose impact is high. For instance, private companies and staff may be encouraged to shift their work or lifestyles so they become the risk takers. Meanwhile, while consumers' growing preference for online shopping can increase the travel demand of transport operators, the latter's transport efficiency is generally higher than that of individual commuters. In the end, an increase in online shopping will eventually help reduce the traffic volume.

Table 3.8: 'Rid' Policies

Policy	Note
SOHO	Promote private companies Remote communication
Telephone Meetings	Same as above
Online Shopping	Travel demand of transport operators increases

Source: Author.

There are more measures under the 'Reduce' policies than what is listed in Table 3-9. Caution should be taken when implementing these policies because when users are reluctant, their reaction can aggravate the traffic situation. These policies may work better in tandem with other policies.

Table 3.9: 'Reduce' Policies

Policy	Note
Car-free District	Substitute transport is requisite
High Occupancy Vehicles Priority	Fake carpooling partner business
Freight Transport Management	Overloading, overwork

Source: Author.

In Table 3-10, public transport systems are part of the 'substitutes'. Conventional public transport vehicles have two advantages: accessibility and connectivity. They exist to allow commuters a swift transit and convenience on their way to their destination—advantages that can surpass the conveniences offered by a private vehicle.

Table 3.10: 'Substitute' Policies

Policy	Note
Public Transport	Finance, profitability, accessibility
Walkways	Same as above
Rental Cycles Park and Ride	Same as above
	Same as above

Source: Author.

'Time' policies (Table 3-11) approach traffic from a different angle. They focus on the temporal shift of traffic demand and increase road capacity by utilising time scales. This generally costs little as drivers only have to depart earlier or later. The issue, though, is whether such changes will affect their business.

Table 3.11: 'Time' Policies

Policy	Note
Flextime	Customer relations, internal communications
Work Schedule	Same as above

Source: Author.

On 'Road Improvement' policies (Table 3.12), any increase in road capacity and road structural enhancement will improve traffic liquidity. Most of these policies require enormous costs not only for investment but for maintenance as well. As tentative measures, they might be effective. However, these will not solve the fundamental problem with traffic volume. After all, road improvements do mean comfortable driving conditions for car users.

Table 3.12: 'Road Improvement' Policies

Policy	Note
Road Widening	Finance, Disincentive for Modal Shifts
Increase Lanes	Same as above
Bypass	Same as above
Grade Separation	Same as above
Road Linearisation	Same as above

Source: Author.

Table 3.13 is an excerpt from the report of a Canadian transport institute[4]. This list illustrates the scope of available strategies on mobility management. In the future, IT-related measures will become more and more important. Just like the benefits of an advanced reservation system, information on volume of vehicles on the road and the chance to avoid congestion spontaneously are valuable to car users. At the same time, it is also important to keep traffic options flexible so that people can choose to stop driving and shift to another transport mode easily such as that offered by the 'park and ride' scheme.

[4] https:www.vtpi.org/park_man.pdf#search='parking+report+problem+pdf'

Table 3.13: Mobility Management Strategies by VTPI

Improved Transport Options	Incentives to Shift Mode	Land Use Management	Policies and Programs
Alternative Work Schedules	Bicycle and Pedestrian Encouragement	Car-Free Districts	Access Management
Bicycle Improvements	Congestion Pricing	Compact Land Use	Campus Transport Management
Bike/Transit Integration	Distance-Based Pricing	Location Efficient Development	Data Collection and Surveys
Carsharing	Commuter Financial Incentives	New Urbanism	Commute Trip Reduction
Guaranteed Ride Home	Fuel Tax Increases	Smart Growth	Freight Transport Management
Security Improvements	High Occupant Vehicle (HOV) Priority	Transit Oriented Development (TOD)	Marketing Programs
Park & Ride	Pay-As-You-Drive Insurance	Street Reclaiming	School Trip Management
Pedestrian Improvements	Parking Pricing		Special Event Management
Ridesharing	Road Pricing		Tourist Transport Management
Shuttle Services	Vehicle Use Restrictions		Transport Market Reforms
Improved Taxi Service			
Telework			
Traffic Calming			
Transit Improvements			

Source: Victoria Transport Policy Institute (VTPI) Parking Management.

