

**POLITECNICO DI MILANO**



**Faculty of Architecture and Society**

**Master of Science in Urban Planning and Policy Design**

**DO YOU ACCEPT MI?**

**ACCEPTABILITY OF MILAN'S CONGESTION CHARGING IN THE LIGHT OF  
LONDON AND STOCKHOLM**

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## **ABSTRACT**

Increasing levels of car ownership and car-dependency have exacerbated environmental problems such as air and noise pollution. For this reason, Travel Demand Management (TDM) strategies like traffic calming, parking and congestion pricing are being implemented around the world in an attempt to change people's travel behavior.

Although environmental problems caused by private car usage, constitute serious threats to human health and well-being, congestion charging schemes generally unpopular with drivers. The most important and challenging factor for the successful implementation of congestion charges is the public and political acceptability because of the some issues like social norms, infringement on freedom, perceived effectiveness, and personal outcome expectations.

Which kind of policies had been effective for the citizens' acceptance? Is it possible to achieve public approval for congestion charging schemes and how? Is it necessary to have decisive political leadership in order to introduce a successful congestion-charging scheme like in London? Or in order to increase acceptability should the central strategy be to hold a referendum after a trial period like in Stockholm? Are Milan cases successful in terms of acceptability?

In the thesis elements of the political and public acceptability of the congestion charging schemes are examined with the help of case studies. In addition, the acceptability of the Milan case in which road pricing was decided by a citizen referendum based on the experiences of other European cities, will be discussed. This paper argues that the Milan cases (both Ecopass and Area C) are significantly less acceptable than other cases in terms of social norms, equity and socio-economic factors. However, Milan's experience demonstrates that it is possible to increase public acceptability by learning from past mistakes and by taking into account lessons from London and Stockholm.

**Keywords:** Sustainable Transportation, Congestion Charging, Policy Acceptability

## **RIASSUNTO**

Il livello crescente di automobili di proprietà e in generale la dipendenza dalle auto hanno esacerbato i problemi ambientali, come l'inquinamento atmosferico e acustico, oltre a generare fenomeni di congestione nelle aree urbane. Per questo motivo, sono state introdotte strategie, dette Travel Demand Management (TDM), quali la moderazione del traffico, politiche di parcheggio e *congestion pricing*, che vengono attuate in tutto il mondo nel tentativo di cambiare il comportamento dei cittadini.

Nonostante i problemi ambientali causati da un uso delle automobili private costituiscano una grave minaccia per la salute umana e il benessere, i sistemi di tariffazione della congestione sono in genere impopolari, in particolare tra gli automobilisti. Il fattore più importante ed impegnativo per l'implementazione delle politiche di *congestion charge* è quello della sua accettabilità, sia pubblica che politica. Essa è influenzata da alcuni temi come le norme sociali, la presunta violazione delle libertà personali, l'efficacia percepita e le aspettative di risultato personale.

Alcune domande rivestono particolare importanza. Che tipo di politiche sono state attuate per ottenere l'accettazione dei cittadini? E' possibile ottenere una maggiore approvazione del pubblico verso la *congestion charge*, e come? E' necessario avere una decisiva leadership politica al fine di introdurre un efficace sistema di tariffazione della congestione, come a Londra? Oppure, al fine di aumentare l'accettabilità deve essere centrale la strategia di massimizzare la partecipazione? Qual è il ruolo dei referendum e cosa cambia se sono indetti prima o dopo un periodo di prova, come a Stoccolma? E' il caso di Milano, con le sue due "versioni" di pricing, un successo in termini di accettabilità?

Nel lavoro di tesi è stata esaminata, con l'aiuto di casi di studio, l'accettabilità politica e pubblica dei sistemi di *congestion charge*. Sono discussi, inoltre, l'accettabilità del caso Milano in cui la reintroduzione è stata decisa da un referendum cittadino, sulla base delle esperienze di altre città europee. La nostra conclusione è che i casi di Milano (sia Ecopass sia Area C) sono significativamente meno accettabili di altri casi in termini di norme sociali, equità e fattori socio-economici. Tuttavia, l'esperienza di Milano dimostra che è possibile aumentare l'accettabilità pubblica, imparando dagli errori del passato e tenendo conto degli insegnamenti di Londra e Stoccolma.

**Parole Chiave:** Trasporti Sostenibili, Congestion Charging, Accettabilità delle Politiche

# 1. INTRODUCTION

## 1.1. AIM OF THE STUDY

Since the United Nations Conference in 1972, sustainable development has become a major concern for policymakers and planners in both developed and developing countries and the concept has been evolved through concerns about environmental quality, social equity, economic vitality, and the threat of climate change.

Cities are not only the largest consumers of natural resources and the biggest sources of pollution and greenhouse gas emissions on the planet but also the focal points and drivers of societal development in all countries. Traffic is the major concern especially around and inside large cities during the last decades; car ownership and car use has increased rapidly. Increasing traffic causes severe environmental problems like air pollution, noise pollution, climate change, etc. A solution to the enormous traffic congestion problems, to safety and environmental problems is urgently required. Long-term sustainable transportation can be achieved by reducing the usage of private cars and using more environmentally friendly modes of travel like public transportation, walking and cycling.

Different policy strategies may influence households to change their travel behavior. The one of the most popular policies is Traffic Demand Management (TDM). The strategies like traffic calming, parking pricing and congestion pricing are more and more implemented around the world. Most of the examples of congestion charging show that the implementation of congestion charging has reduced congestion in urban areas.

The most important and the most challenging factor for the successful implementation of congestion charging is the public and political acceptability because of the some issues like social norms, infringement on freedom, perceived effectiveness, personal outcome expectations.

Bartley's Demand Management Paradox shows that before adopting a national congestion scheme, its proposal would have to satisfy the following key groups:

- The motorists as the main persons or group affected by the measure (Public Acceptability)
- The politicians as the key decision makers (Political Acceptability)
- The business community and Institutional agents (Schade and Schlag, 2000)

A few studies examined differences in public support for road pricing schemes before and after their implementation. In 2005, the citizens of Edinburgh have rejected a congestion-charging scheme by referendum. However, in some cases like in Milan and

Stockholm, public had accepted the implementation of the congestion charging system by referendum.

The aim of the study is to examine the elements of the political and public acceptability of the Milan case in which road pricing was decided by a citizen referendum on the basis of experience with a specific pricing system by comparison with the successful implementations from Europe (London and Stockholm) and with the help of the available empirical data, the effects of the congestion charging scheme will be analyzed according to public acceptability concerns.

## **1.2. METHOD**

The theoretical background for this thesis is largely based on scholarly literature about the public and political acceptability of congestion charging systems in general and relevant cases implemented. The literature review helps to define the concept of sustainability and sustainable transportation, road pricing scheme as a transportation demand management strategy and finally public and political acceptability, which is the most challenging factor of implementing a congestion charging scheme. Proceeding with the case studies' reviews give some lessons that should be taken into account by the cities which want to introduce a road charging scheme or already have a scheme but need to increase acceptability (like Milan) in the light of the issues that literature suggests. The cases chosen for analysis are taken from cities having road pricing scheme with similar objectives in European context.

## **1.3. STRUCTURE OF THE THESIS**

The thesis is methodically build-up around the concept of public and political acceptability of road pricing schemes. The elements determining acceptability are the focal point of the thesis in the search of the acceptance of Milan's cases both Ecopass and Area C.

First, the concepts of sustainable development, sustainable cities and sustainable mobility are explained in Chapter 2. Then acceptability of congestion charging schemes, which is one of the most effective Transportation Demand Management strategies for reducing traffic and providing sustainable transportation, is explained in Chapter 3. After these two chapters dedicated to literature, in Chapter 4 the case of London and Stockholm analyzed according to the literature about acceptability and underlined some key lessons. While in Chapter 5 in addition to the acceptability analysis as specified by the literature, some interpretations are made by using the available empirical data. Finally in Chapter 6, the comparison between the cases is done, interpretation and observations are described and finally the thesis is concluded by suggestions for Milan.

## 2. SUSTAINABLE DEVELOPMENT AND TRANSPORTATION

### 2.1. SUSTAINABLE DEVELOPMENT

Producing of sustainable development is one of the most important growing interests in order to tackle with the current problems like environmental quality, social equity, economic vitality and the threat of climate change. Therefore, not only develop countries but also developing and under developed countries all over the world are making efforts to increase the sustainability if development patterns.

For the first time in 1972, the first elements of sustainability emerged in the global arena by the Declaration of the United Nations Conference on the human environment, held in Stockholm. It is proclaimed that the natural growth of population continuously presents problems for the preservation of the environment, and adequate policies and measures should be adopted, as appropriate, to face these problems. For the purpose of attaining freedom in the world of nature, man must use knowledge to build, in collaboration with nature, a better environment.

According to the conference, to defend and improve the human environment for present and future generations has become an imperative goal for mankind-a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development. Economic and social development is essential for ensuring a favorable living and working environment for man and for creating conditions on earth that are necessary for the improvement of the quality of life.

In the Brundtland Report –“Our Common Future”- in 1987, the well-known definition of sustainable development was used firstly: *‘sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet the own needs.’* This definition includes the concepts of environmental awareness, inter-generational equity, and social-justice, as well as environmental awareness. It contains within it two key concepts:

- The concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given; and
- The idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs.

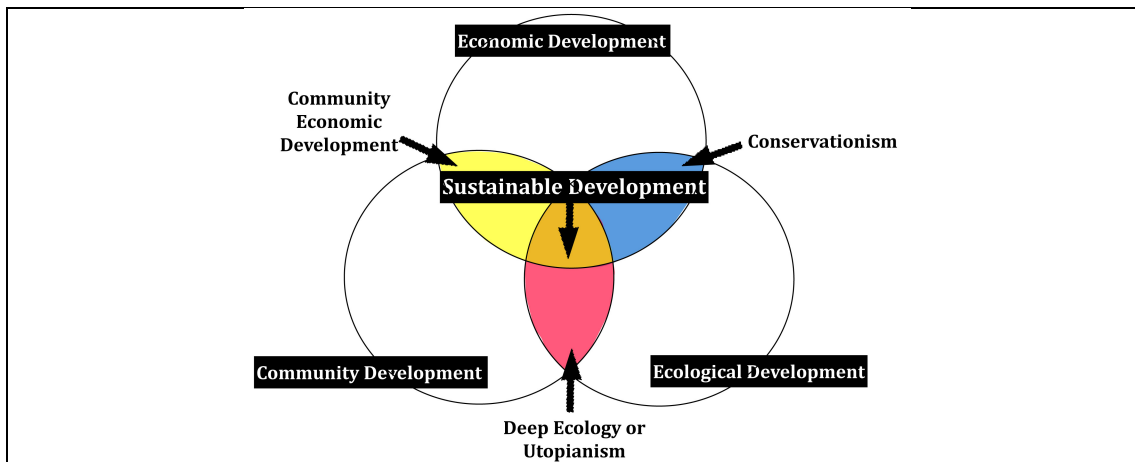


Figure 1. Three Distinct Development Processes underway at the local level (Source: Newman and Kenworthy, 1999, p.4)

The report stated that nature is beautiful but it's also fragile and finely balanced and added that there are thresholds that cannot be crossed and we are close to many of these thresholds. Moreover, it claims that economic development can be sustained without depleting natural resources or harming environment, indeed environment and development are not separate challenges, and they are linked.

5 years later from the Brundtland Report in 1992, the Earth Summit held in Rio de Janeiro by United Nations. In order to achieve sustainable development, the most important principles of the Summit were 'Environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it' and 'Environmental issues are the best handled with the participation of all concerned citizens.' According to Agenda 21, published as an outcome of the Summit, sustainable land-use planning and management and also sustainable energy and transportation systems should be promoted in human settlements. Therefore, to encourage development patterns that reduce transportation demand land-use and transportation planning should be integrated, urban-transportation programs favoring high-occupancy public transportation in countries should be adopted, by providing safe cycle ways and footways non-motorized modes of transportation should be encouraged in urban and suburban centers. The important achievement was the 'Framework Convention on Climate Change', which was the one of two agreements, were opened for signature, in turn led to the Kyoto Protocol (1998), convention on climate change. More than 170 countries signed the protocol.

In 1996, The Habitat II Meeting was held in Istanbul. The purpose of the second United Nations Conference on Human Settlements is to address two themes of equal global importance:

- Adequate shelter for all
- Sustainable human settlements development in an urbanizing world.

According to the meeting, sustainable development is essential for human settlements development, and gives full consideration to the needs and necessities of achieving economic growth, social development and environmental protection. It is proclaimed that city layout and aesthetics, land use patterns, population and building densities, transportation and ease of access for all to basic goods, services and public amenities have a crucial bearing on the livability of settlements.



Today, sustainable development is widely viewed as development that improves the standard of living and quality of life, while at the same time protecting and enhancing the natural environment and honoring local culture and history.

### 2.1.1. SUSTAINABLE CITIES

Cities are the focal points and drivers of societal development in all countries. At the same time, they are the largest consumers of natural resources and the biggest sources of pollution and greenhouse gas emissions on the planet. Therefore, with the discussion of sustainability, the applications of sustainability principles to cities had become the hotly debated topic. Like Yanarella and Levine (1992 cited by Newman and Kenworthy, 1999) say ‘All sustainability initiatives should be centered around strategies for designing, redesigning and building sustainable cities’. They suggest that cities shape the world and that we will never begin the sustainability process unless we can relate it to cities.

Newman and Kenworthy (1999), claims: ‘it is possible to define the goal of sustainability in a city as the reduction of the city’s use of natural resources and production of wastes, while simultaneously improving its livability, so that it can better fit when the capacities of local, regional, and global ecosystems.’

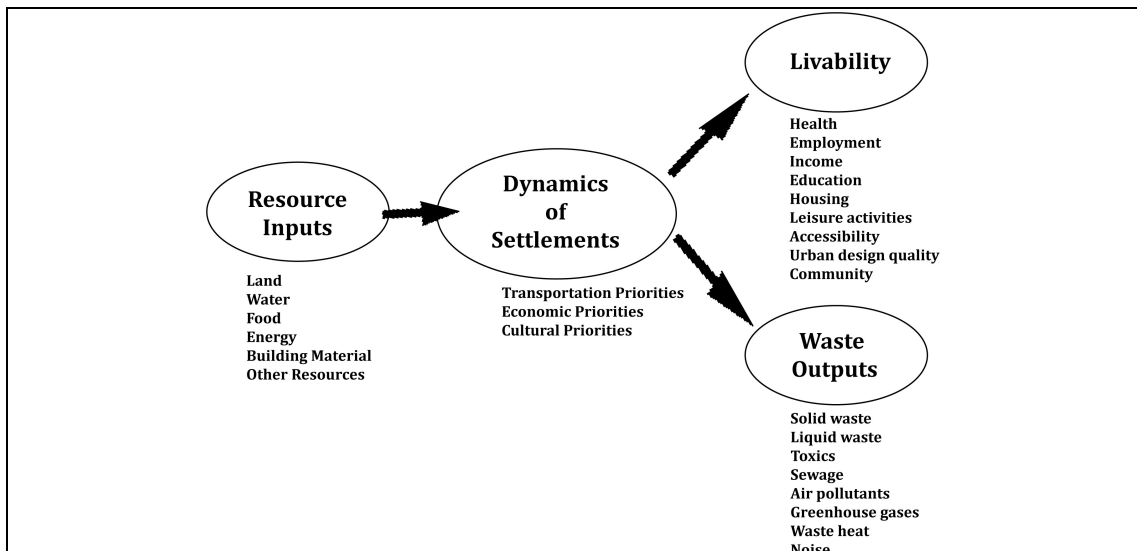


Figure 2. Extended Metabolism Model of Human Settlements ((Source: Newman and Kenworthy, 1999, p.8)

The model called the Extended Metabolism Model of Human Settlements (Figure 2) represents that sustainability for a city is not only about the reducing the metabolic flows (resource inputs and waste outputs); it must also be about increasing human livability (social amenity, health, and well-being). The model is an effective way for cities to try to create a holistic picture of their sustainability agenda. It enables urban managers to create sustainability indicators that together can give a sense of whether they are reducing or increasing their resource inputs and waste outputs and at the same time reducing or improving in livability. (Newman and Kenworthy,1999)

Nijkamp and Pepping (1998) declares ‘Sustainable development has of course a global dimension, but it is also increasingly recognized that there is close mutual interaction between local and global processes: cities are open systems impacting on all other areas and on the earth as a whole, and vice versa..... Sustainability in an urban setting describes the potential of a city to reach a new level of socioeconomic, demographic, environmental and technological performance, which in the long run reinforces the foundations of the

*urban system itself. Thus urban sustainability ensures a long-term continuity of the urban system.'*

The report of 'State of World Population 2007' by United Nations Population Fund (2007) claims that in 2008, for the first time in history, more than half its human population, 3.3 billion people, will be living in urban areas. By 2030, this is expected to swell to almost 5 billion. According to Nijkamp and Pepping (1998) that makes the urbanized areas suitable as focal points of energy environmental policies. There is the obvious reason that most production, consumption and transportation activities in a country take place in urban areas. Local strategies will have to be integrated into a more inclusive temporal and spatial framework to address broader problems and ensure longer-term sustainability (UNFPA, 2007). Cities play a significant role in social and economic activities, but they perform poorly in terms of environmental conservation because of externalities.

Also in the Brundtland Report, it is underlined that, because of the worldwide rapid growth fuel consumption for heating and cooling, automobile transportation, industrial activities and electricity generation have increased dramatically. As a result, air pollution has reached serious levels in the cities of several industrial and newly industrialized countries. Therefore fuel-saving strategies like the organizing of carefully planned public transportation systems, ensuring access to the best available fuel efficient designs and production processes; have to be implemented especially in the growing cities of developing countries.

According to Newman and Kenworthy (1999), with the help of the Extended Metabolism Model (Figure 2) it is possible to procure a set of practical goals or indicators for sustainable city for who seeks to define the indicators of sustainable city and needs to pursue the sustainability agenda around the world. Each indicator requires further explanation and detail, but the basic idea can be seen in the Table 1.

<b>Energy and Air Quality</b>	Reduce total energy use per capita
	Reduce total quantity of air pollutants per capita
	Reduce total greenhouse gases
	Reduce number of vehicles failing emission standards
<b>Water, Materials and Waste</b>	Reduce total water use per capita
	Decrease amount of sewage and industrial waste discharged to streams or ocean
	Decrease amount of solid waste / Increase amount of organic waste
	Reduce consumption of paper and packaging per capita
<b>Land, Green Spaces and Biodiversity</b>	Preserve agricultural land and natural landscape at the urban fringe
	Increase proportion of urban redevelopment to new development
	Increase number of specially zoned transit-oriented locations
	Increase amount of green space in local or regional parks per capita
<b>Transportation</b>	Reduce car use per capita
	Increase transit, walk/bike, and carpooling
	Reduce average commute to and from work
	Increase kilometers of separated cycle ways
	Increase educational attainment (average years per adult)
	Increase local leisure opportunities

<b>Livability Human Amenities and Health</b>	Decrease transportation fatalities and deaths from urban violence
	Increase proportion of city allowing mixed-use, higher-density urban villages

Table 1. Annual Goals and Indicators for a Sustainable City (Source: Newmann and Kenworthy, 1999, p.18-19)

## 2.2. SUSTAINABLE MOBILITY

Since transportation has an important role in sustainable development, helping to create communities, which are socially inclusive, improving access to key services and contributing to emission reductions to address climate change, a myriad of conferences were held, international reports were published about sustainable transportation, like EU Common Transport Policy (1957), OECD: Towards Sustainable Transportation Vancouver Conference (1996) and EU Transport White Paper (2001). Also the importance of sustainable transportation had underlined at the most important international conferences like the Brundtland Report and the Earth Summit, which are the milestones of the sustainable development concept.

According to Earth Summit, Rio de Janeiro, 1992, transportation accounts for about 30 per cent of commercial energy consumption and for about 60 per cent of total global consumption of liquid petroleum and in developing countries, rapid motorization and insufficient investments in urban-transportation planning, traffic management and infrastructure, are creating increasing problems in terms of accidents and injury, health, noise, congestion and loss of productivity similar to those occurring in many developed countries. Therefore, promoting efficient and environmentally sound urban transportation systems in all countries should be a comprehensive approach to urban-transportation planning and management. To this end, all countries should:

- Integrate land-use and transportation planning to encourage development patterns that reduce transportation demand
- Adopt urban-transportation programs favoring high-occupancy public transportation in countries,
- Encourage non-motorized modes of transportation by providing safe cycle ways and footways in urban and suburban centers in countries
- Devote particular attention to effective traffic management, efficient operation of public transportation and maintenance of transportation infrastructure
- Promote the exchange of information among countries and representatives of local and metropolitan areas,
- Re-evaluate the present consumption and production patterns in order to reduce the use of energy and national resources.

According to Organization for Economic Cooperation and Development (OECD), an environmentally sustainable transportation system is:

*‘Transportation that does not endanger public health or ecosystems and meets mobility needs consistent with (a) use of renewable resources at below their rates of regeneration and (b) use of non-renewable resources at below the rates of development of renewable substitutes.’ (OECD, 1997)*

Today in all metropolitan regions, the problem of the automobile and its environmental impact is a major issue. According to Litman and Burwell (2006), transportation has significant and long lasting economical, social and environmental impacts, and so is an important dimension of urban sustainability.

Road traffic, industry and construction operations can generate high levels of air and noise pollution in urban areas, reducing local environmental quality and contributing to climate change. Transportation is vital in connecting people and places. However, poor transportation provision can lead to social exclusion and the severance of communities. Therefore in order to identify sustainable transportation solutions, the social, economic and environmental impacts of transportation have to be understood.