3.8 Indeterminacy of Policies

The importance of implementation capability cannot be highlighted enough. Policies can take time before the expected outcome is achieved. However, the waiting becomes challenging when the policies are faced with financial problems, public backlash, or political barriers. Most of all, it can be disappointing when a policy seems to be meaningless and a waste of time and money.

As for the impact of each policy, the fact is that no one policy behaves like a chemistry experiment—i.e. where the same process repeated several times will have the same result. For example, a strenuous drivers' licence examination may be an incentive in a country whose people are extremely curious, but the same exam can be viewed as a disincentive by examinees in other countries.

The indeterminacy of policies' outcome may be due to the mix of policies, skill of executors, timing, and recipients. When one policy is sound and based on economic theories but has not attained its goal, a reconsideration of other policies affecting the target group should first be made before one can conclude on this one policy's effectiveness. This is where the mix of policies must be reviewed.

Meanwhile, how executors of policies define or implement a policy also affects the result. For example, when introducing a gasoline tax, one politician might say, 'We will

introduce this tax to decongest the traffic situation', whereas another might state, 'We will introduce this tax to secure financial resources for the public transport system because the negative effect of private vehicles on the environment is now at a serious level.' The same policy, two different definitions. The former statement sounds more encouraging to drivers. As a result, people will react differently.

Timing is also important. Gasoline tax is often introduced or raised when the oil price is relatively low to mitigate public criticisms. Conversely, imposing such a tax when the oil price is high is expected to elicit a bigger public outcry.

While incentives are used to drive the public to move in a certain direction, one cannot guarantee with accuracy that the response will be exactly as hoped for. After all, every individual responds to incentives differently. Thus, policymaking is not a constraint imposed by the top but a collaborative process with reciprocal influences between the top and down. Based on this, every policy mix should have some level of flexibility to make room for some adjustment or change in the combination, depending on its effect on its targets.

4. In Anticipation of 2030: Scenarios for Da Nang City

Ordinary folks who were born in a city used to end up living happily and dying in the same town. Today, more and more people move from one city to another. What attracts people to relocate in one city in lieu of another is the key. Attractive cities grow and progress, whereas the rest suffer from shrinking populations. Thus, the first step in drafting a city plan is for its planners to identify how they envision the city to be in the future. The options and potential of a city are aplenty, but it is better to focus on select aspirations because the resources are limited in many ways.

Da Nang City is the starting point of the almost-1,500 km long East–West Economic Corridor that leads through Lao PDR and Thailand to Myanmar. It is located in the central area of Viet Nam and has the potential to be the strategic traffic point of the area. Bullet train routes to megacities such as Ho Chi Minh City (HCMC), Hanoi, Bangkok, Vientiane, Phnom Penh, or Siem Reap will provide tourists with the chance to call at Da Nang en route.

However, inadvertent intercity connection can have disastrous effects. Some

researchers ascribe to the concept of demographic gravitation, which states that large numbers of people in a city, for example, act as a magnet for other people to migrate there. Although there is substantial doubt over this scientific theory, it has its advocates. For instance, Reilly's law of retail gravitation is also based on the same concept.

It might thus be wiser to build express traffic infrastructure for the core cities that are relatively small and within short range of each other such as Hue, Hoi An, or Quang Ngai. It would also be an interesting attempt to make a connection to Pakse and National Biodiversity Conservation areas of Lao PDR, which will take less than one hour to reach by bullet train. By shortening the travel time, neighbouring cities behave like one united area, and Da Nang can further enhance its attraction. The power of demographic gravitation will change through this process. Table 3.14, which is a travel ranking from 2013 of Chinese cities located at the Pearl River Delta, illustrates that the geographic proximity of attractive cities does not necessarily lead to cannibalisation but often generates synergistic effects.

Table 3.14: Ranking of Top 100 City Destinations

City	Ranking	Arrivals 2013 ('000)
Hong Kong	1	25,587.3
Macau	6	14,268.5
Shenzhen	8	11,702.5
Guangzhou	16	7,630.1
Zhuhai	58	2,886.5
Total		62,074.9

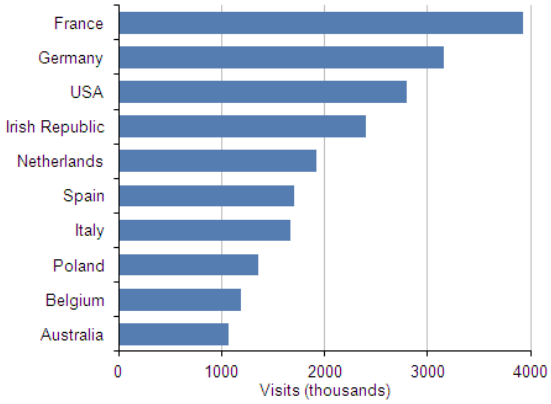
Source: Euromonitor International, 2015, http://blog.euromonitor.com/2015/01/top-100-city-destinations-ranking.html'

In discussing inner-city issues, focus will be on the city's attractiveness in terms of the relationship between its sightseeing sector and the traffic system. Any exposition on the commercial sectors will be out of scope in this section, as some of the key points have already been discussed in the earlier part of this paper within the context of compact cities and economic efficiency.

Figure 3.11 shows the top 10 countries where visitors to the United Kingdom originated. Most travellers clearly came from countries proximate to the United Kingdom. By the same token, residents from the United Kingdom also tended to visit their neighbouring countries in 2013 (Figure 3.12). Of course, accessibility may not be the only reason for such proclivity. One can assume that the travellers also took into consideration

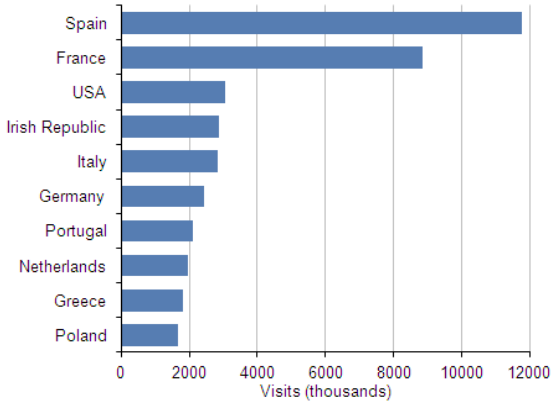
such factors as airline fares, cultural closeness, safety, security and so on.

Figure 3.11: Top 10 Countries Providing Visitors to the United Kingdom (2013)



Source: Office for National Statistics, Travel Trends 2013.

Figure 3.12: Top 10 Countries Visited by UK Residents for at Least One Night (2013)



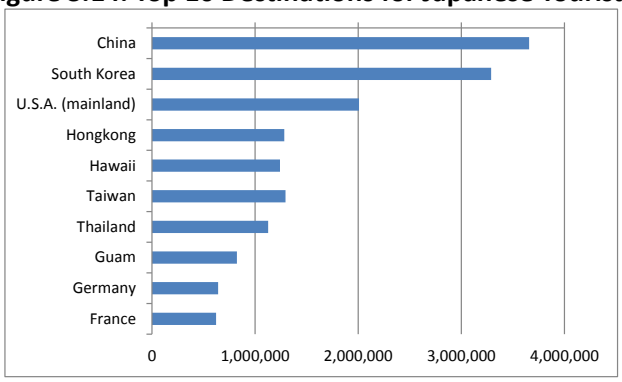
Source: Office for National Statistics, Travel Trends 2013.

However, Chinese and Japanese tourists also follow a similar tendency (Figures 3-13, 3-14). Furthermore, Japanese travellers to Da Nang, Viet Nam skyrocketed last year, after Viet Nam Airlines started direct flights from Tokyo to Da Nang. Data from the Japan Association of Travel Agents show that except for a few cases, the ratio of travellers from adjacent areas is high. All things being equal, travellers—whether domestic or international—are more likely to visit places that are nearer and easily accessible.