<b>Economic</b>	<b>Social</b>	<b>Environmental</b>
Traffic Congestion	Inequity of Impacts	Air pollution
Mobility Barriers	Mobility Disadvantaged	Climate Change
Crash Damages	Human Health Impacts	Habitat Loss
Transportation facility costs	Community Cohesion	Water Pollution
Consumer transportation costs	Community Livability	Hydrologic Impacts
Depletion of non-renewable resources	Aesthetics	Noise Pollution

Table 2. Transportation Impacts on Sustainability (Source: Litman and Burwell, 2006, p.335)

The current transportation development poses significant and growing threats to the environment and human health. The drastic growth in road transportation is the main driver behind this development. (EU Common Transport Policy, 2003) Although individual transportation has numerous advantages in flexibility, speed, privacy and comfort of travel, these advantages should be weighed against their impact on energy consumption and land use (UNCHS -HABITAT, 2001).

Likewise Newman and Kenworthy (1999) place transportation at the center of urban sustainability challenge and suggest that the five key policies are needed to overcome automobile dependence:

- Traffic calming to slow auto traffic and create more urban humane environments better suited to other transportation modes.
- Improved transit, bicycling and walking to provide genuine options to the car'
- Improved land use, especially urban villages that can create multimodal centers with mixed, dense land use that reduce the need to travel,
- Growth management to prevent sprawl and redirect development into urban villages,
- Economic incentives, such as congestion charging, road toll systems

### **2.2.1. TRANSPORTATION DEMAND MANAGEMENT**

*'Transportation is presently unsustainable in terms of resource use and is becoming more unsustainable.'* (OECD, 1997) According to Black and Schreffler (2010) key to the successful transfer of sustainable urban transportation policies is integrating the TDM philosophy into urban transportation planning, as well as the daily management and operation of transportation services and infrastructure.

The term Transportation Demand Management (TDM) has its origins in the United States and has involved strategies to convince commuters to move to higher-occupancy modes, like carpooling or public transportation. After USA, the concept borrowed from all over the world and is recognized as a supportive tool for alleviating the impacts of greenhouse emissions.

According to Victoria Transport Policy Institute (2011) Transportation Demand Management, which can help create a more sustainable transportation, is a general term for strategies that result in more efficient use of transportation resources. It treats

mobility as a means to an end rather than an end itself and emphasizes the movement of people and goods, rather than motor vehicles and so gives priority to more efficient modes like walking, cycling, and public transportation.

One set of tools to address urban mobility and accessibility without expensive and environmentally controversial capital projects is broadly titled transportation demand management. Related concepts that are part of a system to manage travel demand within a sustainable urban transportation approach include:

- Mobility management,
- Travel awareness,
- Smarter choices,
- Travel planning,
- Trip reduction programs, and
- Active traffic management. (Black and Schreffler, 2010)

There are many different TDM strategies with a variety of impacts. Some improve the transportation options available to consumers. Some provide incentives to change trip scheduling, route, mode or destination. Others reduce the need for physical travel through more efficient land use, or transportation substitutes. Online TDM Encyclopedia categorizes under four major titles. (Victoria Transport Policy Institute, 2011)

- Improved Transportation Options; like Bus Rapid Transit, Car Sharing, Park and Ride, Traffic Calming, etc.
- Incentives to Use Alternative Modes and Reduce Driving; Congestion charging, Carbon Taxes, Speed Reductions, Walking And Cycling Encouragement, etc.
- Parking and Land Use Management; Bicycle Parking, Land Use Density and Clustering, Parking Management, Transit Oriented Development (TOD), etc.
- Policy and Institutional Reforms; Operations and Management Programs, Prioritizing Transportation, Regulatory Reform, etc.

#### **2.2.1.1. CONGESTION CHARGING**

Under the 'Incentives to Use Alternative Modes and Reduce Driving' category of Travel Demand Management, congestion charging is a type of road pricing like road tolls, cordon tolls, HOT lanes, etc. Like Newman and Kenworthy, several authors all over the world have considered transportation pricing measures and policies as promising attempts to solve urgent traffic problems, that is, to overcome automobile dependence in urban areas.

The instrument of congestion charging aims to achieve a reduction in congestion and impacts on the environment of car usage through the management of demand for road space and without increasing supply. Congestion charging is intended to ensure that each road user takes into account the impact of her journey on other road users and the public and internalizes these effects. Those who don't have a choice, or who choose to 'stay and pay', should benefit from an easier and faster journey.

Congestion charging is one of a number of alternative demand side strategies offered by economists to address traffic congestion. The literature on congestion pricing launched by Pigou (1920) and Knight (1924), who wrote their seminal contributions about the misallocation of resources that would result from free access to public roads. The external effect is the fundamental reason behind this phenomenon: *'if there is congestion, each trip on the road forces other users to slowdown, and therefore to have longer trip times. In the absence of a toll, a driver does not have to pay for the additional*

costs he imposes on others. When this cost is ignored, the market fails. The situation can be improved by corrective policy measures, a toll being the main example.' (Rouwendaal and Verhoef, 2006)

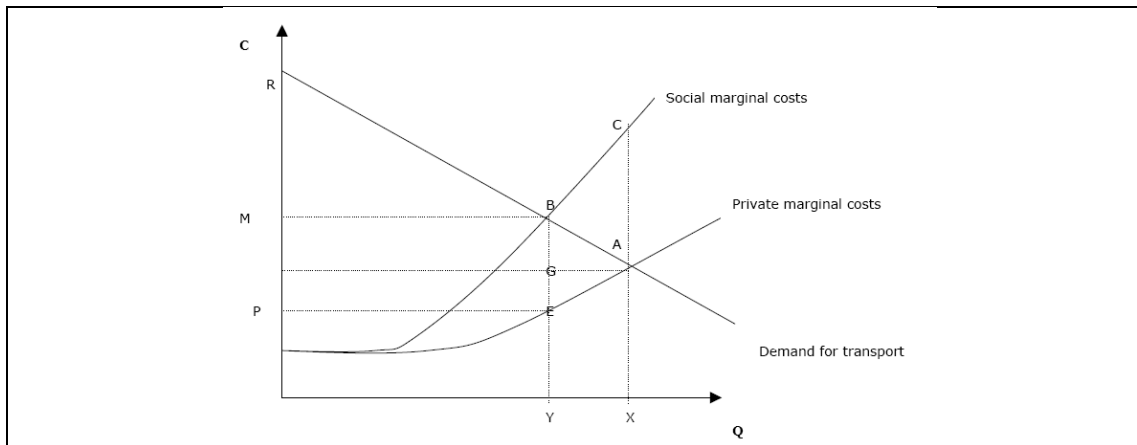


Figure 3. Graphically Road Congestion (Silva, 2007, p.8)

Silva (2007), explains the theory behind the congestion charging scheme: *'The quantity of road usage is indicated on the horizontal axis and the unit costs are indicated on the vertical axis. The downward-sloping curve indicates the demand for transportation; the curve labeled Private Marginal Cost represent the cost borne by every new single motorist entering the road; the Social Marginal Cost curve is the unit social cost created by a single vehicle as a function of road usage and includes the individual cost plus the additional time spent by all other vehicles because one more motorist is using the road. Point B, where demand intersects the social cost curve, is the optimal solution for society: Y vehicle km and M unit cost. However, since users fail to take into account the cost not directly borne by them, they will choose quantity X, at a cost equal to P, corresponding to the intersection of private marginal cost with demand (point A). The optimal situation can be reached through the imposition of a charge equal to EB, which will reconcile private cost and social cost. It can be observed that the optimal congestion level is different from zero: the aim of road pricing should not be a total elimination of traffic. Congestion costs should be defined as what is lost by the society by not being at optimum, are equal to BCA and are also equal to the benefit of introducing the optimal charge. Revenues from the tax are represented by MPEB.'*

According to Hardin (1968), The pollution problem is a consequence of population and there is no foreseeable a technical solution to increasing both human populations and their standard of living on a finite planet. If there were no limitations for the usage of the common resources, they will be completely exhausted. Using the common resources without any limitation can be advantageous in that moment. However in the long term it becomes what he calls 'the tragedy of commons'. Especially considering the natural resources, there should be 'enclosure of commons' like privatization, regulations and polluter pays system.

### 3. ACCEPTABILITY OF CONGESTION CHARGING

Reducing congestion is a central concern in transport policy in many countries both for economic and environmental reasons and transportation policy makers increasingly consider congestion pricing an effective option for this concern. However, public acceptance is considered a major obstacle in setting up a congestion charging scheme. Also, congestion charging schemes may not be politically feasible if they are not acceptable to the public. In particular, the scheme is not easily implemented because lack of public support causes political restraint. Like in Edinburgh and Manchester, public showed their opposition in the referendum in contrast in Milan the congestion charging scheme, Area C, had support from 79 % of the voters like in Stockholm (51%). Separately, in London the scheme established in 2003 without having a referendum.

The aim of this chapter is to evaluate the reasons behind the acceptance and non-acceptance of congestion charging schemes by analyzing the literature. In addition, who the public is, what the public and political acceptability is and how the barriers can be achieved will be explained by examining issues determining acceptability, approaches for building acceptance and finally guidelines for acceptable implementation will be suggested. With the help of the literature review, in the next chapters, successful cases from Europe, London and Stockholm, will be examined in detail (chapter 4) and case of Milan will be analyzed whether it is successful as referendum results shows (chapter 5).

Lowi (1964, 1985) (as cited in Wilson 1973) has proposed threefold classification of public policy relevant to explain barriers related stakeholder, public and political acceptance.

- Distributive policies motivate activity by small organizations like research and development and business policies and attempt a particular benefit on the basis 'every man for himself'.
- Regulatory policies involves a governmental choice as to 'who will be indulged and who deprived' on the basis of some general rules. Also the policies concern legislation and sanctions to influence the activities of citizens and companies (e.g. road traffic acts)
- Redistributive policies encourage the activities of peak associations that have a broad interest in representing a social class and imply redistribution of income by taxation. Welfare state programmes represent traditional examples (but in this context, examples could be congestion charges and heavy vehicle fees).

Another categorization of public policy emphasizes that policy changes can be classified

on the basis of whether costs and benefits of the policy are concentrated to a small group or divided among a larger population. (Wilson, 1980 as cited in OPTIC, 2011)

	Concentrated Costs	Distributed Costs
Concentrated Benefits	Interest Group Politics	Client Politics
Distributed Benefits	Entrepreneurial Politics	Majority Politics

Table 3. Wilson's theory. (Source: OPTIC, 2011, p.17)

- Majority policy, where both benefits and costs are spread, is not likely to be decided and implemented because no specific group cares sufficiently. (e.g. social security payments)
- Entrepreneur policy where benefits are spread and costs focused. Groups affected negatively by the policy have incentives to organize and struggle against the policy. (e.g. environmental policy)
- Client policy, with focused benefit and spread costs is in contrast most likely to be adopted and implemented, because those groups benefiting from the policy will be likely to mobilize, while those paying the costs will not. (e.g. many distributive policies, transport infrastructure projects)
- Interest group policy where both benefits and costs are focused and cause organized conflict. (e.g. labor market policies) In general, as a result of negotiations policy changes. (OPTIC, 2011)

As regards cultural, public, stakeholder and political barriers it follows from the terminologies of Lowi and Wilson that policy makers should aim to establish policy packages with a flavor of distributive and client policies and avoid purely redistributive, regulatory and entrepreneur policy packages. Hence, for instance if a policy can be considered redistributive, regulatory or entrepreneur policy the chances of formation and implementation would increase if it were included in policy packages with aspects of majority or interest group policy, or even distributive and client policy.

According to Wilson (1980 as cited in OPTIC, 2011), whether costs and benefits of a policy package are concentrated or distributed greatly affects the likelihood of acceptance. Most acceptable policies yield focused benefits but distributed costs, because those getting clear benefits will mobilize while those getting the insignificant disadvantages will not care. Thus, a strategy to increase acceptance may be to make benefits concentrated rather than distributed or to make costs distributed rather than concentrated or both.

### 3.1. PUBLIC ACCEPTABILITY

According to Schade and Schlag (2000, 2003), the term of 'public acceptability' is much debated issue however there is lack of conceptual clarity about definitions, methodology and general research frameworks. What exactly meant by acceptance is fuzzy as *"acceptance of what, through whom and under which conditions and circumstances"*. 'Acceptability' refers to the attitude towards a specific object. That's why it is something more hypothetical, however 'acceptance' is related to some kind of behavior as an (re-) action towards an object.

In addition, it is needed to define what public is. Is it motorists, voters, consumers, citizens or inhabitants? Bartley (1995 as cited in Schade and Schlag 2000) demonstrates the complexity and interconnectedness of the general decision making process by The



Demand Management Paradox which demonstrates that any proposed national charging scheme would have to satisfy the following key groups before it could be adopted:

- The motorists as the main persons or group affected by the measure (Public Acceptability)
- The politicians as the key decision makers (Political Acceptability)
- The business community and Institutional agents

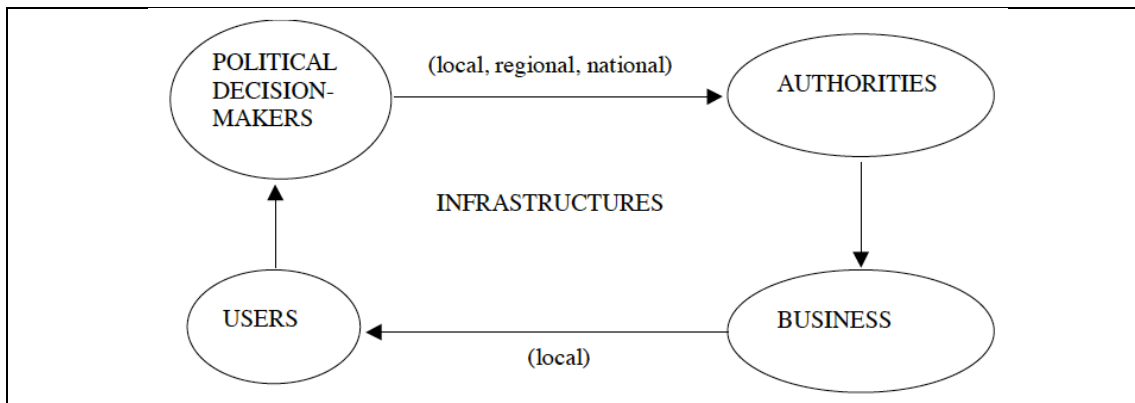


Figure 4. The Demand Management Paradox of Bartley (Schade and Schlag, 2000, p.6)

Jones (1998) summarizes the concerns of the public about the congestion charging scheme under eight headings.

- Drivers find it difficult to accept the notion that they should be 'charged for congestion'. They think that they are not the contributors to it but the victim of it and also they are already 'paying for congestion' in terms of delays and additional stress of driving in congested conditions.
- Introducing congestion charging scheme is a very extreme measure, it is not needed. Sometimes drivers would rather put up with the delays or traffic reduction can be achieved in other ways like better public transportation.
- Drivers think that pricing will be a very ineffective means of discouraging car use. However high charges, most drivers will be forced to carry on driving as the alternative transportation modes are inadequate and they will want to maximize the benefit from their investment (cars).
- The technology of the scheme is not reliable, incorrect charges can be made or particular vehicles may not correctly recorded. Even it is reliable, if some drivers refuse to pay the system will not work.
- The camera technology may lead privacy invasion by identifying individual moments.
- The scheme will cause severe boundary problems. Many drivers will park just outside the zone and complete their journey on foot or by public transport. Therefore, there will be congestion in previously uncongested areas.
- The scheme is just another form of taxation. Because of the growing suspicion of government, especially in Western democracies drivers think that the measure is just an easy option for absorption.
- The scheme is unfair. The urban road network unlike motorways is viewed as public space that is free to use and congestion may be viewed as a socially preferable form of rationing rather than introducing rationing by money.

It is necessary that in order to have public's approval, political authorities have to deal with these concerns.

### 3.1.1. GOODWIN'S CYCLE OF PUBLIC ACCEPTABILITY

Before defining the factor determining acceptability, it is necessary to identify the Goodwin's three phases for road pricing debate.

Goodwin (2006 as cited by Bird and Morris, 2006) produced a diagram describing the cycle of public acceptability of congestion charging schemes and depicting an S-shaped curve of public support over time. According to Bird and Morris (2006) all the schemes do not exactly map Goodwin's graph. But international and domestic experience does suggest that most road pricing schemes do follow approximately the same trend.

According to Goodwin acceptability passes through three phases.

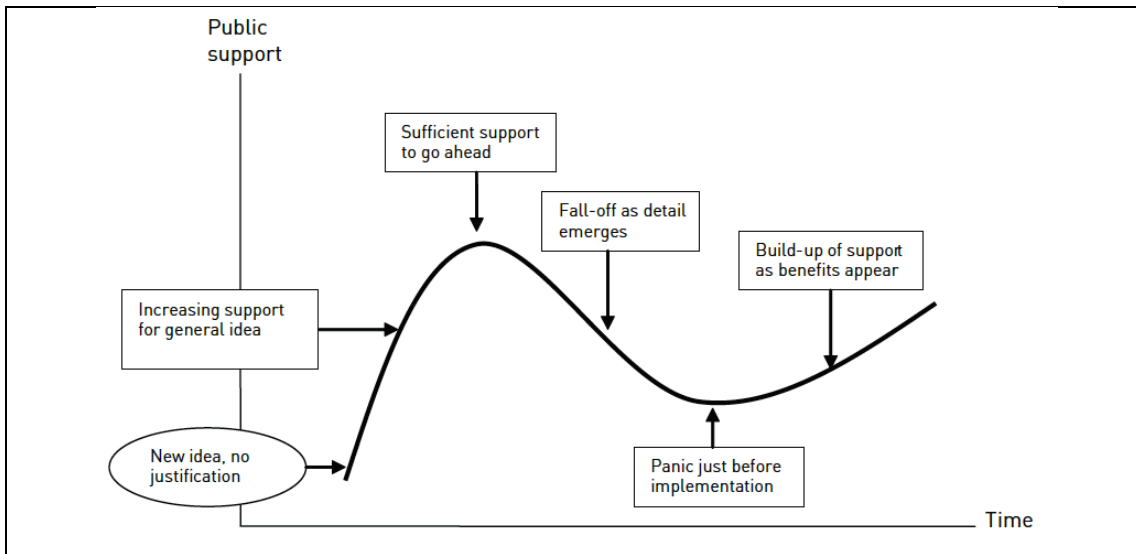
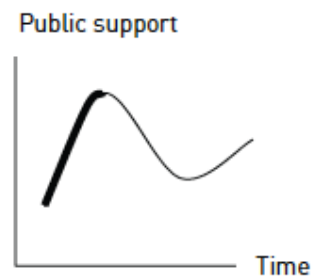


Figure 5. Goodwin's cycle of public acceptability (Source: Bird and Morris, 2006, p.14)

#### Phase 1: Recognition of the Problem

In the beginning since the public do not have any desire for road pricing among the public, the acceptance is very low. In order to increase openness towards the idea of road pricing, two factors should be recognized:

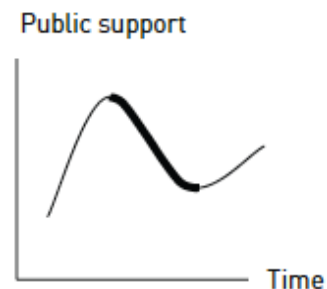
- The presence of a problem that needs to be addressed
- Ineffectiveness of traditional measures to solve the problem. (Bird and Morris, 2006)



Since the public may not see road pricing scheme as a solution, just the idea should be opened. (Bird and Morris, 2006) For instance in London congestion was perceived as an important problem and everybody was agree that something has to be done for that. Therefore, the introduction of the charge does appear to have addressed these concerns.

#### Phase 2: Emerging Details

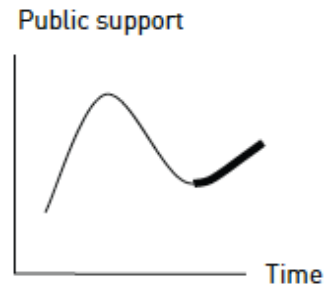
As more detailed plans are presented, the public is less able to accept it. (Bird and Morris, 2006) For instance in Stockholm after the details of the scheme were introduced, the support of the public had decreased. However, the existing schemes have attempted to address this through the way they are designed (for example, by providing



exemptions), the expansion of public transport and extensive communications campaigns.

*Phase 3: Increasing acceptability*

According to Goodwin (2006 (2006 as cited by Bird and Morris, 2006) after road pricing has been introduced, there is significant evidence that acceptability increases like in London or Stockholm case. At this point, personal experience takes over from speculation, and support rises again.



In addition according to Goodwin (as cited by Bird and Morris, 2006), the successful introduction of road pricing is linked to five conditions:

- Condition 1: The public sees congestion as a problem.
- Condition 2: The public sees the need for a radical solution.
- Condition 3: The public sees that road pricing is a viable solution.
- Condition 4: Opposition is minimized as scheme details emerge and are adapted to meet public concern wherever possible.
- Condition 5: There is sufficient political support for road pricing to ride out opposition and reap the benefits of increased support after its introduction.