Figure 3.13: Top 10 Destinations for Chinese Tourists

Source: Wall Street Journal. Japan Is Most Preferred Destination for Chinese Tourists in 2015, http://blogs.wsj.com/chinarealtime/2015/01/07/japan-is-most-preferred-destination-for-chinese-tourists-in-2015/

Figure 3.14: Top 10 Destinations for Japanese Tourists



Source: Japan Association of Travel Agents, https://www.jata-net.or.jp/data/stats/2013/05.html

In terms of the sightseeing sector, one key issue is the balance between pursuit of economic development and tourism. There are instances where this commitment to economic development can have irreparable effects on tourism. For example, Dresden Elbe Valley used to be a world heritage site, but the status was revoked due to the construction of a bridge that was meant to remedy inner-city traffic congestion. The bridge was completed in 2013 and is said to have contributed to traffic improvement, although the

total impact remains to be seen.

Because transport policies can conflict with tourism policies, the question, 'What do you want to be in the future?' needs to be asked again. After defining the aspiration, cities will then have to make consistent and sound policies for the future city. For instance, metro rails are more ideal for old city areas for their landscape to be maintained as tourism sites.

Figure 3.15: Dresden Elbe Valley and Waldschlösschen Bridge

Source: https://de.wikipedia.org/wiki/Datei:050628-elbtal-vom-luisenhof.jpg
https://de.wikipedia.org/wiki/Datei:Waldschl18-small.jpg

A city plan is required not only to develop a compact city but also to preserve national heritage and tourism resources. This plan will prevent, for instance, any haphazard redevelopment of old urban areas. In France, many historic buildings are protected under the *Loi Malraux* (Malraux Law), which aims to preserve, renovate, and commercialise traditional buildings designated by the government. However, Tour Montparnasse, an office skyscraper, was built in an area long known as a centre of artist communes (Figure 3-16). The tower has been criticised for being out of place in the harmonised city. Today, Paris has banned buildings over seven storeys high from the city centre.

Likewise, in China, although many hutongs (old lanes) have been demolished during the country's economic development, some are still designated as protected areas and preserved as part of China's cultural history. This structure is exactly the same as transport problems because city plans and transport policies are closely relevant to each other. Moreover, as earlier mentioned, the 'disharmony between the city and the transport system' encumbers the function of public transport systems. This is where pre-emptive measures should be included in the city plan to make transport policies successful.

Figure 3.16: View of Tour Montparnasse, from the Tower

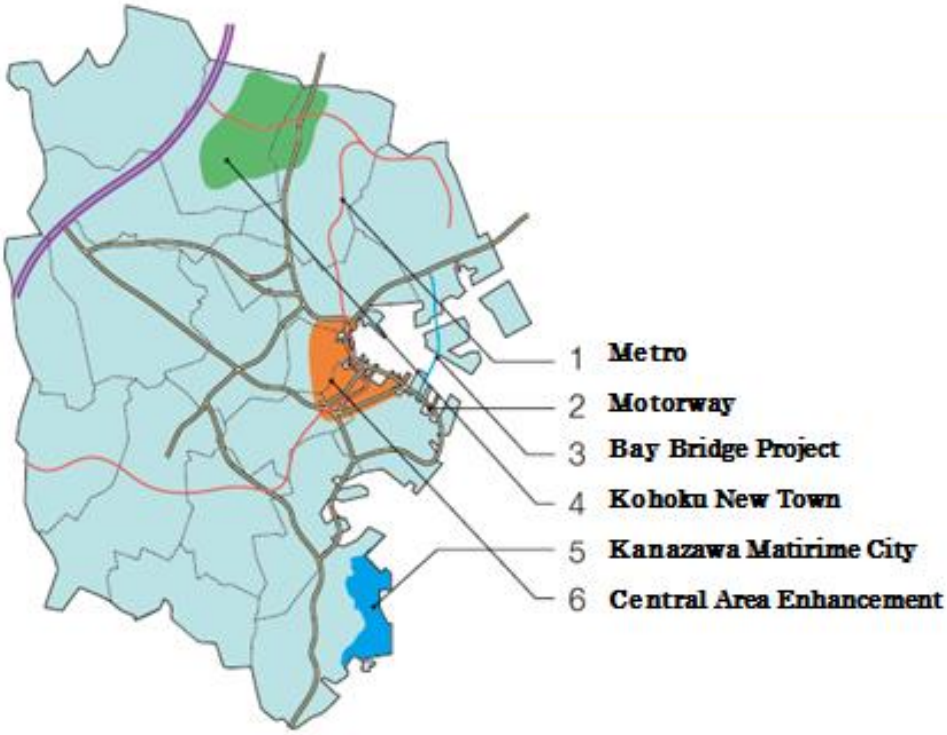
Source: Available at: https://commons.wikimedia.org/wiki/File:Champ_de_Mars_from_the_Eiffel_Tower_-_July_2006_edit.jpg and https://fr.wikipedia.org/wiki/Tour_Montparnasse