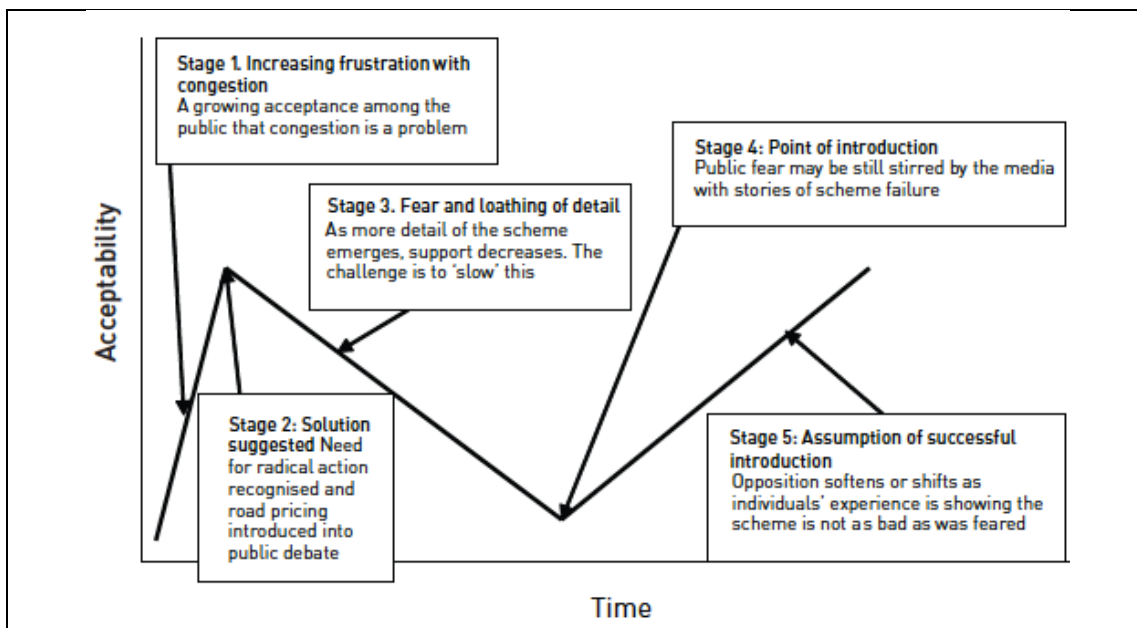


Figure 6. Cycle of the road pricing debate (Bird and Morris, 2006, p.23)

In the first two conditions congestion is a problem and it requires a radical solution. In the third condition road pricing could be presented as a part of a package of measures to address congestion and also involve the public accepting that road pricing would be an effective response to congestion. In the fourth and fifth condition unacceptability is minimized and that the government must ride out opposition. (Bird and Morris, 2006)

**3.1.2. ISSUES DETERMINING ACCEPTABILITY**

According to Schade and Schlag (2000), after defining the term of 'public' and 'acceptability', in order to increase the acceptability of congestion charging schemes essential issues determining acceptability should be described.

- Problem perception
- Important aims to reach,
- Mobility related social norms,
- Knowledge about options,
- Perceived effectiveness and efficiency of the proposed measures,
- Equity (personal outcome expectation),
- Attribution of responsibility,
- Socio-economic factors.

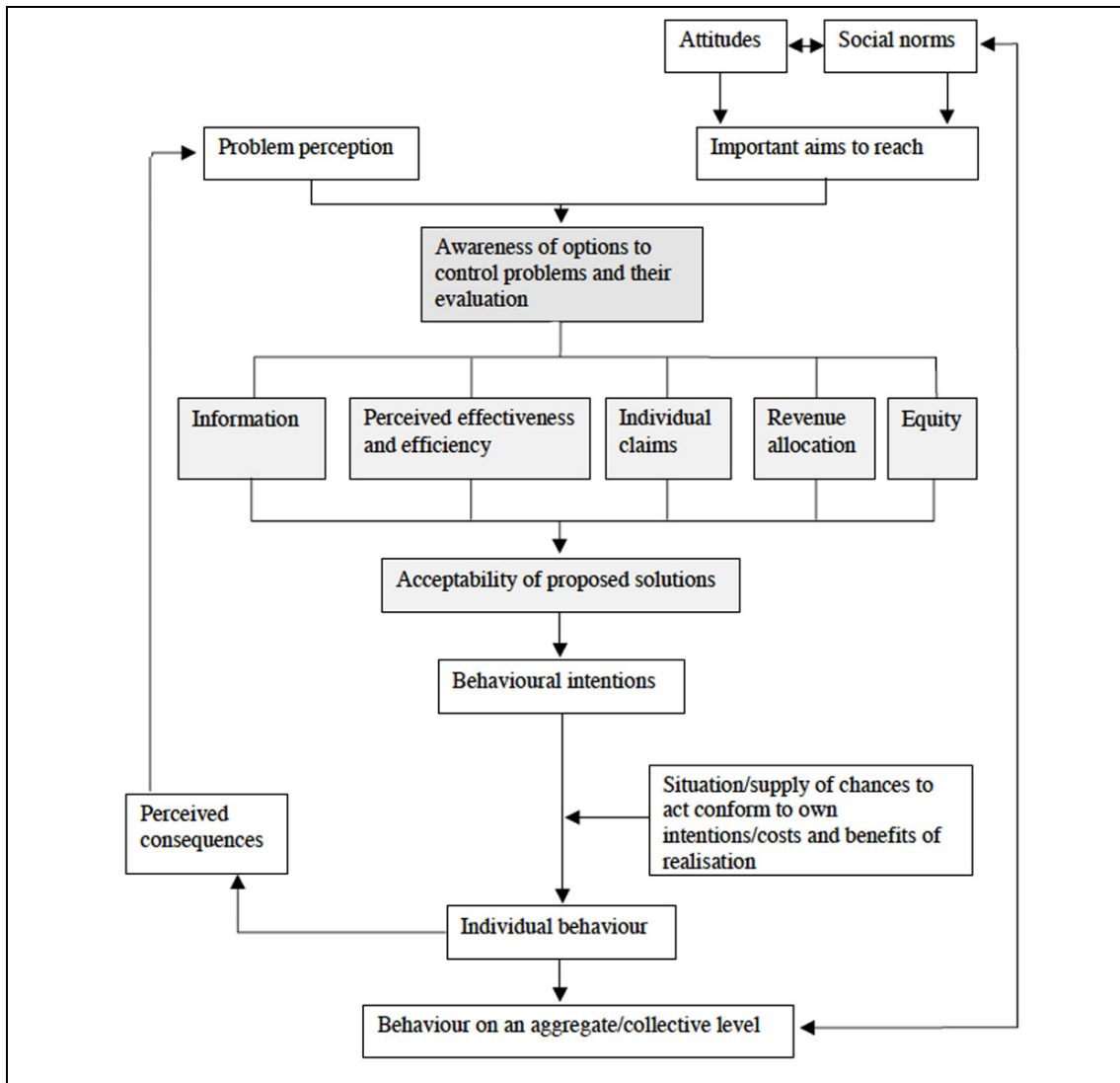


Figure 7. Structure of acceptability issues (Schade and Schlag, 2000, p.10)

For the acceptance of the congestion charging systems the first essential issue is **'problem perception'**. In order to be acceptable, there should be a severe problem whose consequences are judged to be problematic and damaging. Like Jones (1998) says 'pain' must be worth 'gain'. The problem should be seen as likely to get worse in the future and widely shared across the community. For instance in Milan, every single person was aware of the severe level of the air pollution of Milan and so everybody was agree that something should be done in order to fight with the air pollution.



Figure 8. Motorists' Problem Perception and an advertisement (Source: [http://sp2.fotolog.com/photo/18/52/85/luckyshot/1199138587\\_f.jpg](http://sp2.fotolog.com/photo/18/52/85/luckyshot/1199138587_f.jpg) and <http://cogitatedotcom.files.wordpress.com/2011/02/you-are-traffic-sign-via-copenhagenize.jpg?w=500>)

The **main aim of the scheme** is an affective factor for the acceptance. There are different general aims like demand management, ecological aims, financial aims, and mobility aims. According to Schade and Schlag (2000), public search for certain mobility aims. Conflict between different aims, which can cause uncertainty, is crucial for the acceptability. In addition, even though social aims are more favorable to the acceptance of the congestion charging schemes, personal aims compete with it. The reason is that people doesn't want to change their mode of travel, they want to use their private car whenever they want. Therefore this problem generates 'social dilemma'. For example, McQuiad and Grieco (2005) claims: *'the use of a cordon system, rather than a zone system (where anyone traveling within the zone would pay the toll) meant that those causing congestion solely within Edinburgh would not be influenced by the charges. This suggested that reducing congestion may have been a secondary motive to the pressure to gain political support for the referendum to introduce congestion pricing and that congestion pricing for Edinburgh had a high revenue raising component.'* As a result, public denied the congestion charging scheme in referendum.

According to Ajzen (1991 as cited by Schade and Schlag, 2003), **perceived social norms** refer to perceived opinions of others with the importance of the other's opinions. In other words, it is the respondent's assumption about his friends and family's opinion. Therefore, if a person's social circle is favorable to a presented pricing strategy, his/her reaction to the scheme will be positive.

Moreover, **knowledge about the action** is necessary but not sufficient precondition for the acceptability. People have to have an idea about the problem and the aims of the scheme. The information has to be clear and objective. Informed people are more aware of the advantages and disadvantages of road pricing than uninformed people. (Schade and Schlag, 2003) For example in Stockholm, information was given to public via flyers, posters, meetings, signs on busses and parking meters, letters, commercials on radio and television, website (including monthly reports). The public received much information about positive effects of the system of congestion charging. Before the implementation of the charge acceptability was lower. After the trial the acceptance of congestion charge had increased because people experienced positive consequences of the charge. However, public support for road pricing schemes doesn't always increase after their implementation, despite the existence information campaigns. For example, in Copenhagen, before and after the road pricing experiment, the public reaction hasn't changed.

Apart information, that is more-or-less a pre-requisite of acceptability, **perceived**

**effectiveness and efficiency of the proposal** are one of the most important determinants for the acceptability of congestion-charging schemes. According to Schade and Schlag (2003) *'In this context effectiveness refers to the degree to which the aims of the measure can be reached and efficiency means the cost-benefit-relation of the congestion charging measure.'* People are used to regard public roads as 'free' goods; therefore there will be strong emotional resistance to any attempt for charging their use.

Like Guiliano (1992, cited by McQuiad and Grieco, 2005) says: *'the main reasons for non-introduction of road pricing are public scepticism about outcomes (i.e. the effectiveness of the schemes), concerns on impacts on business and resistance to charges for what is free (i.e. conflicts with prior experience).'* In Edinburgh, according to Gaunt et al. (2006), the public were largely unconvinced that the scheme would have achieved its dual objectives of reducing congestion and improving public transport.

A key factor influencing acceptability and affecting the behavior of almost any individual is **equity** (Social fairness), which refers to the distribution of costs and benefits. (Guiliano, 1994, as cited in Schade and Schlag, 2003) As Schade and Achlag claims *'From the psychological point of view perceived justice is the basic requirement for the acceptability.'* The more people perceive advantages following the introduction of road pricing, the more they will be willing to accept it. In addition, allocation of revenues, may influence the distributional impacts, plays a crucial role in increasing acceptability, mainly via fairness considerations.

According to Jones (2003), there are two primary dimensions to equity. These are:

**-Spatial equity** is the right of access to jobs, goods and services from any location. For example, a person lives just outside the charging area but works inside the area is spatially disadvantaged than a person who both lives and works inside the charging area. The problem is clearly dependent on the nature of the Congestion Charging scheme. However it can be solved by the reinvestment of the revenues if they are spent for transportation related investments such as extension of public transportation.

**-Social equity** is the major public and political concern of the measure. Those who value the journey more highly will be willing to pay and to enjoy improved traveling conditions however low income group doesn't have such a choice. Therefore socially marginal journey does not equate to the economically marginal journey.

According to Rawls (1971 as cited by Raux and Souche, 2003, p. 155-156), in addition to the spatial equity corresponds to 'principle of liberty', there are two more dimensions of equity which are directly applicable to the transport field and its pricing. These are:

**-Horizontal equity**, principle of equal opportunity, means that individuals in similar situations are treated similarly. It involves the equality of treatment of different users and in particular the user-pays principle –get what they pay for and pay for what they get.

**-Vertical equity**, 'principle of difference', states that individuals in dissimilar or unequal situations should be treated dissimilarly in an effort to make them more equal. (e.g. in the context of congestion charging; exemptions and price reduction)

According to Viegas (2001), **longitudinal equity** that is related with the comparison of conditions between present and past, for each citizen individually, and for social groups

(balance of gains and losses), must be considered. He believes that for the discussion of urban road pricing the two most pressing dimensions of equity are longitudinal equity- having to pay for what previously was freely available and taken by many as a basic right- and vertical equity- risk of exclusion from access to a wide range of urban functions for those with little revenue available for the extra cost of driving into the city.

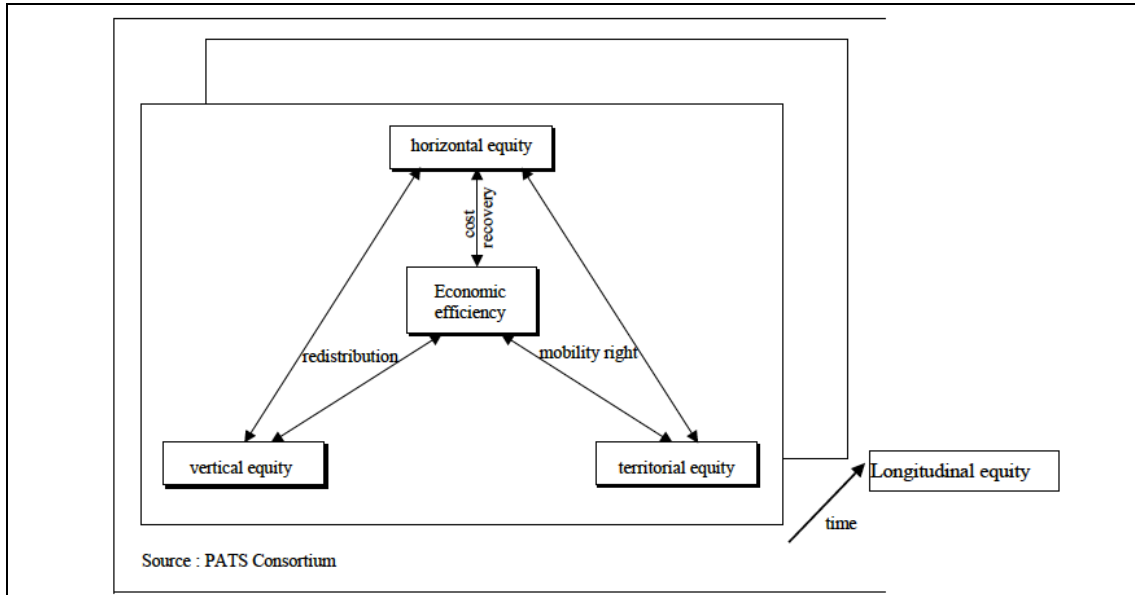


Figure 9. Equity and Efficiency Dimensions as Minimal Conditions of Acceptability (Raux and Souche, 2003, p.156)

According to Raux and Souche (2003) achieving economic efficiency requires pricing changes, which can be in conflict with the different types of equity, including the application of pricing to things previously perceived as being free.

*Vertical equity implies that any policy, which is likely to worsen the situation of the most advantaged groups or the worst served areas, or even which openly does not aim an improvement of these situations is very likely to be rejected. It results from this that the principles of allocation of revenues from pricing plays by their more or less distributive character a central role in the acceptability of pricing.*

*Horizontal equity implies a better coverage of the costs by the users. However, with pricing changes implied by this equity principle some actors concerned may consider themselves as losers comparatively to others (e.g. 'I pay more than the others with regard to the costs that I inflict and to the advantages that I bring to the society').*

*These dimensions of equity are indivisible from the perception of the fairness of a transport policy. The majority of these dimensions are related to the criterion of economic efficiency, which cannot be durably ignored. This set of contradictory constraints thus forms the framework of defining and managing transport policies, which aim at being both equitable and efficient. It results from these incompatibilities that the second best solution will be then an imperfect compromise resulting from the trade-off between economic efficiency and the dimensions of equity.' (Raux and Sauche, 2003, p.156-157)*

Environmental behavior responsibility for problem causation and the responsibility for problem solving **-the attribution of responsibility-** is required factor for the higher acceptability. *'If people consider themselves as at least partly responsible for solving the*

problems, this should lead to increased agreement with measures that raise the price of or restrict the use of car.'

In order to increase the acceptability of congestion charging schemes, the last essential issue determining acceptability is **socio-economic factors**. According to Rienstra (1999 as cited by Schade and Schlag, 2003), 'low-income groups are more opposed to road pricing because of the higher marginal utility of money and their decreased willingness to pay to reduce externalities.' However, higher income groups support road pricing systems more because their value of time is higher.

According to Guiliano (1994, quoted in Richardson and Bae, 1998, p.249) the three important points about the distributional effects of the congestion pricing measures.

- *Net impacts depend on how toll revenues are spent*
- *In most circumstances the rich will benefit more than the poor.*
- *It is possible to compensate everybody, so some groups will be made worse off by tolls.*

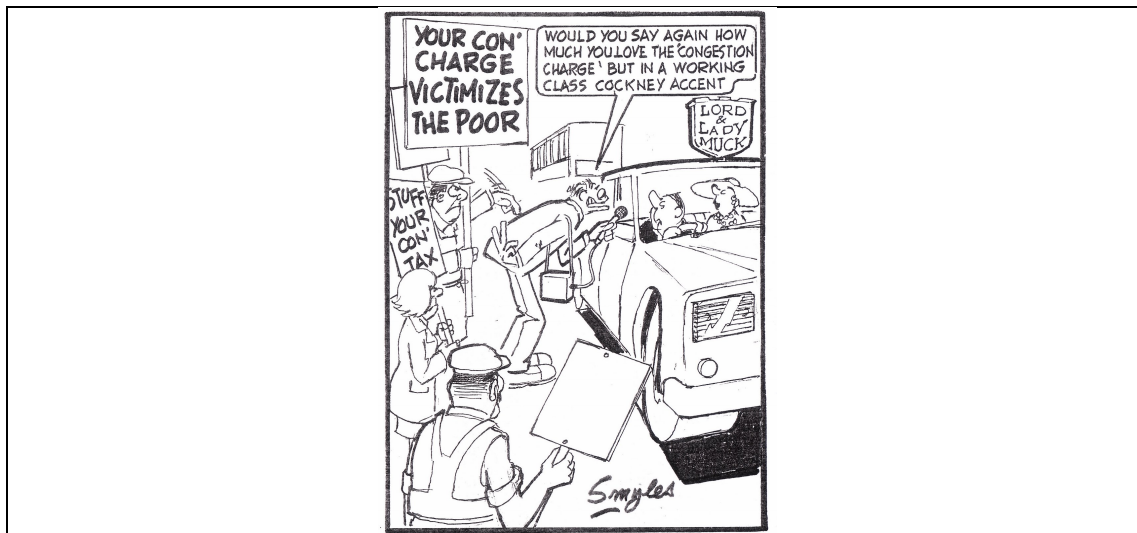


Figure 10. Congestion charging victimizes the poor (Source: [http://londonelectioncartoons.blogspot.it/2008/04/blog-post\\_15.html](http://londonelectioncartoons.blogspot.it/2008/04/blog-post_15.html))

Giuliano (1992, cited in King et al., 2005) suggests a more precise breakdown of pricing's winners and losers. Congestion pricing will benefit three groups:

- *Drivers whose time saved is more valuable than the tolls they pay*
- *People who already use transit or carpools and will not pay tolls*
- *People who receive the toll revenue*

Congestion pricing will make three groups worse off:

- *Drivers whose time saved is less valuable than the toll they pay*
- *People who switch to a less convenient route to avoid the toll*
- *People on non-tolled routes whose traffic increases when drivers from switch to less convenient route to avoid the toll*



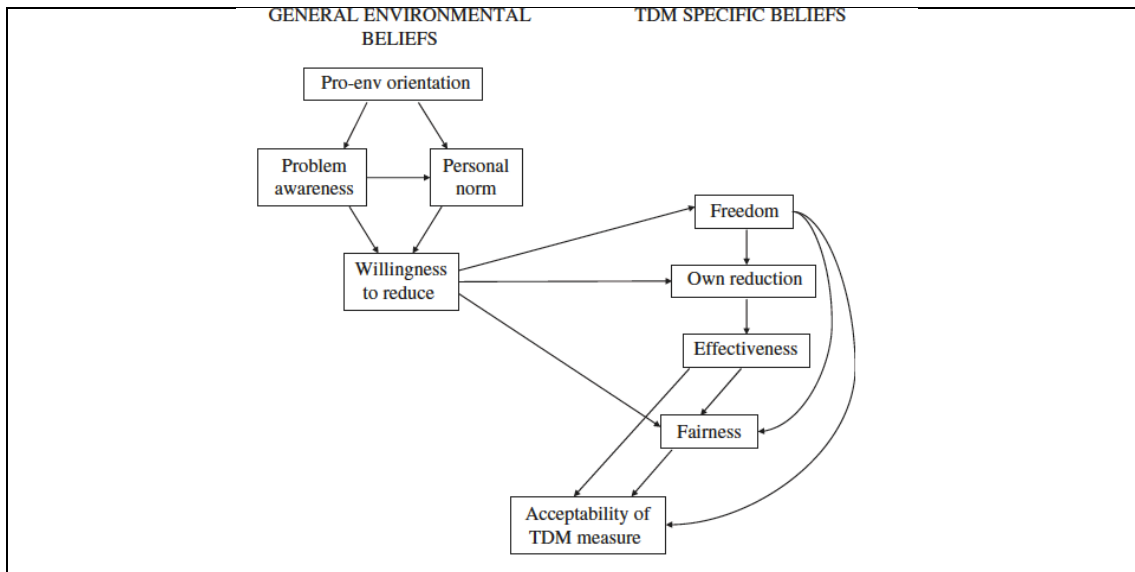


Figure 11. Proposed model of factors predicting acceptability of TDM measures (Eriksson et al., 2006, p.16)

According to VBN (Value - Belief - Norm) theory of environmentalism, the willingness to reduce the negative environmental effects of car use is explained by a norm activation process. (Figure 11) 'A personal norm is activated by personal values and problem awareness. A stronger willingness to reduce car increases for non-coercive measures (the information campaign and improved public transportation) and is lesser infringement on freedom for coercive measures (increased tax on fuel.) A stronger willingness to reduce car use is related to a larger reduction in own car use and perceptions of the measures as more fair.' (Eriksson et al., 2006)

However Jagers' study (2010) claims that behind the people's willingness to act, there are four major factors: perceived degree of environmental threat, interest in the environment, age and ideology. The more left wing an individual is and the younger the person is, the higher the degree of willingness. Nevertheless the levels of education and gender differences don't affect the willingness to act. On the other hand, Harsman and Quigley (2010), as a result of their study argued that the propensity to favor the system of congestion tolls also varied with the demographic characteristics of voters, with better-educated voters and working-age voters tending to favor the tolls and immigrants and male workers tending to oppose the levies.