Finally, this section concludes with a review of the city design of Yokohama, Japan's second largest city after Tokyo. Yokohama has 3.7 million people, slightly larger than the expected population of Da Nang in 2030. It is located along the coastline of the Pacific Ocean and is the most successful harbour city in Japan.

The city reform project started in the latter half of the 1960s to deal with the various urban problems that had emerged at the height of Japan's economic boom. Yokohama's population tripled from 0.6 million in 1945 to 1.8 million by 1965. The city once suffered from the destruction of farmlands and mountain forests, as well as lacked necessary infrastructure such as schools or parks and had to deal with the consequences of haphazard sprawling development. It eventually gathered momentum to develop the central area of the city, create jobs, and enhance its attractiveness. The following goals were set for the project:

- Protect pedestrians; secure safe walking spaces
- Respect natural characteristics such as local land features and flora
- Cherish the local historical and cultural heritage
- Allow open spaces and greenery
- Value water spaces such as seas and rivers
- Increase community space for human interaction
- Seek morphological and optical beauty.

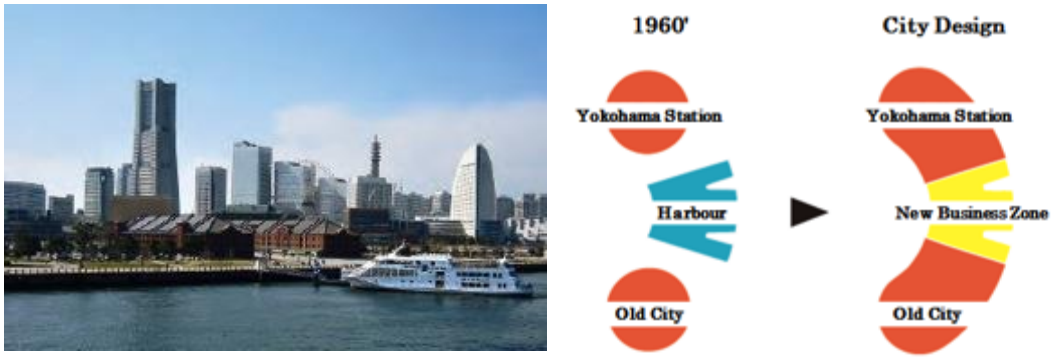
Figure 3.17: Six Major Projects of Yokohama City



Source: City of Yokohama, available at: http://www.city.yokohama.lg.jp/toshi/design/pdf/udleaflet.pdf#search='urban+design+yokohama'

The new central business district connecting Yokohama's two existing city centres was named Minato Mirai 21, which means 'Harbour Future 21'. The district is divided into two main areas. One is the business centre with the Landmark Tower and Nissan Motor Co., Ltd headquarters; the other is the area characterised by different types of low-rise buildings typified by the Red Brick Warehouse. The latter area is designed with a brown-base colour, which contrasts with the predominantly grey-coloured business zone. Thus, each zone is known for different types of appeal and, as a result, contributes to the vitality of the whole city.

Figure 3.18: New Business Zone and Concept



Source: City of Yokohama, available at:
http://www.city.yokohama.lg.jp/toshi/design/pdf/udleaflet.pdf#search='urban+design+yokohama'

What is noteworthy about the urban design of Yokohama is that it stipulates an implementation policy that is based on civic participation and collaboration. It tries to involve all the constitutional units of the city such as the citizens, schools, universities, companies, and community, so that it ultimately solicits more familiar and specific community plans. This is an autonomous revitalisation of communities.

Promoting civic involvement does not mean the end of the city plan. Now that Yokohama has almost completed all its six major projects, it has attained some level of success. It is, however, very concerned for the future, tackling contemporary issues such as energy problems, local autonomy, ageing society with fewer children, and global competition. For the 200th anniversary of the opening of its port, Yokohama is now expanding the scope of the city plan and aiming to unify the circumferential areas of the harbour (Figure 3.19).