According to Jakobsson et al. (2000), the most important reasons for opposing appear to social or moral norms of fairness and freedom of choice. Infringement on freedom can cause failure to implement and the problem of 'Rat running', which is car users try to avoid being charged by driving in areas that are unpriced and consequently causing problems in these areas. Also, income and expectation of how much others on average will reduce car use are in turn determinants.

In addition to these factors according to Winslott-Hiselius et al. (2009), media is an important element in the process of public opinion formation because citizens rely on information to make public opinion formation. Media influence is a change in the knowledge, attitudes, and actions of people as a result of exposure to media messages.

Moreover the infrastructure of the public transportation has an important role on the acceptance of the congestion charging schemes. For instance in Stockholm there were a high initial transportation share that contributed to the acceptance and also the

expansion of the public transportation were highly appreciated. (Kottenhoff and Freij, 2009)

### 3.2. POLITICAL ACCEPTABILITY

Since the politicians are the key decision makers, without their support the introduction of any road pricing scheme is impossible. Hence their opinions and acceptability are very important for the implementation of road pricing. (Schade and Schlag, 2000)

According to Schade and Schlag (200), political decisions have to consider the interests and opinions of different societal groups as well as politicians' own interests, and it is likely that interactions and relationships between these groups are very complex and dynamic. Johansson et al., (2003 cited by Garling and Schuitema, 2007) added: *'in political decision making, conflicts between different goals must be resolved, either because different political parties prioritize different goals or because a TDM measure may lead to conflicting effects. For instance, in Europe, reducing car traffic is attractive to the green party but not to the social democrats or conservatives since they view it as a threat to economic development and, in the prolongation, to the welfare of society.'*

According to Frey (2003), among politicians missing attribution and power are two reasons why they are against the scheme.

- **Missing attribution:** In a democracy politicians' actions are strongly determined by how they are likely to affect their popularity and re-election chances. Road pricing scheme is not a direct intervention, which directly benefits the politicians. Therefore they indicate to the voters that government is taking decisive action and the politicians have an almost instinctive preference for direct interventions over anonymous pricing instruments.
- **Power:** When politicians use road pricing to solve congestion problems, they relinquish some of their power. However they have the power of giving permits to whichever individuals and groups they favor.

According to May et al. (2010), urban road user charging is the responsibility of not only city and regional authorities, but also national governments and the European Commission. They all have important enabling roles.

City and Regional Authorities should specify their objectives clearly before thinking about a pricing scheme. They should be flexible and dynamic in their approach to scheme design and development, while ensuring that scheme performance is as effective as possible. City and Regional Authorities designing a road user charging scheme should allocate resources for establishing baseline conditions, for collection of traffic and other data for analysis, and for continuous monitoring of performance after implementation. Before implementing road user charging, city and regional authorities should pay careful attention to the planned implementation process and endeavor to establish a consensus among all the agencies involved.

National governments have a responsibility to develop a clear national transport strategy and to explain it clearly. The application of road user charging should be seen as part of that wider strategy. Also national governments need to ensure that appropriate legislation exists to allow local authorities to plan and implement schemes, to provide the governance. Finally they need to provide support to verify that implemented schemes are effectively monitored and their results disseminated

The European Commission should publish guidance for authorities interested in considering road user charging as a policy option. Also the Commission should bear in mind the need for governance structures, which enable city authorities, both to implement road user charging and the policy instruments which complement it, and to collect and use scheme revenues in accordance with policy objectives.

### **3.2.1. APPROACHES FOR BUILDING ACCEPTANCE**

Since the congestion charging scheme is very controversial policy and the lack of public acceptability is recognized as one of the main obstacles for its implementation, building legitimacy for introducing the scheme is strategically important. In order to legitimately introduce the policy, Isaksson and Richardson (2009) examine whether urban planners, policy makers and politicians should seek full citizen support or work strategically towards implementation in the face of public opposition.

One of the possible strategies for implementing such a controversial policy is 'Confronting the citizen'. Since it is a radical policy, the actors of the policy can be brave to have the potential confront by public. Banister (2003, cited by Isaksson and Richardson, 2009, p.2) asks 'is implementation always 'contingent upon the original proposals being weakened to become acceptable?' For him, London is the one of the few cases in transportation, which was not significantly weakened in order to be acceptable. Isaksson and Richardson (2009) add *'Making a radical difference does not necessarily rely on painstaking and uncertain work of consensus building.'* Mayor Livingstone

However in London there is a strong tradition of communication between the public and the policy makers. When the municipality publishes report or plans, the public send their suggestions and the municipality appreciate all the suggestion. Like in the congestion charging scheme. According to Dix, Assistant Director in Transport for London, the mayor didn't confront the public. After he elected in 2000, asked Transport for London to investigate the options for implementing a congestion-charging scheme in London. Transport for London had created teams to fulfill the mayor's election promise. During 3 years, mayor had published a discussion paper called 'Hearing London's view', a draft and a final transportation strategy. In every paper, many written responses had received. According to suggestions of the respondents', the drafts had been refined. Therefore this process had helped to increase the acceptability. (Dix, 2002)

According to Isaksson and Richardson (2009), another strategy for implementing congestion-charging scheme is 'Securing consent' which is almost impossible. For instance unlikely London case, In Edinburgh there wasn't powerful mayor who committed to the pricing scheme. Therefore, a range of different techniques was used in order to create citizens consent. Consultants were used to work with citizens and stakeholder groups in a consensual way. However the result was not successful 74% of voters were against congestion charge. The case of Edinburg shows that attempts to secure consent can fail. Hence, local authorities should be brave for the oppositions.

Therefore which strategy should policy makers apply in order to build legitimacy to implement the scheme in a particular place is the hotly debated subject. According to Frey (2003), with two basic changes in political decision-making road pricing can be introduced.

In decision making process 'Direct voter participation' via initiatives and referenda can solve the conflicts. Direct democracy may have the potential to overcome resistance to road pricing. Thanks to the widespread discussions before the referendum, the voters will be much better informed. Referendums focus the attention of the citizens on the

issue of traffic congestion and the contribution road pricing can make in solving it. (Frey, 2003) For instance in Stockholm, citizens were given considerable power through the referendum, yet there was a clear attempt to 'prepare' them to vote in favor of congestion charging, through a careful system design.

Frey's second way for acceptable scheme is 'Democratic Traffic Districts' which is special political bodies to assign decisions on traffic issues. Democratic Traffic Districts are established to serve only one function, managing particular public transport problems. They are to be democratically based, preferably by allowing direct citizen participation and have the power to tax and charge to impose road prices. In return, the citizens must receive a discount on their taxes. Therefore, road pricing may have a better chance of being implemented when traffic management is undertaken by a body designed specifically for that purpose.

According to Isaksson and Richardson (2009), apart from the strategies for building legitimacy, there are also some specific design issues, which can be seen as part of the strategy to build legitimacy for the congestion-charging scheme.

Firstly, area selection is vitally important. The choice of the location and of the dimension of the charging area should have been based on theoretical transportation planning consideration. Otherwise the scheme can lead to new congestion without solving any problems. Second important issue is the length of the trial, which should be a solid trial with a clear and measurable impact. Like Mayor of Stockholm says it is more important to end the trial in a good time before elections. (Isaksson and Richardson, 2009)

Another essential issue is the evaluation, which has a strategic importance. Chairman of the Stockholm's congestion charging scheme thinks that from the first day of the trial they had to produce results for the media. They couldn't run a trial for a year and make an analysis and show the results he says. Since the citizens had chance to experience the positive effects of the scheme, they became more positive.

The final issue is the boundary for the referendum. Since the congestion-charging scheme was designed for the municipality of Stockholm and the whole region would be affected by the scheme, the municipalities around the city of Stockholm were also involved to the referendum. However in the end votes of surrounding municipalities didn't account for the final decision.

Jones (1998) added five key questions that need to be addressed when designing a congestion charging scheme.

- Who should be charged?

Depending on the aim of the scheme, exemptions should be defined clearly. For example if the primary objective of the scheme is air quality improvement, then pedestrians, cyclists and drivers of electric vehicles might be excluded. For instance; in Milan when the scheme was pollution charging -Ecopass- environmental friendly vehicles were exempted. Where traffic reduction is the primary objective, exemptions and reduction should be for more vulnerable groups like disabled travelers, certain low income, high priority workers, etc. In London, hospital workers, blue badge holders (disabled travelers) are exempted from the charge.

- How much should they pay?

Level of charge also varies depending on the policy objectives and local circumstance. If the primary aim is to raise revenue, then charges will be lower than where the

objectives is to overcome congestion. Also price reductions might be offered to certain groups. For example; in Milan's Ecopass scheme, the prices varied according to vehicle's emission classes, now prices varies according to the user type like residents of the zone.

- Where should they be charged?

Area selection depends on the objectives of the scheme and local geographical factors. Where the aim is primarily to control traffic congestion, then the charged area can be smaller than if wider environmental objectives lie behind the scheme. However in Milan's case since the primary objective of the scheme changed from pollution charge to congestion charging, the charging zone remains the same.

- When should they be charged?

It is also related to the objectives of the scheme. Where the objective is revenue raising, then a 24-hour charge may be an appropriate option. However, if the primary aim of the scheme is congestion reduction then charging hours will be for shorter periods and also price can be sensible to the peak hours. In addition, in order to prevent the impact of the charges on city center trade, no charge can be levied during periods of the week when the city center shops are open.

- How should they be charged?

The basis of charging can vary thanks to electronic road pricing. 5 main principles for road charging are:

- Point-based charging, at key links or nodes in the road network like at bridges or tunnels
- Cordon/boundary-based charging, for crossing into or out of sectors or enclosed areas like in Stockholm
- Area-based charging, giving right of travel within a defined area like in Milan.
- Length-based charging, defined either in terms of the time taken to make the journey or the distance traveled.
- Externality-based charging, whereby the charge is linked directly to the negative impact being caused by the vehicle like in Cambridge.

### **3.3. GUIDELINES FOR ACCEPTABLE IMPLEMENTATION**

Jones (2003, p.46) suggested twelve general principles that can be applied for an effective and acceptable congestion charging scheme in order to restrain traffic in a particular area.

- Establish If there are local problems which can be addressed through a Congestion Charging scheme
- Make sure if the problems are serious enough to implement a scheme, and start with a communications strategy to make stakeholder groups aware of the problems and the need for action.
- Identify target trips and target group, where car use might be reduced without causing significant hardship
- Work with stakeholder groups to identify broad Congestion Charging scheme options (and any other appropriate traffic reduction options) that meet policy objectives, target the less essential trips and address stakeholder concerns. In the case of the Congestion Charging options, this would be based on the following parameters:
  - The basis of the charging scheme
  - The spatial and temporal extent of the scheme
  - The package of concessions and exemptions
  - The selected charging and enforcement technology, and

- The package of complementary transport investments
- Consult stakeholder groups on the options and explain the consequences of each option including non-pricing restraint and 'do nothing' options.
- Based on the level of the support for different Congestion Charging options, review whether it is possible to develop a hybrid option that increases overall acceptability while achieving policy objectives; the scheme preferred by the professionals may not be 'best'!
- Review boundary impacts and other possible negative effects and develop appropriate mitigation measures.
- Ensure that sufficient elements of the transportation package are in place prior to implementation of Congestion Charging scheme,
  - to provide a reasonable range of alternatives for those no longer able to drive into the charged area, and
  - to counter anticipated secondary impacts close to the boundary and elsewhere.
- Minimize disruption caused by the scheme enabling street works and the pre-scheme package and mitigation measure, through the communications strategy explain what is happening, when and why.
- Be prepared for public support to 'dip' prior to implementation and be aware that it is likely to quickly increase subsequently. A strong political will is essential: 'hold on!'
- As part of the overall communications strategy, run a targeted 'travel awareness campaign', in conjunction with the introduction of the Congestion Charging scheme, to encourage the maximum voluntary reduction in car use.
- Monitor the situation closely after implementation, to provide a quick response to media stories and to make any adjustments to the scheme that may be necessary in the light of experience (e.g. traffic signal settings at boundary junctions).

Jones (2003, p.47) added that while following the twelve guidelines, in order to increase the chances of successful scheme implementation actors of the scheme should draw attention to four important areas:

- Identifying and capitalizing on the scope for traffic reduction, minimizing 'harmful' effects on vulnerable groups by answering 'Which kind of car trip could most easily be made in other ways?' and 'To what extent would the voluntary removal of these trips achieve the underlying policy objectives for which Congestion Charging scheme is being advocated?'
- Generating relevant Congestion Charging Scheme design options in order to minimize the impacts on city center and give priority to freight and service vehicles
- Implementing appropriate up-front measures, improving modal alternatives like public transportation and mitigating negative effects such as boundary effect, increased pressure for car parking
- Developing an appropriate communication strategy, the scheme needs to proactively engage key stakeholder groups at all stages of the scheme design and implementation process including;
  - Agreement on problems/ objectives
  - Generation of the scheme options
  - Selection of preferred scheme
  - The implementation process and
  - Post-scheme monitoring and evaluation

According to Viegas and Macario (2003), for a long time policy makers of pricing policies followed a cycle of allocative decisions, which presumes a unitary decision, making process, ignores situation of conflict and give no importance to interaction between actors.

However in PATS research (Recommendations on Transport Pricing Strategies) the discursive approach is suggested which uses different stages to describe the policy process. And the policy and its implementation are understood as a result of a bargaining process, which involves large number of actors

<p><b>Stage 1. Problem perception and definition of objectives</b></p> <ul style="list-style-type: none"> <li>• Perception of problems</li> <li>• Definition of objectives (GSA)</li> </ul>	<p><b>Stage 2. Policy design</b></p> <ul style="list-style-type: none"> <li>• Identification of alternatives</li> <li>• Planning concepts/future scenarios</li> <li>• Selection of Policy Instruments (GSA)</li> <li>• Assessment of impacts and reactions (with feed-back and development of mitigation or compensatory strategies)</li> </ul>
<p><b>Stage 3. Planning implementation</b></p> <ul style="list-style-type: none"> <li>• Deployment of policy instruments</li> <li>• Identifying and bringing together 'implementers' (GSA)</li> <li>• Definition of implementation plan</li> </ul>	<p><b>Stage 4. Field implementation</b></p> <ul style="list-style-type: none"> <li>• Monitor implementation plan</li> <li>• Assess effectiveness</li> <li>• Make evidence of effectiveness results (GSA)</li> </ul>
<p><b>Stage 5. Policy evaluation</b></p> <ul style="list-style-type: none"> <li>• Checking stakeholders reactions</li> <li>• Monitoring and evaluation of implementation</li> <li>• Evaluation of policy impacts</li> </ul>	<p><i>GSA = Gaining stakeholders acceptance</i></p>

Table 4. Decision Making Discursive Approach to Enhance Acceptability of Transport Pricing Policies (Source: Viegas and Macario, 2003, p.178)

In the first stage the problem and objectives are discussed by the stakeholder groups. In the second stage, for the defined problem main outlines of a solution are discussed. Stakeholders' reactions are an important element of the decision making process. Government collaborates with the stakeholder for having achieve support. Policy design and implementation are opened stages in a process. The results of an earlier stage can be questioned every time and force to change the all decision-making cycle. In the third stage the solutions chosen and finally implemented should then be the most persuasive results of a bargaining process. Evaluation as the measurement and monitoring of performance is to be preferred for stage 4. Lastly, in stage 5, the final evaluation is to be made framing the proposed discursive approach as a learning process. Therefore, assessment of stakeholders' reactions is not only considered at the stage of policy implementation but during all stages. (Viegas and Macario, 2003)

## 4. CASE STUDIES

### 4.1. LONDON

#### 4.1.1. CONTEXT DESCRIPTION

United Kingdom and England's capital, London, is a major global business, financial, and cultural centre; but also one of the most popular tourist destinations in the world. It has fifth-largest city GDP in the world. The population of Greater London is 7,806,800 in 2011 and is estimated to be 8,828,800 in 2031. (Hollis J., 2010)

The London Congestion Charging, introduced on 17 February 2003, was originally intended to cover 'Central London', which includes the financial center as well as Parliament and the principal government offices, the major tourist sites, the main centers of business, law and entertainment but also more than 136,000 residents. The zone covers approximately 22 square kilometers (land percentage 1.3%). Between 2007 and 2011, Western Extension operated.

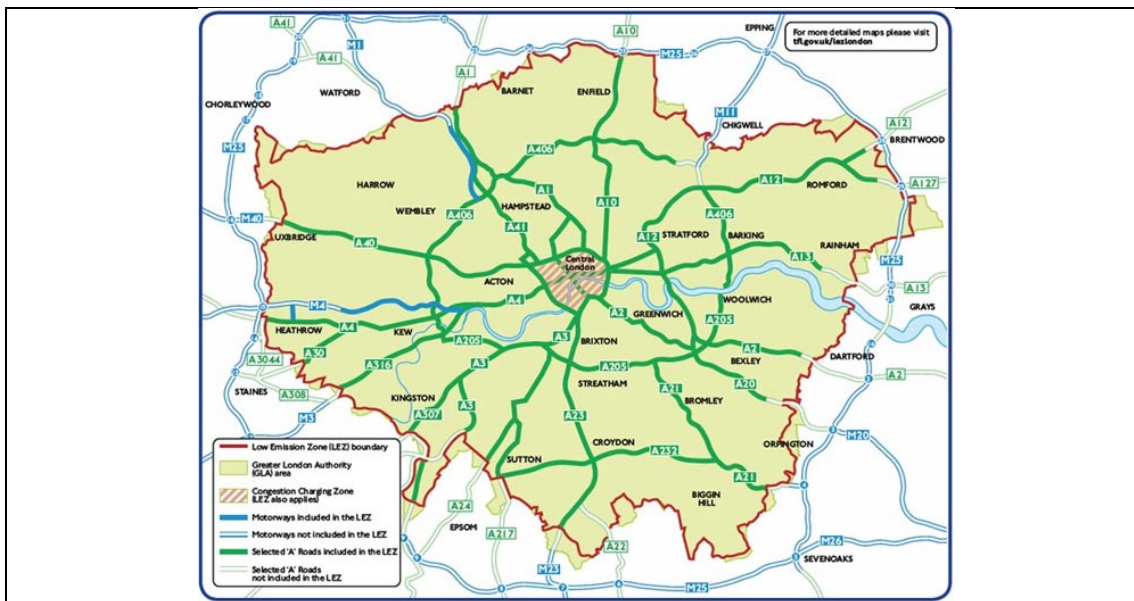


Figure 12. The central London Congestion Charging zone within the Greater London boundary (Source: [http://www.vanarama.co.uk/Assets/images/new\\_img/lez\\_map.jpg](http://www.vanarama.co.uk/Assets/images/new_img/lez_map.jpg))

#### 4.1.1.1. OBJECTIVES OF THE SCHEME

In 2004 Transport for London (TfL) reported that the central London congestion charging scheme was introduced on 17 February 2003. The primary aim of the scheme was to reduce traffic congestion in and around the charging zone. The scheme was



expected to contribute directly to four of the Mayor's ten priorities for transport as set out in his Transport Strategy published in July 2001:

- To reduce congestion;
- To make radical improvements in bus services;
- To improve journey time reliability for car users;
- To make the distribution of goods and services more reliable, sustainable and efficient.

In addition, wider transportation, safety and environmental improvements to central London has also facilitated by reducing traffic levels. More generally, produced net revenues will support the Mayor's Transport Strategy. (TfL, Sixth Annual Report, 2008)

#### 4.1.1.2. SCHEME DESCRIPTION

Congestion Charging was introduced in Central London on 17th February 2003. The Scheme, implemented and operated by Transport for London (TfL), operates by an area licensing system. The Western Extension, covered approximately 20 square kilometers, was implemented on 19th February 2007. Thanks to the success of the original congestion charging scheme, Mayor included possible extension to his manifesto for the 2004 Mayoral election. The area of Western Extension was selected because the area experience higher levels of traffic, had suitable diversion routes around the boundary and also was well served by public transportation. However in 2010 Transport for London (TfL) announced that the Western Extension would formally be removed on 4 January 2011. The reason why the extension was removed was the results of the public consultation reviewed by new elected Mayor Boris Johnson whose manifesto commitments was to consult on the future of the Western Extension. Out of 28,000 people who responded to the consultation, 67% of the respondents preferred the option to remove the Western Extension.



Figure 13. The Congestion Charging Zone and the Removed Western Extension (Source: <http://www.tfl.gov.uk/assets/downloads/cc-zone-showing-removal-4Jan2011-map.pdf>)

The congestion charge was a £5 daily charge for driving or parking a vehicle on public roads within the congestion charging zone between 07:00 and 18:30, Monday to Friday, excluding weekends and public holidays. In 2007 with the

Western Extension, the daily charge increased to £8 and the charging hours became between 07:00 and 18:00 in weekdays (Monday to Friday). Finally in 2011 with the removal of the Western Extension it rose to £10 within the same hours if it is paid in advance or on the same day. However if it is paid in the following charging day, the charge is £12. The drivers registered to automated payment system (CC Auto Pay) pay a reduced daily charge, £9.

Since it is a daily charge, users can then exit and enter as many times as they like during the day. The charge could be paid on a daily, weekly, monthly or annual basis online, by phone, by text message, by post or at a shop.



Figure 14. Congestion charge reminder signs (Source: <http://static.guim.co.uk/sys-images/Observer/Pix/pictures/2012/3/17/1331995800876/A-congestion-charge-remind-007.jpg> and <http://www.zimbio.com/pictures/MJm45Kcs4Mp/Manhattan+Facing+London+Style+Congestion+Charging/kzZlvSurQDZ>)

With the help of Automatic Number Plate Recognition (ANPR) software, cameras at entry points will match vehicles coming in with the database and photograph those in violation for penalty charges. Each vehicle entering the zone would pass at least 3 cameras on of which would provide a color photo.

There are a variety of 90-100 per cent discounts, as well as exemptions.

Discount/status	Category
Fully exempt	Motorcycles, mopeds and bicycles Emergency vehicles Public service vehicles with 9 or more seats licensed as buses Vehicles used by disabled persons that are exempt from VED <sup>1</sup> Licensed London taxis and mini-cabs
100% discount with free registration	Certain military vehicles Local government service vehicles (e.g. refuse trucks, street maintenance) Vehicles with 9 or more seats not licensed as buses (e.g. community minibuses)
100% discount with £10 registration per year	Vehicles driven for or by individuals or institutions that are Blue Badge holders <sup>2</sup> Cars, which emit 100g/km, or less of CO <sub>2</sub> and that meet the Euro 5 standard for air quality. Electric and plug-in hybrid vehicles Roadside assistance and recovery vehicles (e.g. motoring organizations such as the Automobile Association)
90% discount with £10 registration per	Vehicles registered to residents of the central zone

year	
Notes:	
1 VED: Vehicle excise duty.	
2 Blue Badges, which existed before the scheme was implemented, are special parking permits issued to disabled people to allow them to park near shops, stations, and other facilities. The badge belongs to the disabled person who qualifies for it (who may or may not be a car driver) and can be used in any vehicle they are traveling in. The discount applies to individual Blue Badge holders anywhere in the EC.	
Unemployed 15-25 as a percentage of total unemployed (authors' calculations on OECD data).	

Table 5. Discounts and Exemptions of London case (Source: Santos and Fraser, 2005, p.7)

#### **4.1.2. HISTORY OF THE CONGESTION CHARGE**

##### **4.1.2.1. BIRTH OF THE CONGESTION CHARGE**

As Dix (2002) explains the birth of London Congestion Charge:

In London, the search for improving the pricing system for the use of roads date back to 1960s. In 1967, the study of 'Better Towns with Less Traffic' by the Ministry of Transport suggested that direct road pricing was the most effective means of traffic restraint.

In the early 1970s because of the concern about the impact of congestion on the quality of life and urban efficiency the Greater London Council commissioned studies to investigate methods of traffic restraint. According to the study, Supplementary License system is the best method of achieving these. The method of the system is that a paper license would have to be purchased and displayed on any vehicle, which was in the designated area during the day.

In 1980s, the London Planning Advisory Committee (LPAC) did research about transport strategies in order to give some advice for London. According to the study of LPAC, the management of congestion was central for London and there was a need to obtain balance between the demand and supply of road space by direct measures.

In 1995 The London Congestion Charging Research Programme, commissioned by the Department of Transport in 1991, published a study and reported that traffic would diminish by the introduction of congestion charging in London and it would produce net revenues and provide a rapid payback on the initial costs in both financial and economic terms. The report proposed a £4.00 toll for each trip entering a central London.

In 1998, the Road Charging Options for London (ROCOL) study, one of the most important milestones of the London Congestion Charge, was published by independent working group of experts. The group was set up by the Government Office for London to identify all of the possible scheme options from geographical area of the scheme to its technology. The ROCOL report had formed the basic design of the proposed central London congestion charging scheme.

The report had suggested an area licensing system, implemented by Automatic Number Plate Recognition (ANPR) technology with a £5 daily charge and claimed that the scheme could reduce traffic by around 12% in central London and journey speed and reliability would improve. In addition the report indicated that such a scheme could become operational in central London within four years.

#### 4.1.2.2. IMPLEMENTATION PROCESS

The implementation process of the congestion charging scheme had started with the ROCOL's suggestions and the election of the Mayor of London.

After Tony Blair's elections in 1997, in 1999 Parliament passed legislation to create a new Greater London Authority and a directly elected Mayor for the whole of London. The legislation included powers for the Mayor to introduce congestion charging and a work- place car parking tax without needing to seek approval by Government Ministers. (Wetzel, n.d.)

Therefore, the importance of the campaign, which began in 1999 for Mayor of London, had rose. There were four main candidates from main political parties. Ken Livingstone was an independent socialist candidate. The whole question of transport policies and traffic problems played a prominent part in the election campaign. (Dix, 2002)

Ken Livingstone was the only candidate who promised to introduce congestion charging in his election campaign and made transport policy generally. Like Livingstone two other candidates also made election promises to introduce a congestion charging scheme in Central London. In May 2000 Ken Livingstone was elected as Mayor of London. (Wetzel, n.d.)

After the election of the Mayor, in July 2000 he commissioned Transport for London to investigate the option for implementing a congestion charging scheme in London. The team committed to fulfilling the Mayor's election promise created. (Dix, 2002)

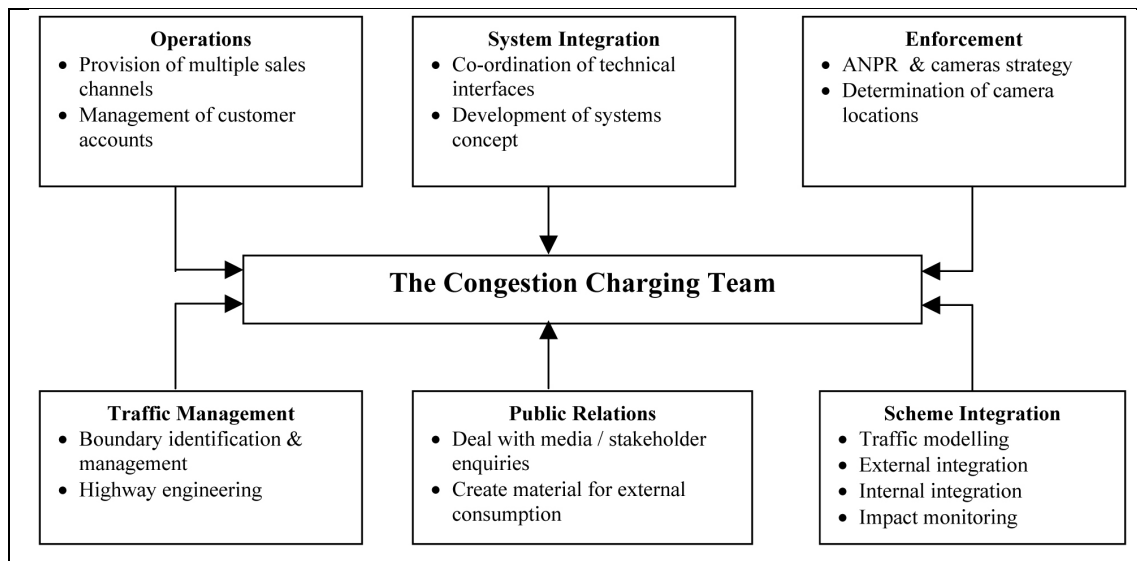


Figure 15. The Congestion Charging Team and its bodies. (Source: Dix, 2002, p.6)

In addition in May 2000, continuous and extensive consultation process had started immediately.

##### 4.1.2.2.1. PUBLIC CONSULTATION PROCESS AND PUBLIC ACCEPTABILITY

*'The Congestion Charging scheme of London is the most radical transportation policy to have been proposed in the last 20 years and it represents a watershed in policy action'* (Banister, 2003). In order to reach all the aims of the scheme, gaining public support is the one of the most vital factor. Therefore in London, the Mayor spent much time and energy engaging everyone's interests in order to advance their support.

The public consultation process includes information campaigns like public meetings, exhibitions, leaflet, publications of green and white papers and public's response to these papers. In addition, the process also incorporates changes in the scheme according to the public's responses and consultation process of the changes. However, the process doesn't include referendum.

In July 2000, the Mayor began the process of consultation, which lasted 18 months. The report called 'Hearing London's Views' had published and sent to 400 key stakeholders, there were six times as many in support of the concept as opposed it. Then in January 2001 Mayor's draft Transportation Strategy that display the Mayor's plans for transport in London, was published. 8000 written responses to the draft showed that the public, stakeholder and other interested parties were broadly in favor of the proposed congestion charging scheme. (Dix, 2002)

Strategy		
July 2000	Hearing London's Views	400 stakeholders
January 2001	Draft Transport Strategy	8000 responses
July 2001	Final Transport Strategy	
Detail		
July 23 2001	TfL Scheme Order	500 stakeholders
	Opinion polls throughout 10 week consultation process	
	TfL held two public meetings and an exhibition	
September 28 2001	End of consultation	2274 responses
November 27 2001	TfL proposed modifications to the Scheme Order	
December 10 2001	Further consultation	
January 18 2002	End of consultation	533 responses
February 26 2002	Decision by Mayor to confirm the Central London Congestion Charging Scheme Order with Modifications	
June 2002	Draft London Plan	
Legal challenge		
July 15 2002	Legal challenge by Westminster Council and Kennington Association	
July 31 2002	High court ruling against a Judicial Review on the Mayor's decision to proceed with congestion charging	
Review and implementation		
October 14 2002	Final review and deadline for other provisions (e.g., advance purchase of licences) – registration commences	
December 2002	Payment in advance commences	
February 17 2003	"Go-live" for Congestion Charging	

Figure 16. The Consultation Process (Source: Banister, 2003, p.254)

In July 2001, Final Transportation Strategy had published and also 500 stakeholders received the Scheme Order, which includes the legal basis for the implementation of the scheme by TfL. In this first phase of the public consultation, opinions polls showed clear support for the scheme conducted. During ten weeks Transport for London held two public meetings and an exhibition. Thanks to the events, Londoners had chance to understand more details about the scheme and discuss with the TfL staff. (Banister, 2003)

Certain changes were done on the details to the Scheme Order by the analysis of the responses to the consultation. Boundary changes, a change in the time of operation, changes in the payment deadlines and changes so that residents are limited to one vehicle for a discount at any one point in time are some of these changes. Also there were also some modifications in the discounts and exemptions. (Banister, 2003)

Barrier	Original Proposal July 2001	Consultation – Issues raised	Final Proposal March 2002
Principle of congestion charging	Central part of London's Transport Strategy	Widespread support – alternatives suggested included massive improvement of public transport or workplace parking levies – still a funding shortfall	No change, but the scheme "go-live" date will be reviewed in October 2002. If improvements in public transport not ready, then the Scheme may be delayed
Area of charging	Zone is 21 km <sup>2</sup> or 1.3% of Greater London – Inner Ring Road with 174 entry/exit points	Scheme should have wider boundaries (e.g., the North and South Circular roads) or be restricted to the area North of the Thames	No changes made – one minor modification to allow access to a petrol station in Park Lane – in the longer term extensions may be made
Boundary effects	On Inner Ring Road where no charge will be levied	Increased flows on Inner Ring Road from diverted traffic and local roads affected. Modelling suggests that there is the capacity available, even around the hotspot of Tower Bridge	No change, but the traffic changes will be monitored
Charges and time of operation	£5 for cars and van, £15 for lorries 07.00–19.00 on weekdays	Hostility to higher charges for lorries as many of their journeys are unavoidable. A standard charge may be regressive. But technical problems of introducing a full road pricing scheme as in Singapore. This may happen later. No discounts for weekly, monthly or annual passes	£5 for all vehicles. Charges apply to each vehicle for each day, so allowing more than 1 trip by the same vehicle within the day. 07.00 – 18.30 on weekdays
Exemptions and discounts	Some 16 categories of exemptions and discounts	Caused huge difficulties. Some wanted no exemptions and others many more categories. Essential journeys cannot be defined individually. Some changes to help schools, voluntary bodies, some NHS staff and patients, fire-fighters and disabled people (Disabled blue badge holders)	Some changes in the categories and residents (90% reduction) discount area extended to 3 small areas outside the charging zone. Private hire vehicles and minicabs on hire will also be exempt, as will alternative fuel vehicles (not just mono fuelled gas vehicles), breakdown and recovery vehicles, and emergency service vehicles.

Figure 17. A summary of the changes that have been made as a result of consultation (Source: Banister, 2003, p.256)

During the public meetings and exhibitions, an information campaign continued for reminding motorists the approaching start of the scheme and verifying that they understood how to actually pay the charge. According to Wetzel (n.d.), *'the press and media campaign were against congestion charging. Probably because the UK media is largely based in London and most journalists had cars almost every page would carry hostile articles re possible adverse impacts.'*

In order to address this media barrage, signs were displayed on the roadsides, buses, bus stops; adverts were placed on TV, radio and newspapers, thousands of leaflets were distributed, the call centre and website were advertised, information packs were distributed and e- mailed to businesses and face to face activity was arranged in the Boroughs most directly affected. (Wetzel, n.d.)

In January 2002 Londoners were consulted again on these suggested modifications like the first public consultation process. In this second round, lower response rate (533 responses) from the general public than before showed the satisfaction.

In February 2002 the Mayor confirmed the Central London Congestion Charging Scheme Order with modifications.

Since in order to be acceptable, the way of investment of the scheme's revenues is very important, Greater London Authority publish a law about the revenues of the scheme. According to the law, the money raised from congestion charging must be spent on improving London's transport system providing further benefits to Londoners and visitors to the city. In addition the revenue will enable substantial investment like further bus network improvements to offer a real alternative to the car; safety and security schemes to improve personal safety and reduce transport-related crime and fear of crime; accelerating road and bridge maintenance programmes to benefit motorists. There were 200 extra buses coming into the cordon area on implementation in February 2003. (Banister, 2003)

The complementary measures that were implemented both before the revenue stream in place and those makes the scheme possible:

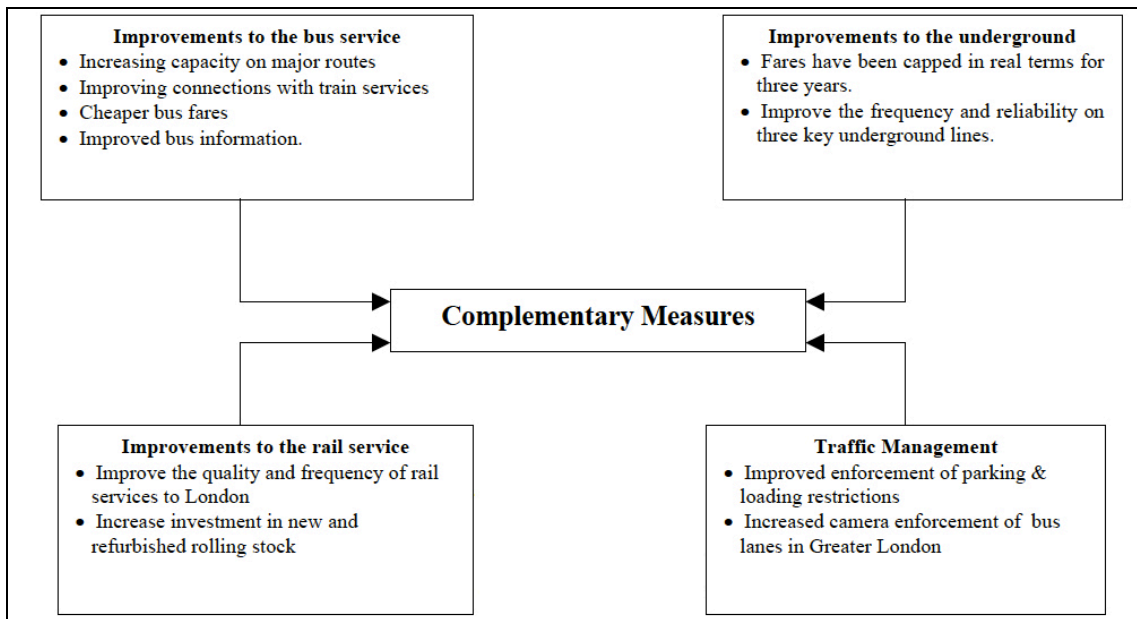


Figure 18. The Complementary Measures (Source: Dix, 2002, p.10)

If the London case examined by issues determining acceptability explained in the literature review (Chapter 3), it is seen that London case is generally acceptable, even if raising some equity issues.

<b>Factors Determining Acceptability</b>	<b>London</b>
Problem Perception	<input checked="" type="checkbox"/> The Mayor had stressed the fact that the roads in and outside the area were heavily congested all day. He said the transportation system had been starved of investment for decades. In the RCOL report (2000): 90% of London residents, polled in 1999, thought that there was too much traffic in the capital, and were concerned about its impacts on travel times and air pollution. So, the general perception was that 'something had to be done'.
Important aims to reach	<input checked="" type="checkbox"/> The main and secondary aims are clear and relevant for the city. Strategies are consistent with the aims. Also, the scheme was expected to contribute directly to four of the Mayor's ten priorities for transport (Transport Strategy).
Mobility related Social Norms	<input checked="" type="checkbox"/> According to Kelly et al.'s study (2004) level of environmental concerns in Britain is close to the European average higher than Southern European countries.

Knowledge about the Action	<input checked="" type="checkbox"/> From the beginning to the end Londoners are officially informed by public meetings, exhibitions, advertisements on media, TV, radio, websites, leaflets, notices on the streets and letters.
Perceived Effectiveness and efficiency	<input checked="" type="checkbox"/> Londoners didn't have any concern about the efficiency of the scheme of reducing congestion in the city center. However, they had some concerns about the boundary effect and impacts on the business.
Equity	<input checked="" type="checkbox"/> There is a variety of 90-100 % reductions, as well as exemptions in order to address the vertical equity problems. However, low-income group doesn't have a choice to value the journey more highly and enjoy improved traveling conditions therefore, social equity didn't address. In addition, according to Social Impact Study, high-income group in the charging area have personally gained from the scheme and low-income group who are Congestion Charging Zone drivers have personally lost. Thus, longitudinal equity didn't address, too.
Attribution of Responsibility	<input checked="" type="checkbox"/> According to Kelly et al. (2004) the interviews showed that regarding a sense of a belief that their pro- environmental actions would make a difference, the average positive response in Britain was higher than Ireland, Portugal, Bulgaria and Latvia and however lower than Scandinavian countries.
Socio-economic Factors	<input checked="" type="checkbox"/> Like Guiliano (1994) claims, in London the rich benefited more than poor. According to Social Impact Study, those most likely to say they have personally gained from the scheme in the Congestion Charging Zone neighborhoods come from high income households, households without cars and those in the 35-54 age bracket. Those most likely to say they have personally lost are Congestion Charging Zone drivers; those from lower income households and those aged 25-34.
Revenue Allocation	<input checked="" type="checkbox"/> According to the law, the money raised from congestion charging must be spent on improving London's transport system providing further benefits to Londoners and visitors to the city. (Public transport, walking facilities, road works, and road safety improvements)

Table 6. Examination of London case in terms of factors determining acceptability (Source: self elaboration)

According to Dix (2005), prior to the introduction of the London congestion charge public opinion was equivocal. After introduction, public opinion shifted decisively in favor of the scheme, with opposition levels falling.

	02	03 Pre-CC	03 Post-CC				04	
Support	40	38	39	57	50	59	48	54
Neither	19	16	18	16	18	15	21	18
Oppose	40	43	41	27	31	24	28	27

Table 7. Results of the different surveys of public acceptability according to time (Source: Dix, 2005)

#### 4.1.2.2.2. POLITICAL ACCEPTABILITY

Besides Livingston's election success, there were some barriers to the implementation



of the scheme. Since different interest groups have varying interests and perception from congestion charging, it is inevitable that there will be some groups against the scheme. For whom sell bicycle or motorcycle it is an opportunity to increase their sales. In contrast, for some retailers it is the reason why their sales reduced. Or for motorist groups it is another form of taxation and infringement on freedom. In London, some politicians like the candidate from Conservative party, motoring lobby consisting of vehicles and parts manufacturers and distributors, motor repair garages and breakdown services, petrol companies, vehicle hire companies, and some labor organization like London Chamber of Commerce were against to the scheme. Therefore, all the groups and organizations that were against the scheme had different requests according to their interests.

For instance, London Chamber of Commerce is one of the organizations that reflect the views of business located in the charging zone. According to Banister (2003), London Chamber of Commerce and Industry supported the principle of congestion charging in Central London however they had several concerns:

- There must be sufficient public transport available to absorb the potential 15% transfer of people from their cars. The proposed additional buses are unlikely to provide this capacity.
- Funds must be ring fenced for new transport solutions and that this should last longer than the 10 years so far committed by the Treasury.
- Any charging must not burden business with bureaucracy.
- Congestion charging must provide new money for London's transport system, not an excuse by which government can reduce London's transport budget.

The Mayor's Office was agree with these concerns and except the demand that the scheme be restricted to the North of River Thames, all wills had accepted. The reason of that is the support of business organizations is critical for the introduction of the scheme. (Banister, 2003)

Another important local authority within the charging zone is 'City of Westminster'. According to Banister (2003), by City of Westminster the only serious legal challenge has been prepared on four related grounds. It sought a judicial review of the congestion charging scheme on the basis that it was unlawful because:

- The necessary information was lacking.
- An Environmental Impact Assessment should have been carried out before the Scheme is introduced.
- A public inquiry should have been held.
- Under the Human Rights Act 1998, the rights of those affected by the Scheme have not been safeguarded.

In July 2002, Westminster City and the Royal Borough of Kensington and Chelsea challenged in the High Court, however a ruling made in favor of the Mayor. According to Banister (2003), Mr. Justice Maurice Kay was satisfied that the Mayor's decision was 'a lawful one'. The ruling was major barrier to implementation.

According to Curacao Report (2009), other important barriers are:

- Some retailers, notably John Lewis, opposed the scheme and through their own research concluded that charging had led to an estimated sales reduction of 7.3% at their Oxford Street store; Transport for London maintains that there is no evidence that the charge has had a detrimental effect on business

- performance within the zone.
- The introduction of the scheme in February 2003 coincided with a temporary economic slowdown.