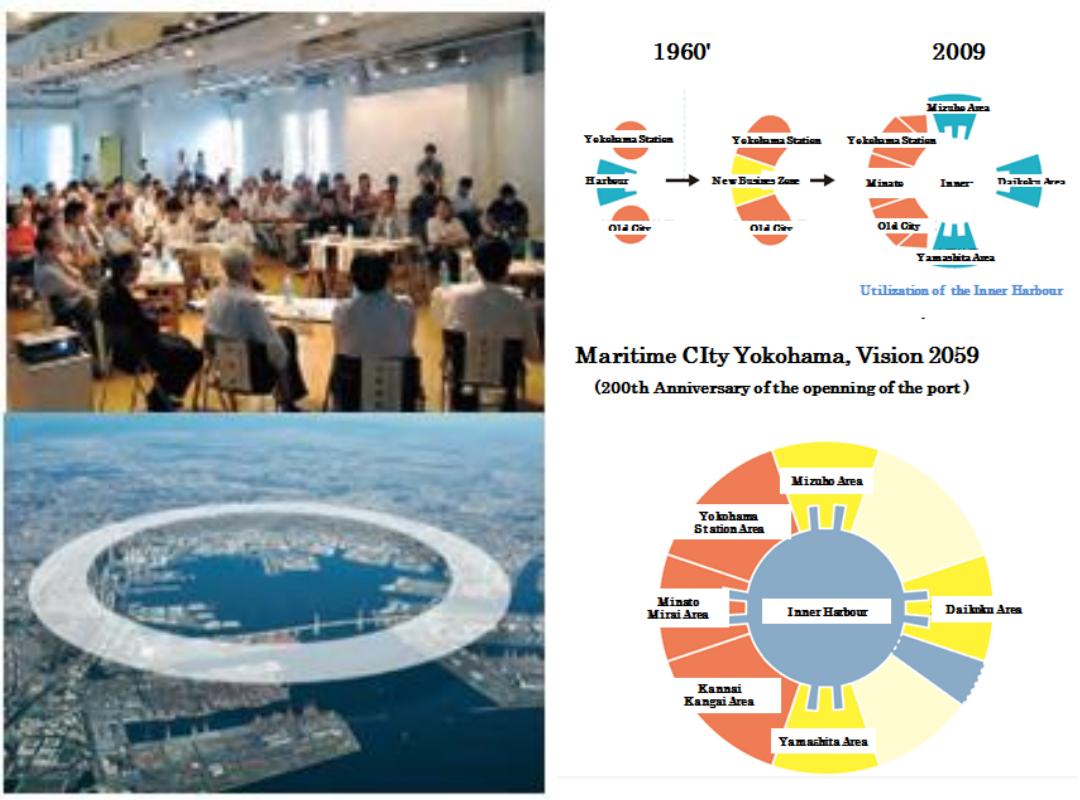
5. Future Issues

This report calls for a deeper research on each policy or city design that will support traffic reforms. Specifically, the strategic combination of policies, relationships between city design and the transport system, relationships between the attractiveness of cities and transport systems, and the methodology that involves citizen participation in the plan should be covered in more detail.

Recall that even Yokohama, which takes a far-sighted city plan, could not avoid the development trap in the 1960s. It must have been a laborious and hard task to solve

those social problems. After all, it took almost 50 years for the city to complete its six projects. Today, Yokohama is implementing pre-emptive measures by detecting latent social problems that might afflict its society in the future. Its vision for 2059 does not sound like some run-of-the-mill ambition. Rather, its vision of a future maritime city with an inner harbour is nothing but exciting, inspiring, and challenging. This paradigm shift—from mere resolution of negative problems (i.e. reactive measures) to proactive creation of positive projects (pre-emptive measures)—seems to be the key to solving urban traffic. This topic also needs further research.

Figure 3.19: Vision 2059 of Yokohama Maritime City



Source: City of Yokohama, available at: http://www.city.yokohama.lg.jp/toshi/design/pdf/udleaflet.pdf#search='urban+design+yokohama'