Despite of these barriers, the principle had been clearly accepted and the consultation process had been successfully negotiated.

In 2004 Ken Livingston was re-elected, largely on the success of the road pricing. According to Wetzel (n.d.), the transportation world recognized his re-election as testimony that congestion charging could be both efficient and popular with voters.

From February 2007, the congestion charging zone was enlarged by a westward extension which proved highly controversial. Also in 2008, Livingston had proposed to introduce a higher daily levy - £25 compared to the current £8 charge - for high emission vehicles in the Autumn 2008. The low acceptability of these proposals had effected the election and in May 2008, Boris Johnson won the election and became the new Mayor of London. After the public and stakeholder consultation process, In October 2010 the new Conservative Mayor Boris Johnston announced a decision to abandon the westward extension and in early 2011, the zone returned to its original cordon.

#### 4.1.3. RESULTS AND IMPACTS OF THE CONGESTION CHARGE

Transport for London (TfL) has been monitoring traffic patterns in the original zone closely since 2002 with independent contractors undertaking each of the main data collection elements. A number of specialist external advisers like leading academics or professionals who advise on specific aspects of the work and help guarantee that the monitoring is robust support team of TfL. (TfL, 2003)

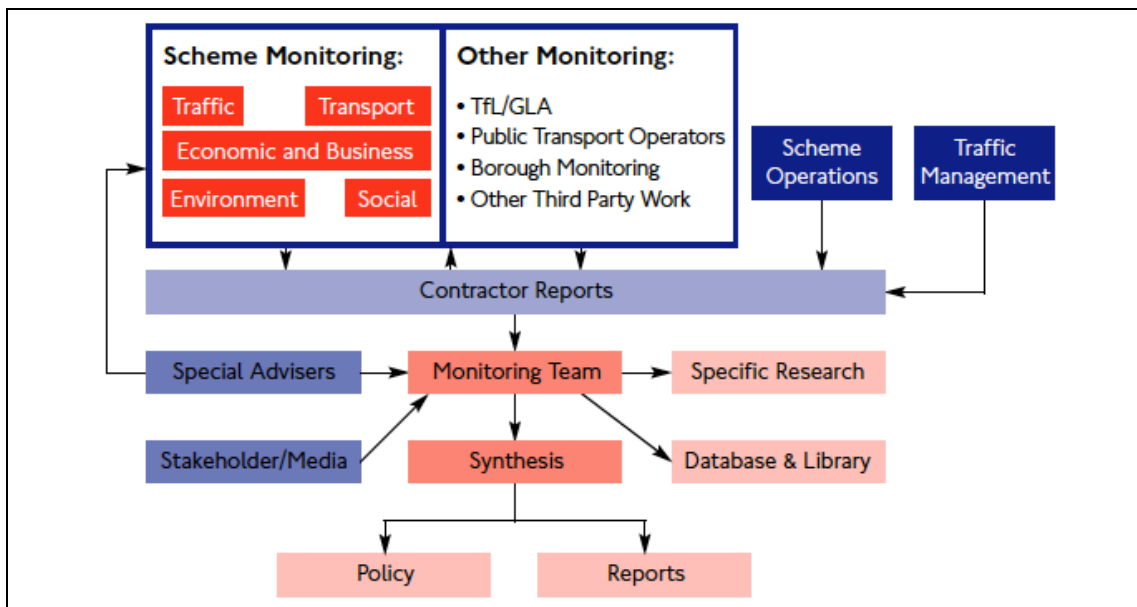


Figure 19. Organization of the congestion charging monitoring programme (Source: TfL, 2003, p.30)

Almost every year TfL publishes annual reports describing the impacts of congestion charging in and around central London on various aspects like congestion, public transportation, emissions, accidents, and traffic speed and so on.

#### 4.1.3.1. IMPACTS OF THE CONGESTION CHARGE ON CONGESTION, PUBLIC TRANSPORTATION AND EMISSIONS

##### ***Congestion***

After one year of operation, TfL observed that traffic had adjusted rapidly to the introduction of charging. Traffic circulating within the charging zone had reduced by 15 percent during charging hours. Traffic entering the zone during the charging hours had reduced by 18 percent.

After two years of operation, TfL noticed that traffic patterns in and around the charging zone had again remained broadly stable throughout 2004. The total volume of traffic entering the charging zone during charging hours during 2004 was identical to 2003.

In 2005, the total volume of traffic entering the charging zone during charging hours was 3 percent against 2004, notionally representing the impact of the charge increase to £8, which represents an overall reduction of 21 percent compared to pre-charging levels in 2002.

In 2006, most key measures are indicating traffic conditions closely comparable to 2005, the balance of evidence suggesting further small incremental declines in total traffic in and around the central London charging zone.

As a result, before the western extension area, there was a tendency towards sharply decreased congestion in central London and more variable network conditions in relation to the earlier years of the scheme. Average congestion in the original charging zone during 2006 was 8 per cent lower than the value representing conditions before implementation of the original scheme in 2002, compared with typical reductions in the 20 to 30 per cent range in earlier years. (TfL, 2008)

Vehicle type	Change in inbound traffic				
	2003 vs 2002	2004 vs 2003	2005 vs 2004	2006 vs 2005	2006 vs 2002
All vehicles	-14%	0%	-2%	0%	-16%
Four or more wheels	-18%	0%	-3%	0%	-21%
Potentially chargeable	-27%	-1%	-3%	+1%	-30%
- Cars and minicabs	-33%	-1%	-3%	0%	-36%
- Vans	-11%	-1%	-3%	+2%	-13%
- Lorries and other	-11%	-5%	-4%	+6%	-13%
Non chargeable	+18%	+1%	-4%	-1%	+16%
- Licensed taxis	+17%	-1%	0%	-3%	+13%
- Buses and coaches	+23%	+8%	-4%	+3%	+25%
- Powered two-wheelers	+12%	-3%	-9%	0%	0%
- Pedal cycles	+19%	+8%	+7%	+8%	+49%

Table 8. Key year-on-year changes to traffic entering the central London charging zone during charging hours, 07:00-18:30. (Source: TfL, 2007, p.21)

After the Western Extension in 2007, traffic entering the western extension during charging hours reduced by a representative value of 14 percent (vehicles with four or more wheels) compared with pre-extension conditions of 2005/06. This scale of reduction has been maintained into 2008. This compares with TfL's range of prior expectation for reductions between 13 and 17 percent and is therefore towards the lower end of the expected range. (TfL, 2008)

Vehicle type	2005 average (000s)	2006 average (000s)	2007 average (000s)	Percentage of total 2005	Percentage of total 2006	Percentage of total 2007
All vehicles	250	253	221	100%	100%	100%
Four or more wheels	226	228	195	90%	90%	88%
Potentially chargeable	179	182	149	72%	72%	67%
- Cars and minicabs	135	138	107	54%	55%	48%
- Vans	35	36	33	14%	14%	15%
- Lorries and others	9	9	9	4%	3%	4%
Non chargeable	71	70	72	28%	28%	33%
- Licensed taxis	38	35	35	15%	14%	16%
- Buses and coaches	10	10	10	4%	4%	5%
- Powered two-wheelers	13	13	14	4%	5%	6%
- Pedal cycles	11	12	13	4%	5%	6%

Table 9. Traffic entering the western extension zone across all inbound roads. Charging hours, 07:00- 18:00, 2005 to 2007 (Source: TfL, 2008, p.20)

However, the operation of the original charging zone experienced no net negative traffic volume impact since the introduction of the western extension. Indicators of traffic circulating within the original charging zone for 2007 are somewhat variable, but suggest a generally stable picture overall.

	2003 vs 2002	2004 vs 2003	2005 vs 2004	2006 vs 2005	2007 vs 2006	2007 vs 2002
All vehicles	-14%	0%	-2%	0%	0%	-16%
Four or more wheels	-18%	-1%	-2%	-1%	0%	-21%
Potentially chargeable	-27%	-1%	-3%	0%	1%	-29%
- Cars and minicabs	-33%	-1%	-3%	-1%	0%	-36%
- Vans	-11%	-1%	-4%	2%	1%	-13%
- Lorries and other	-10%	-5%	-4%	6%	9%	-5%
Non chargeable	17%	1%	-1%	-1%	-1%	15%
- Licensed taxis	17%	-1%	1%	-3%	-5%	7%
- Buses and coaches	23%	8%	-4%	-3%	5%	31%
- Powered two-wheelers	13%	-2%	-9%	0%	-3%	-3%
- Pedal cycles	20%	8%	7%	7%	12%	66%

Table 10. Key year-on-year changes to traffic entering the central London charging zone during charging hours, 07:00- 18:00 (Source: TfL, 2008, p.41)

According to TfL (2008), levels of traffic on the Inner Ring Road in 2007 were effectively identical to those of 2006. Also, the traffic reduction benefits of charging in the central zone have therefore been maintained, and there are no indications of significant overall traffic impacts resulting from the introduction of the western extension scheme in February 2007.

One of the main indicators used to monitor traffic circulating within the original charging zone is an estimate of vehicle-kilometers. TfL initially reported a decrease of 15 percent in vehicle kilometers driven within the charging zone, comparing annualized estimates for 2003 with equivalent estimates for 2002. Traffic circulating within the

charging zone in 2006 was very similar to 2006. There has been very little change in the estimated vehicle-kilometers driven in the central zone during 2007 compared with equivalent figures for 2006. Most of the indicated year-on-year changes are not statistically significant, although a tendency towards small increases in potentially chargeable vehicles in comparison to 2005 is noted.

Vehicle Type	2002 vkm (millions)		2003 vkm (millions)		2004 vkm (millions)		2005 vkm (millions)		2006 vkm (millions)		2007 vkm (millions)	
<b>All vehicles</b>	1.64	100%	1.45	100%	1.38	100%	1.4	100%	1.34	100%	1.34	100%
<b>Four or more wheels</b>	1.44	88%	1.23	84%	1.16	84%	1.16	83%	1.12	84%	1.10	83%
<b>Potentially chargeable</b>	1.13	69%	0.85	58%	0.8	58%	0.79	56%	0.78	58%	0.77	58%
- <b>Cars and minicabs</b>	0.77	47%	0.51	35%	0.47	34%	0.47	33%	0.46	34%	0.44	33%
- <b>Vans</b>	0.29	18%	0.27	19%	0.26	19%	0.25	18%	0.25	19%	0.25	19%
- <b>Lorries and other</b>	0.07	4%	0.07	5%	0.06	5%	0.07	5%	0.07	5%	0.07	5%
<b>Non Chargeable</b>	0.51	31%	0.6	42%	0.58	43%	0.61	44%	0.56	42%	0.57	42%
- <b>licensed taxis</b>	0.26	16%	0.31	21%	0.29	21%	0.3	22%	0.27	20%	0.27	20%
- <b>buses and coaches</b>	0.05	3%	0.07	5%	0.07	5%	0.07	5%	0.07	5%	0.06	4%
- <b>Powered two-wheeler</b>	0.13	8%	0.14	9%	0.13	10%	0.13	10%	0.12	9%	0.12	9%
- <b>Pedal cycles</b>	0.07	4%	0.09	6%	0.09	7%	0.1	7%	0.09	7%	0.11	8%

Table 11. Vehicle-kilometer (vkm) within the central London congestion charging zone and percentage contribution to total traffic during charging hours, 07:00 – 18:00. Annualized weekdays for 2002, 2003, 2004, 2005, 2006, 2007 (Source: Self elaboration data with TfL 2006,2008)

In 2007 there was a reduction of 11 percent in the vehicle-kilometers driven by vehicles with four or more wheels in the western extension zone during charging hours on a typical weekday. This was at the lower end of TfL's expectations of between 10 and 14 percent. Cars and minicabs have seen the greatest reduction, and in terms of traffic composition, the distance traveled by potentially chargeable vehicles has declined by 14 percent.

Vehicle type	2006 average	Percentage of total 2006	2007 average	Percentage of total 2007	2007 vs 2006
All vehicles	1.12	100%	1.02	100%	-10%
Four or more wheels	1.00	89%	0.90	88%	-11%
Potentially chargeable	0.85	76%	0.73	72%	-14%
- Cars and minicabs	0.67	60%	0.55	54%	-18%
- Vans	0.15	13%	0.15	15%	-2%
- Lorries and others	0.04	3%	0.04	4%	1%
Non chargeable	0.27	24%	0.29	28%	6%
- Licensed taxis	0.12	11%	0.13	13%	4%
- Buses and coaches	0.03	3%	0.04	4%	13%
- Powered two-wheelers	0.06	5%	0.06	6%	9%
- Pedal cycles	0.06	5%	0.06	6%	4%

Table 12. Indicative daily vehicle-kilometers driven (millions) within the western extension zone during charging hours, 07:00-18:00. (Source: TfL, 2008, p.25)

More recent data on congestion in Central London has been disappointing. Indeed, Transport for London admits that streets are as congested as they were in 2002, but highlights that traffic would be even worse without the fee.

## Public Transportation

The introduction of charging in 2003 had contributed to a wider trend of significant increases to both bus network capacity and patronage. Improvements to bus services in London were an acknowledged Mayoral transport priority and the majority of net revenues from the scheme had been allocated to bus operational measures. TfL estimated that congestion charging in central London was responsible for up to one-half of the bus patronage increases seen over the period 2002-2003.

According to TfL's regular Central Area Peak Count survey of bus passengers entering central London (covering an area wider than, but subsuming, the original charging zone) following substantial increases in 2003 and the years immediately beforehand, the number of bus passengers entering central London has tended to be relatively stable over the last four years.

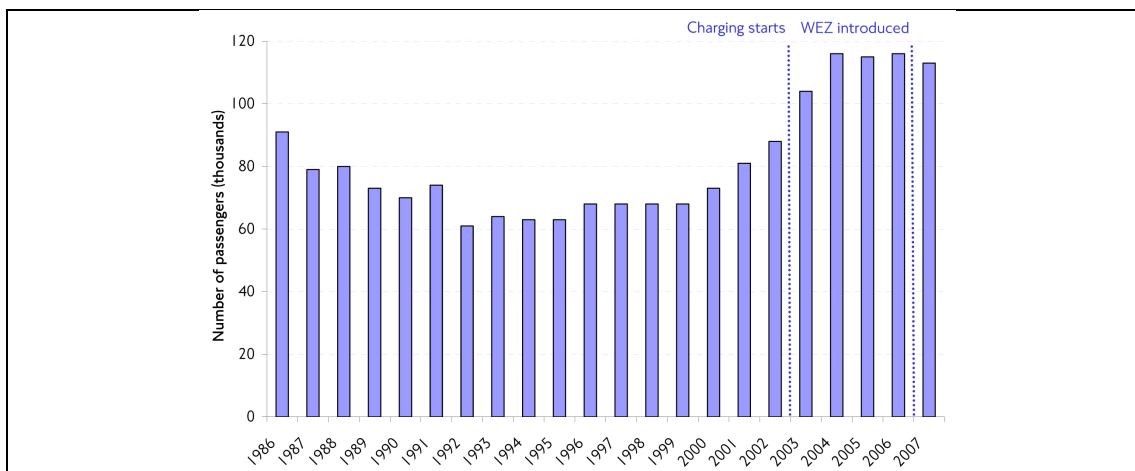


Figure 20. Bus passengers entering central London, 07:00 10:00, Autumn counts, 1986 to 2007 (Source: TfL, 2008, p.91)

In 2007 there was an increase in bus passengers entering the western extension zone – with a 6 percent increase during charging hours, and a 9 percent increase in the morning peak period. Bus network capacity had increased by around 17 percent, resulting in a reduction to average bus vehicle occupancies.

In addition, bus reliability in recent years has increased not just as a result of reduced congestion in the charging zone but also as result of increased investment on buses (TfL, 2005). Excess waiting time – a measure of the unreliability of the service – fell by 30 percent in the first year and by a further 18 percent in the second year after the introduction of charging. Although congestion charging related traffic changes would have contributed substantially to this in central London, the general trend was mirrored throughout the entire London bus network and in part reflected new bus operator contractual regimes. (TfL, 2007) In the western extension for 2007 the equivalent indicators were unchanged – or had even deteriorated slightly

## Accidents

After the implementation of the scheme, there had seen significant year-on-year reductions to reported personal injury road traffic accidents both within the central London zone and across London as a whole, reflecting wider TfL and borough road safety initiatives. This background trend was further enhanced by an estimated 'excess reduction' of between 40 and 70 fewer accidents per year within the charging zone and on the Inner Ring Road. (TfL, 2006)

Trends in reported accidents within the central charging zone during 2005/2006 showed a greater proportionate decline in accidents compared with other areas in London. However, for the first time since the introduction of charging there was evidence of increased numbers of collisions involving pedal cyclists, which may in part reflect greater numbers of these vehicles. (TfL, 2007)

Around the western extension boundary, there were fewer collisions for all time periods, with a 9 percent decrease during charging hours. On the free passage route between the western extension and the original charging zone, there were three more collisions during charging hours, and three less during weekends – differences that are not statistically significant. (TfL, 2007)

		Western extension zone	Western extension boundary	Free passage route	Original charging zone	Inner Ring Road	Greater London
2006	Weekdays 07.00-18.00	337	216	71	808	251	10,826
	Weekdays 00.00-07.00;18.00-24.00	187	102	37	380	149	5,194
	Weekends all day	150	100	44	304	145	5,171
	Total	674	418	152	1,492	545	21,191
2007	Weekdays 07.00-18.00	339	197	74	761	258	10,147
	Weekdays 00.00-07.00;18.00-24.00	159	89	37	349	159	4,845
	Weekends all day	161	93	41	249	128	4,765
	Total	659	379	152	1,359	545	19,757

Table 13. Total reported collisions involving personal injury by area and time period - March to December, 2006 and 2007. (Source: TfL, 2008, p.102)

In relation to the original central London charging zone there were more substantial reductions – equating to 6 percent fewer collisions during charging hours and 9 percent fewer collisions overall. This compares to equivalent reduction of 6 percent and 7 percent respectively for the whole of Greater London. (TfL, 2007)

### ***Emissions & Air Quality***

By reducing the volume of traffic circulating within the charging zone and improving the efficiency with which it circulates, it was estimated that congestion charging had been directly responsible for reductions of 8 percent in Oxides of Nitrogen (NOx), 7 percent in fine particulate matter (PM10) and 16 percent for Carbon Dioxide (CO2). These figures related to an annual average 24-hour day for all emissions from road traffic only. (TfL, 2007)

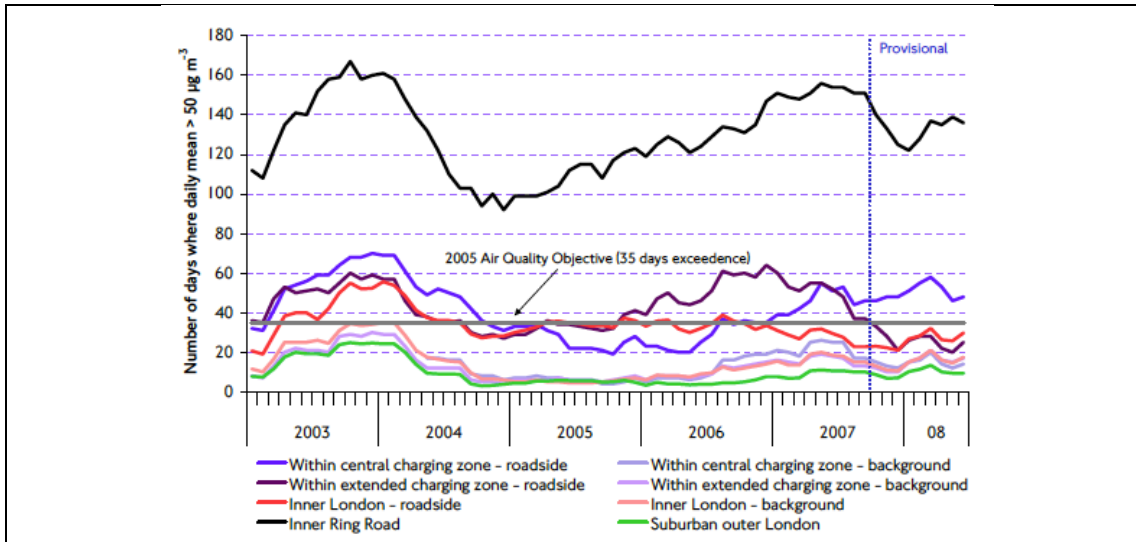


Figure 21. Running annual mean count of PM10 exceedence days at congestion charging indicator sites. (Source: TfL, 2008, p.109)

The concentrations at the roadside site within the original central London charging zone and at the roadside site within the extended charging zone show quite noticeable deviations away from the general trends. The reasons for this are likely to be due to the presence of major construction and road works during 2007 at both sites. By spring 2008, concentrations at the extension zone roadside site were back to similar levels to other inner London roadside sites. (TfL, 2008)

#### 4.1.3.2. SOCIAL IMPACTS OF THE CONGESTION CHARGE

In 2004 Central London Congestion Charge Social Impacts Surveys 2002, 2003 was published for Transport for London. Face-to-face household survey and an individual telephone survey were done in order to evaluate the social impacts of the scheme.

One in four of Congestion Charging Zone respondents say that overall they have personally gained as a result of the congestion charging scheme. There has been a +7% point increase in comparison to expectations in 2002. That is one in five more respondents saying they have gained rather than lost than expected to. (TfL, 2004)

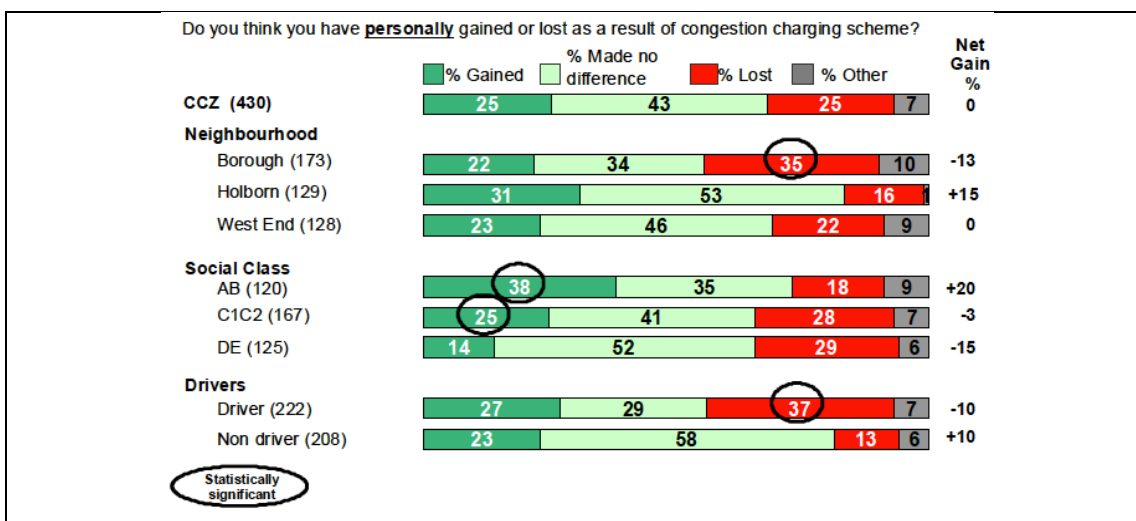


Figure 22. Congestion Charging Zone - Personal gain and loss (Source: TfL, 2004, p.194)



In the Congestion Charging Zone neighborhoods come from high-income households, households without cars and those in the 35-54-age bracket said that they have personally gained from the scheme. Congestion Charging Zone drivers, those from lower income households and those aged 25-34 claimed that they have personally lost. Drivers, those with a higher income and white respondents are by far the most positive. (TfL, 2004)

Around a quarter of respondents from the Inner London neighborhoods say that they have personally gained as a result of the scheme (23%). This is a significantly higher proportion than expected to gain in 2002 (14%). However there has been little movement amongst those who expected to lose and those who say they actually have, just over a quarter are negative towards the scheme in both 2002 and 2003. An increasing proportion says that the scheme has made no difference to them personally (45% compared to 40% in 2002). (TfL, 2004)

	Inner London		
	Expectation 2002	Actual Experience 2003	Change +/-
<i>Base: All respondents</i>	(678)	(678)	(678)
	%	%	%
Gained	14	23	+9
Made no difference to me	40	45	+5
Positives and negatives balance each other out	9	5	-4
Lost	27	26	-1
No answer/don't know	10	*	-10
<b>Net gain (Gained-Lost)</b>	<b>-13</b>	<b>-3</b>	<b>+10</b>

Table 14. Overall, do you think you have/will personally gained/gain or lost/lose as a result of the Congestion Charging Scheme? (Source: TfL, 2004, p.198)

In Inner London, fewer respondents in comparison to those in the Congestion Charging Zone say that their household has gained as a result of the Congestion Charging Scheme (14%). However this has seen a small 4% point rise in comparison to 2002 expectations. This compares to 23% gain at a personal level, so there is the perception that other people in the household have not been as positively affected as themselves. (TfL, 2004)

Inner London	Expectation 2002	Experience 2003	Change +/-
<i>Base: All multi-person households answering</i>	(509)	(509)	(509)
Gained	10	14	+4
Made no difference to household	34	57	+23
+/- balance each other out	10	3	-7
Lost	27	23	-4
Don't know	19	2	-17
<b>Net gain (Gained-Lost)</b>	<b>-17</b>	<b>-9</b>	<b>+8</b>

Table 15. Whether household has/will gain as a result of the scheme (Source: TfL, 2004, p.203)

Over half of Inner London respondents (57%) believe the scheme has made no difference to their household. As with the Congestion Charging Zone respondents, this is where differences between expectations and experience are most evident. While the proportion who say that they feel their household has lost as a result of the scheme is still higher than those who say they have gained, the net difference between these scores is closer than 'expected' in 2002. (TfL, 2004)

As with Inner London and the Congestion Charging Zone, just under half of respondents in Outer London and beyond the M25- Orbital Motorway say that the scheme has made no difference to them personally (44%), this is 17 percentage points higher than expectations. (TfL, 2004)

Outer London and beyond the M25	Expectation 2002	Actual Experience 2003		Change +/-
<i>Base: All who travelled into the zone during CCZ hours/All respondents</i>	(777) %	(734) %	(777) %	%
Gained	25	24	24	-1
Made no difference to me	27	43	44	+17
+/- balance out	8	2	2	-6
Lost	37	29	28	-9
No answer/don't know	4	2	2	-2
<b>Net gain (Gained-Lost)</b>	<b>-12</b>	<b>-5</b>	<b>-4</b>	<b>+8</b>

Table 16. Whether have/will personally lose or gain as a result of the scheme (Source: TfL, 2004, p.205)

Those from beyond the M25 are significantly more likely to be positive about the scheme than those from Outer London: 30% say they have gained as a result of the scheme (compared to 21% in Outer London). Congestion Charging Zone drivers are, however, significantly more likely to remain critical, 47% say they feel they have personally lost as a result of the scheme. (TfL, 2004)

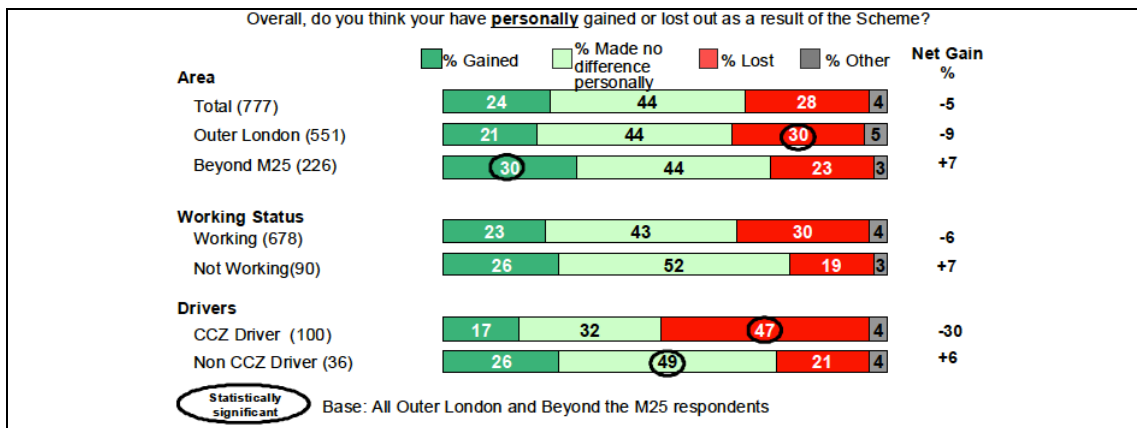


Figure 23. Inner London and beyond the M25: personal gain and loss (Source: TfL, 2004, p.205)

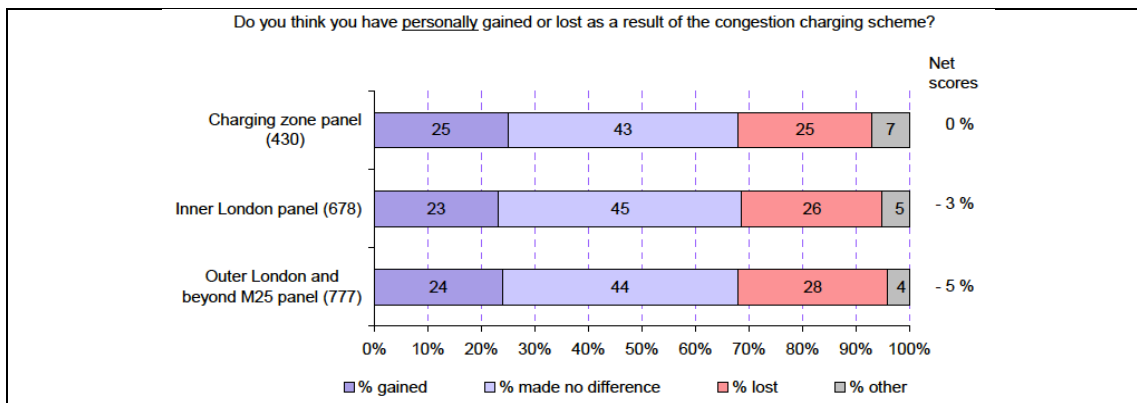


Figure 24. Personal overall balance of experience as a result of the congestion charging scheme, all respondents. (Source: TfL 2005, p.63)

In the charging zone young people and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at 73 percent and 77 percent respectively. Across all groups, at least half of all respondents said that they had gained from the scheme or that it had made no difference to them, with householders with primary school children the least likely to do so at 50 percent. (TfL, 2005)

In inner London, young people, those on a low income and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at around 75 percent. Across all groups, at least half of all respondents said that they had gained from the scheme or that it had made no difference to them, with householders with primary school children again the least likely to do so at 58 percent. (TfL, 2005)

In outer London, women, young people, those on a low income and older people were more likely to say that they had gained from the scheme or that it had made no difference to them, at around 70 percent. Across all groups of outer London residents who made trips to the charging zone, at least half of all respondents said that they had gained from the scheme or that it had made no difference to them, with black and minority ethnic respondents in this case the least likely to do so at 50 percent. (TfL, 2005)

The majority of all respondents who had arrived in the zone during charging hours had traveled by public transport (75 percent in both 2002 and 2003). The proportion of respondents who had traveled to the zone on the interview day by car or van fell from 8 percent to 5 percent between the two surveys waves, reflecting the reduction in car travel to the charging zone. (TfL, 2005)

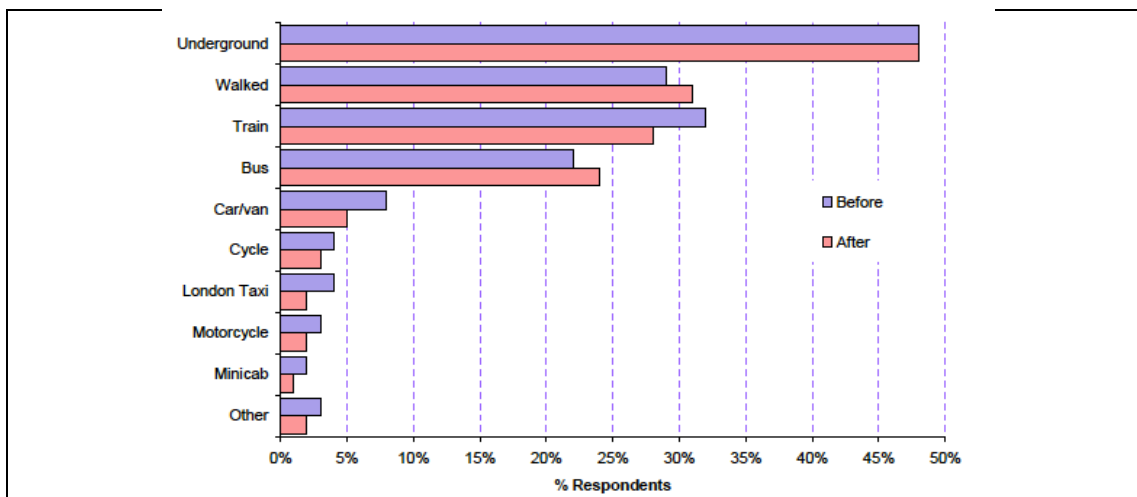


Figure 25. Modes used to travel into or in the congestion charging zone during charging hours, before and after the introduction of charging. On-street survey respondents only. (Source: TfL, 2005, p.65)

According to Litman T. (2005), the winners and the loser of the London Congestion Charging Scheme are:

Winners	Losers
<ul style="list-style-type: none"> <li>• Downtown bus riders.</li> <li>• All transit riders (due to increased funding for improvements).</li> <li>• Taxi riders and drivers.</li> <li>• Motorists with high-value trips.</li> <li>• Most city center businesses.</li> <li>• Overall city productivity.</li> <li>• Pedestrians and cyclists.</li> </ul>	<ul style="list-style-type: none"> <li>• Motorists with marginal-value trips.</li> <li>• City center businesses that depend on low-cost weekday car access.</li> <li>• Residents and motorists in border areas who experience spillover impacts.</li> <li>• City center parking revenue recipients.</li> </ul>

Table 17. Winners and Losers of the London Congestion Charging Scheme (Source: Litman T., 2011, p.10)

#### 4.1.4. LESSONS LEARNED

Almost all transportation specialists accept that London Congestion Charging Scheme is not only economic and political success but also a popular success. According to Richardson and Isaksson (2009), *'what is unique about London case is that Mayor Livingstone was in powerful position with new powers provided by the government, and a mandate from the London electorate, as the policy was contained in his election manifesto.'*

Since the level of congestion has decreased, the usage of public transportation has increased, the public transportation improved by revenues of the scheme, London's experience shows that congestion charging is technically feasible and effective. In addition according to Leape (2006), political opposition has been minimal and popular support is now widespread.

Like almost all congestion charging schemes, the weakest chain is the social impacts of the schemes. Surprisingly, according to Social Impact Survey of Mori, people from Inner and Outer London has gained as a result of the scheme or the scheme didn't make any difference to them personally. In the congestion charging Zone people come from high-income households without cars and those in the 35-54-age bracket are the people who personally gain most however those from lower income households and those aged 25-34 are who have personally lost. Therefore inside the charging zone there is the problem of equity in terms of socio-economic factors. According to Banister (2003), the revenues should be reinvested in projects that all the citizens, especially low-income car drivers can benefit in order to overcome equity problems.

The lessons that should be taken into account from London case are:

- The remarkable factor of the London Congestion Charging scheme is that political leadership was clear. Because of Ken Livingstone's determination and braveness it is possible to say that he is the 'hero' of the scheme. Since clearness of the political leadership is very important for the success of the congestion charging scheme, it is hard to copy for any other authority or city. (Isaksson & Richardson, 2009)

-The public was well informed and they were listened. Several alternatives were evaluated by clear cost benefit analysis. (Santos & Fraser, 2005) Thanks to the information campaigns, the public had chance to know more about the scheme and according to their suggestions, the scheme was revised several times. Therefore, the acceptability of the scheme has risen.

-After the implementation, it was important to keep people knowledgeable about how the scheme was progressing and give constant reminders that traffic levels in London only get worse if congestion charge was not adopted by annual reports or impact assessments.

- Payment methods were clear and easy for drivers whether retail shop, internet, telephone, text message (SMS) or mail.
- The London Congestion Charging scheme is not a stand-alone policy. It was a part of a transportation demand management strategies with improvement of public transportation.
- It is seen that even after all these preliminary consultation process, the public was equivocal about the scheme. However, after the implementation the acceptability of the public has increased. Therefore, it is not clear that a referendum would have supported the London Congestion Charging Scheme.
- The collaboration between the local government officers and private company suppliers was an essential element. In addition, implementation and management of the scheme was professional and only experts keep control over all the phases of the scheme.

## 4.2. STOCKHOLM

### 4.2.1. CONTEXT DESCRIPTION

Stockholm, the capital and the largest city of Sweden, is the most populated urban area in Scandinavia with a population of 864,324 in the municipality (2011), 1.4 million in the urban area and around 2.1 million in the metropolitan area (2011). Global city of Stockholm is cultural, media, political and economical centre of Sweden. The city is divided by water and built on 14 islands. Therefore, traffic drives past the city over a few bridges. During rush hour the Stockholm traffic system comes close to reaching its maximum capacity. The traffic situation also causes environmental problems like air and noise pollution. (Swedish Road Administration, 2005)

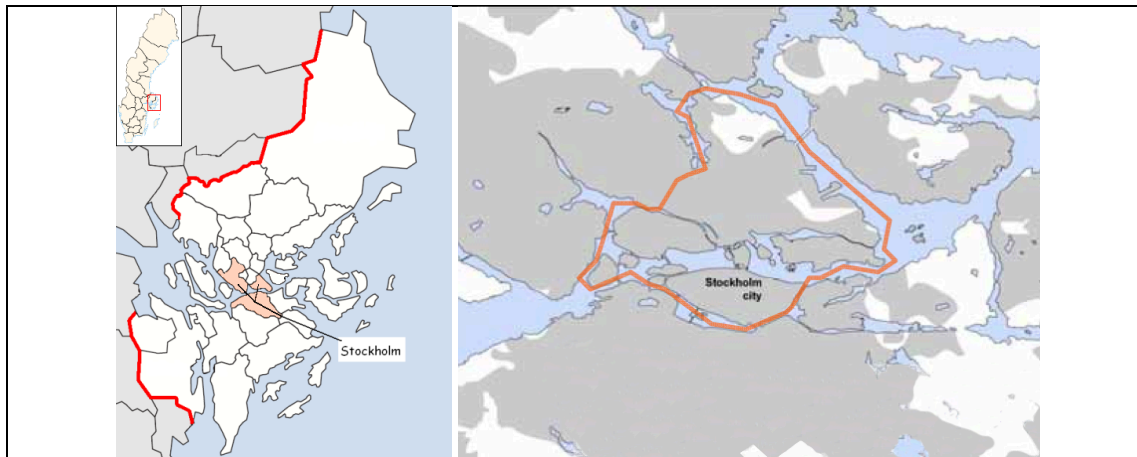


Figure 26. Stockholm County, City of Stockholm and the border of the scheme (Source: [http://en.wikipedia.org/wiki/City\\_of\\_Stockholm](http://en.wikipedia.org/wiki/City_of_Stockholm) and Alarik, 2006)

Stockholm Congestion Charge was introduced between January 3, 2006 and July 31, 2006 as a seven-month trial and then it was implemented on a permanent basis on August 1, 2007. Charging area that covers 35 square kilometers (land percentage 9.2%) includes entire Stockholm City Center with some municipalities like Kungsholmen, Södermalm, Norrmalm, etc.

#### 4.2.1.1. OBJECTIVES OF THE SCHEME

On 2 June 2003 Stockholm City Council adopted a proposal to conduct a road traffic trial with environmental and congestion charging. This became known as “the Stockholm Trial”. On 16 June 2004 the Swedish parliament passed the Congestion Charging Act. This act authorized the collection of a congestion tax in Stockholm up to and including 31 July 2006. On 28 April 2005 the government resolved that the trial period with environmental charges/congestion charging in Stockholm should commence on 3 January 2006. The main parties involved were the City of Stockholm, the Swedish Road Administration and Stockholm Transport (SL). The trial was to be financed by the state. (City of Stockholm, 2006)

Officially the main objective of the scheme was threefold: a reduction in congestion, increase in accessibility and improvements in environmental quality.

In other words according to City of Stockholm (2006), the objectives of the trial are:

- To reduce the number of vehicles passing into and out of the congestion-charge zone during the morning and afternoon/evening peak periods by 10–15%.

- To improve the flow of traffic on the busiest streets and roads in Stockholm.
- To reduce emissions of carbon dioxide, nitric oxides and other particles into the air in the inner city.
- To improve the urban environment as perceived by Stockholm residents.

#### 4.2.1.2. SCHEME DESCRIPTION

The Stockholm Trial with Congestion Charging began on 3 January 2006, and continued through 31 July 2006. During the trial the area inside the toll zone had a number of inhabitants close to 300,000, the populations of the City of Stockholm and the metropolitan region being 771,000 and 1,890,000 respectively. In addition, substantial public bus service enhancements and new park-and-ride lots were introduced nearly a year earlier. On 1<sup>st</sup> of August 2007 was started to operate permanently.

A cordon surrounding the inner city was established and 18 gantries monitored traffic flowing across the zone. The vehicles entering or leaving Stockholm are subject to a fee, which is regulated by the Congestion Tax Act on weekdays between 6 a.m. and 6.29 p.m. During the July, public holidays and at weekend there isn't any tax. Every crossing the cordon is SEK 10, 15 or 20 depending on the time of day. The tax during rush hours between 7.30 and 8.29 a.m. and between 4 and 5.29 p.m. is the highest. (SRA, 2005)

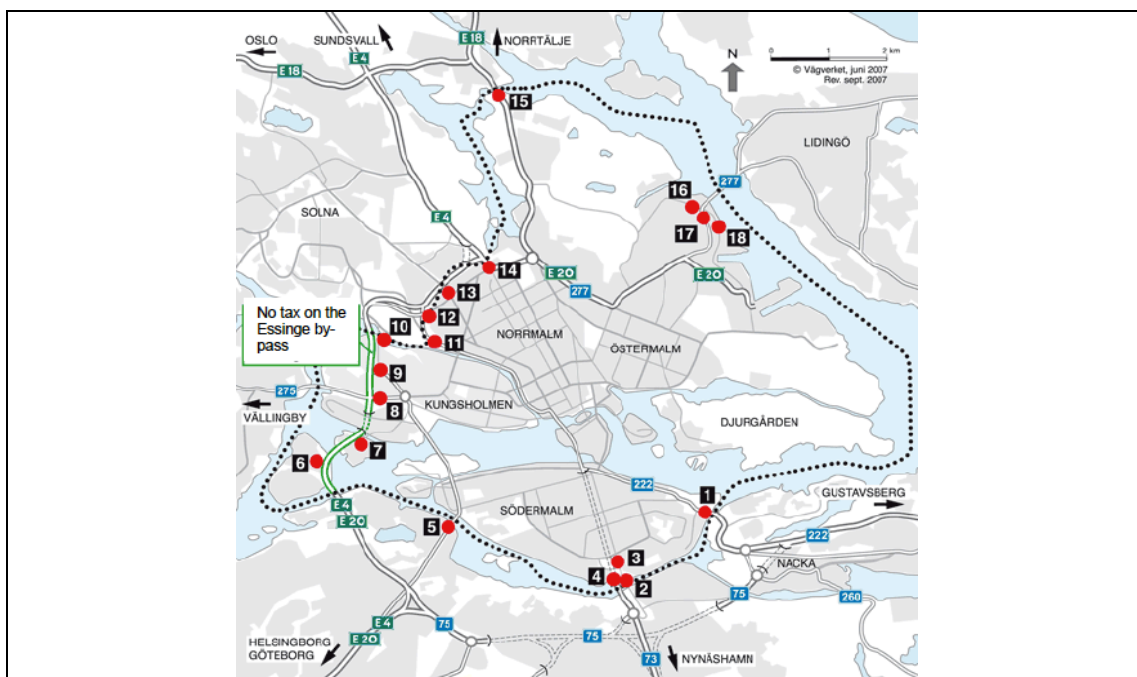


Figure 27. Map of the charging zone with 18 gantries (Source: [http://www.konsult.leeds.ac.uk/private/level2/instruments/instrument001/Stockholm\\_map.jpg](http://www.konsult.leeds.ac.uk/private/level2/instruments/instrument001/Stockholm_map.jpg))

In Swedish law 'a charge can only be levied when the payer receives something in return.' Since the charges are for using the existing infrastructure. The charges are classified as a "tax" rather than a "fee". In addition since local government bodies can only collect taxes from their own citizens, the tax had to be made a state tax. (SRA, 2005) The National Road Administration is responsible for collecting the charges and administering the system, while the city of Stockholm is responsible for monitoring the impacts of the scheme.

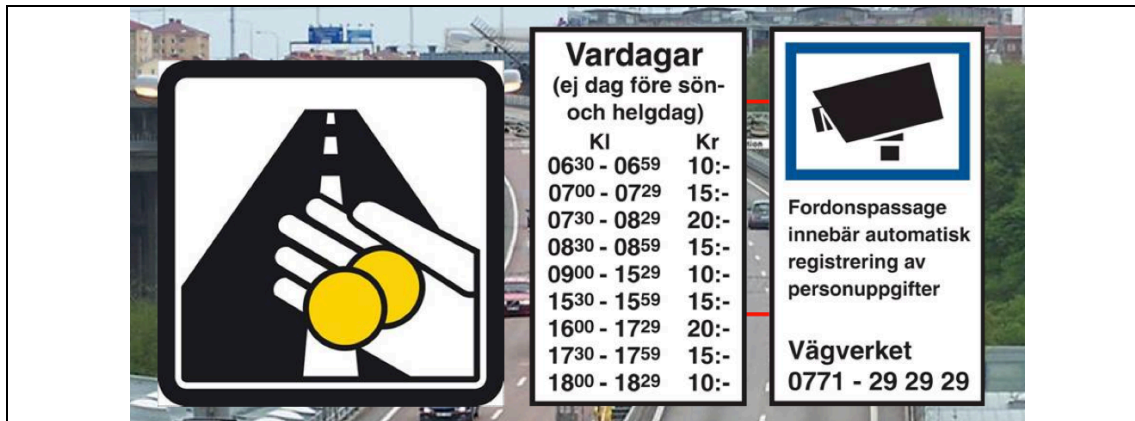


Figure 28. Toll Road signs and Congestion charges by time of day (Source: SRA, 2006)

The tax can be paid automatically via direct debit, at Pressbyrå kiosks or 7-Eleven shops throughout the country, via the Internet using a credit or charge card, at banks or via Internet banking. (SRA, 2005)

Like in London case there isn't any discounts for some specific group of people however there are some exempted vehicles:

- emergency service vehicles
- buses with a total weight of 14 tons or more
- diplomatic cars
- taxis vehicles
- motorcycles
- vehicles abroad
- military vehicles
- transportation service vehicles, total weight less than 14 tons (The approval of National Tax Board is required)
- vehicle used by a person with a disability parking permit (The approval of National Tax Board is required) This exemption did not apply to commercial transport vehicles.
- vehicle equipped with technology for running completely or partially on electricity or gas other than LPG, or on a fuel blend consisting primarily of alcohol, and registered as such at the SRA. (SRA, 2005)

About green cars the Riksdag (Swedish Parliament) made a new decision that the registered green cars before 1 January 2009 are exempted from the tax however green cars, which are entered in the Swedish Road Traffic Registry after the date, are not exempted. Therefore thanks to the rule the transformation of the vehicles in order to avoid the tax is prevented. In other words, people who can afford to change their cars, high-income group, in order to be exempted from the tax cannot change their cars.

In addition to exempt vehicles, there are also some geographic exemptions. Essingeleden motorway is the only main route by-passing central Stockholm therefore vehicles using the motorway only by-passing Stockholm are not subject to the tax. In addition the island of Lidingo has only one access to the center. Therefore, drivers who pass the bridge within 30 minutes also exempted from the congestion tax. (SRA, 2005)



## **4.2.2. HISTORY OF THE CONGESTION CHARGE**

### **4.2.2.1. BIRTH OF THE CONGESTION CHARGE**

The Dennis Package was an agreement on a large investment plan for road and public transportation facilities in the Stockholm area. The package achieved in 1993, also covered road tolls in order to control the traffic. According to Swedish Road Administration- SRA (2002) the plan was about a ring around an inner circular passage for traffic going into central Stockholm and the idea was to put the vehicles entering the motorway ring and the inner city an entrance fee, more than € 1.

Social Democrats were back in power in 1994. The discussion about the Dennis Package dragged on. Many resident from surrounding municipalities claimed that they would be excluded from the network and the tolls would be social discriminative because of the hit on low-income resident. In addition many people thought that the tolls were just another type of tax not an environmental movement. Thus, opposition by the politicians and the public finally became too strong. As a result the agreement was abandoned in 1997. (SRA, 2002)

According to Isaksson and Richardson (2009), the Dennis Package shows the difficulties in settling stable political agreements on contentious traffic issues in Stockholm. Unlikely right wing parties i.e. the Moderate Party and the Liberal Party, the Green Party, the Stockholm party with two small right-wing parties – the Centre Party and the Christian Democrats had been positive to congestion charging.

### **4.2.2.2. IMPLEMENTATION PROCESS**

In March 2002, Stockholm Committee was commissioned by the government to examine what should be done in order to implement congestion charges. (Gudmundsson et al., 2009)

With the general elections, social-democratic governments backed by Left and Green parties, both at the national level and in the City of Stockholm. According to Eliasson (2008), in order to give support a social-democratic national government, the Green Party's condition was full-scale, several year trial with congestion charges in Stockholm. Anna Billstrom, the leader of Stockholm Social democrats had promised that there would not be any road pricing in Stockholm in her election manifesto. However social democrats in national government forced her to accept a charging trial not to endanger a social-democratic government.

In March 2003 the small research-oriented consultancy Transek (later WSP Analysis & Strategy) were contacted by the politicians to help them sort out all sorts of questions – designing the charges, choosing technology, planning the evaluation, coming up with a time plan, analyzing effects for public transit etc.

As the City of Stockholm's Executive Office proposal, the proposal of the scheme presented at the Stockholm City hearing on April 23, 2003. A congestion charging secretariat was to be established and a political reference group formed to monitor the work. (SL, 2006)

On 2 June 2003, the Stockholm City Council adopted a majority proposal to conduct congestion charges trials. In the autumn of 2003, a separate congestion charge office (MAK) created by the City of Stockholm within the City of Stockholm's Executive Office. The three project groups – planning, information and engineering – carried out the work with a project leader for each group. Transport of Stockholm (SL) has participated in the planning and information groups and in an overall reference group. (SL, 2006)

The negotiations about the role and function of public transportation and the need of improvement of the public transport based on demand analyses were started with the Government negotiator Lars Eric Ericsson in the winter 2003/2004. During the spring it is decided that SL and the County Council would conduct traffic reinforcements during the trial with financial guarantees. (SL, 2006)

The formal decision on implementation was made through the Swedish Parliament passing the Congestion Charges Act on 16 June 2004. It was also decided that the Trial should be limited in time and that there would be a referendum simultaneously with the general election in autumn 2006, where the Stockholm citizens could vote for or against the congestion charges to be made permanent. In June 2004, SL and the Government signed an agreement about improvement of public transportation during the trial. Thanks to the agreement a number of investments has implemented during the year. (SL, 2006)

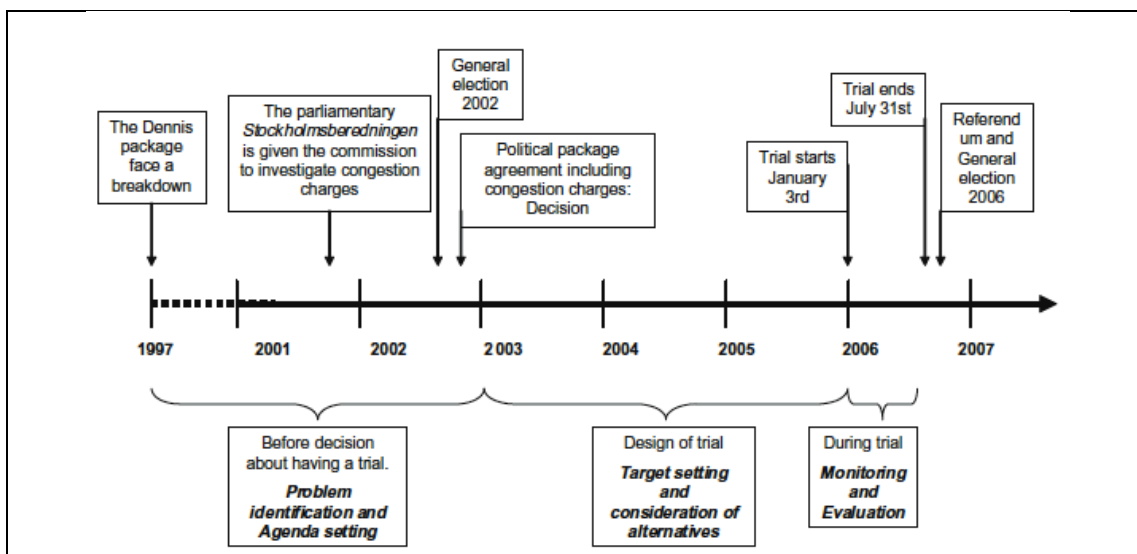


Figure 29. Timeline of some important events connected to phases in the policy process. (Source: Gudmundsson et al., 2009, p.262)

According to SL (2006), key actors during the period were:

- Congestion Charge Office MAK which, instructed by the City of Stockholm, to inform about and evaluate the Stockholm Trial,
- The National Road Administration (SRA) to work out the tax registration during the trial, the payment system and the information about the payment system,
- SL, commissioned by the Government to deliver public transportation and to inform about this

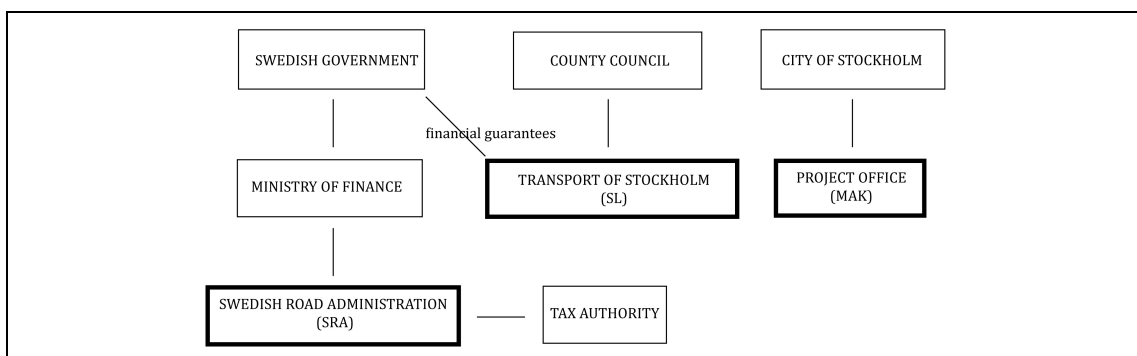


Figure 30. Actors in the period (Source: self elaborations)

In July 2005, a second agreement between SL and the Government about continuation of the extended public transportation for five months was signed after which, the expiry of the Stockholm Trial (up to December 31, 2006). (SL, 2006)

The trial started on 3<sup>rd</sup> of January 2006. According to the agreements, the scheme has completed by public transit extensions —197 new buses, 16 new bus lines, 200 new bus parking spaces, 9 new workshop places, 3 new washing halls and 3 new fuelling installations, 17 depots and 1400 new spaces for park-and-ride facilities over 23 parking lots in 13 municipalities, 615 bicycle parking spaces over 10 parking lots in 6 municipalities was in place between August 22, 2005 and December 31, 2006. (SL, 2006)

The trial period was followed by referendums in the City of Stockholm and in about half of the neighboring municipalities, coinciding with the general election of 2006. In the City of Stockholm, the votes were in favor of keeping the charges. In the contrary, when the all votes were combined in the county the result was against the charges. However, Eliasson (2008) claims: *'the results could be viewed as a bit skewed, since most of the municipalities where polls showed greater support for the charges did not arrange a referendum at all; in most cases, these municipalities argued that it was up to the City of Stockholm to decide the issue.'* Also according to Stockholmsforsoket (website of Stockholm Trial), 11 municipalities, which have a total of about 400.000 eligible voters and a voting percentage of usually 75-80%, didn't held referendums.

In the end, the new elected Liberal-Conservative government decided to reintroduce the congestion charges in August 2007. The revenues of the scheme are reinvested for road investments as a part of a more comprehensive, partially government-funded transport investment package including both road and transit investments. (Eliasson, 2008)

#### **4.2.2.2.1. PUBLIC CONSULTATION PROCESS AND PUBLIC ACCEPTABILITY**

Before the trial, there were very successful information campaign which, includes direct communication channel such as joint website in English and other languages, customer service, meetings, flyers, letters, signs on public transportation, advertisements in the daily newspapers, radio and television. Giving information about reliable collection of the taxes was necessary condition in order to make the citizens sure that the system works properly. (SRA, 2005)

The communication strategy was implemented before the trial period giving enough information about how they should pay the tax. Because if drivers were well informed, the flow of traffic at the control points would not be disrupted and Customer Services would not be overwhelmed by calls. (SRA, 2005)

Several activities were arranged in shopping centers and malls and also at public transportation nodes like Stockholm Central Railway Station. In addition an information film was produced and shown on a short public service programme on Swedish Television. (SRA, 2005)



Figure 31. Letter sent to vehicle owners / leaflets and fact sheets / Signs on bus (SRA, 2006)

The strategy has changed as the starting day has come and became more public and intensive. The information campaign continued but gradually decreased. During the trial, more importance was given to the media to help spread information to individuals and decision- makers. (SRA, 2005)

And also media was important to show the results of the evaluation to the public therefore, the office gave great effort to give the results quickly accessible to both media and the public. As Stockholm Congestion Charging Trial (SCCT) chairman explains the strategic importance of the process:

*'You can't run a trial for a year and then make an analysis and show the results. The first day of the trial, journalists will be out driving, and if we wanted to give input to the media picture, we had to produce results within 6 hours. / . . ./ Success or failure – people would get to know what actually happened. / / . . ./ so the strategy was to give a press conference the first day at three o'clock in the afternoon. (JE 16/01/2007).'* (as cited by Isaksson and Richardson, 2009)

The trial period was very unique. Like Billstrom says: *'It wouldn't be possible to vote in advance, because then you wouldn't know what you vote about. / . . ./ This is an issue where people need to get a chance to see for themselves, to get an experience 'is it good?', 'is it bad?', 'how can it be improved?', and so on. I was convinced that the referendum should be held after the trial. (AB 17/4/2007).'* (as cited by Isaksson and Richardson, 2009)

According to Harsman and Quigley (2010), for each person/voter it was possible to experience the effects of tolling system on his or her personal travel times and costs for almost seven months. Therefore, each voter had a chance to observe the extent of congestion and the other environmental impacts of the trial. Also, the trial appeared as a potential to turn perceived public opposition into support prior to a referendum.

On September 2006, the referendum was held in Stockholm and some surrounding municipalities. According to Isaksson and Richardson (2009), in Swedish legislation, there isn't a regional referendum. It is limited to the municipality of Stockholm. Therefore it was very critical for many surrounding municipalities. It is decided that Stockholm City will issue its own referendum likewise the other municipalities. The result of these was however not given the same formal status as the referendum in Stockholm municipality.

The question of the referendum was clear:

*Environmental fees/congestion tax means that fees will be charged in road traffic with the*

purpose to reduce queuing and improve the environment. The income will be returned to the Stockholm region for investments in public transport and roads.

In the other municipalities the question on the ballots were:

*Do you believe that congestion tax should be permanently introduced in Stockholm?*  
(Isaksson and Richardson, 2009)

The referendum in Stockholm resulted in 51% for and 45% against the congestion tax. The average vote result in the other municipalities in the region was 40% for and 60% against. Since the majority didn't accept the permanent congestion charging scheme, it is decided that only voters in Stockholm Municipality would decide the scheme.

After the referendum results, giving the decision of counting only the results coming from the city of Stockholm can be interpreted as betrayal to surrounding municipalities that could lead to mistrust. In the beginning the idea was regional referendum however, due to the Swedish law, it couldn't have been done. Therefore many municipalities have decided to hold a referendum of their own; this indicates that they wanted to have voice in the process. In order to be clear, the decision about which municipality's results accounted should have been decided before having referendums.

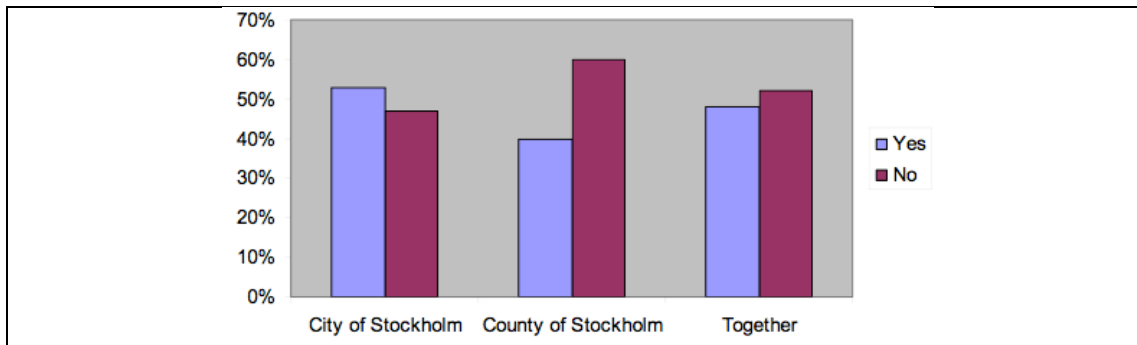
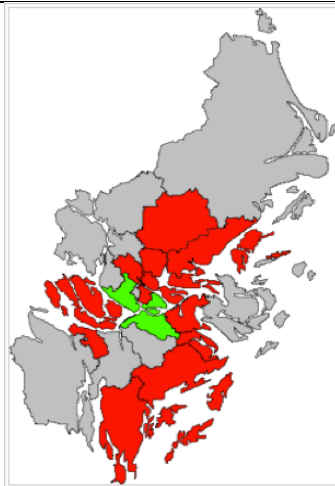


Figure 32. Results of the Referendum (Source: Orn, n.d.)

Municipality	Votes		
	#	Yes	No
Danderyd	16,962	32.5%	67.5%
Ekerö	13,528	39.9%	60.1%
Haninge	37,548	40.8%	59.2%
Lidingö	24,926	29.6%	70.4%
Nacka	44,785	42.9%	57.1%
Nynäshamn	12,588	41.2%	58.8%
Salem	7,563	39.6%	60.4%
Sollentuna	32,409	40.8%	59.2%
Solna	35,598	43.9%	56.1%
<b>Stockholm</b>	458,786	53.0%	47.0%
Tyresö	22,526	44.3%	55.7%
Täby	35,630	34.2%	65.8%
Vallentuna	14,884	42.5%	57.5%
Vaxholm	5,699	45.9%	54.1%
Österåker	20,140	40.9%	59.1%
Total excluding Stockholm	324,786	39.8%	60.2%
Total	783,572	47.5%	52.5%



Map showing the results of the referendum in each municipality.  
 Green: 'Yes'-majority.  
 Red: 'No'-majority.  
 Grey: No referendum held.

Table 18. Referendum Results  
(Source:[http://en.wikipedia.org/wiki/Stockholm\\_congestion\\_tax](http://en.wikipedia.org/wiki/Stockholm_congestion_tax))

Figure 33. Map of the Referendum Results  
(Source:[http://en.wikipedia.org/wiki/Stockholm\\_congestion\\_tax](http://en.wikipedia.org/wiki/Stockholm_congestion_tax))

According to Eliasson et al. (2009), before the trial started, the general opinion was negative to both the trial as such, and to congestion charges in general. However attitudes of the general public and of business (separate business attitude surveys were conducted) became more positive once the charges were in place. In autumn 2005 a majority (55%) of the residents in the metropolitan area (Stockholm county) stated that they found it to be a “very or rather bad decision” to conduct a trial (City of Stockholm, 2006). After the toll was introduced, this percentage fell continuously. In April 2006 the majority had shifted, with 53% of the county population now stating that the trial was a “very or rather good decision” (City of Stockholm, 2006). Similar trends – from different baselines – were found for all investigated sub-populations.

If the Stockholm case examined by issues determining acceptability explained in the literature review (Chapter 3), it is seen that it is highly acceptable.

Factors Determining Acceptability	Stockholm
Problem Perception	<input checked="" type="checkbox"/> Over half a million cars were traveling into the city every weekday. By 2005, average commute times were up by 18% from the year before. (IBM, 2007) City Councilor Ulla Hamilton claims that Stockholmers need to use car less and walk, cycle or use public transport instead. There is no other way out if Stockholm is to be a functioning city.
Important aims to reach	<input checked="" type="checkbox"/> The main and secondary aims are clear and relevant for the city. Strategies are consistent with the aims.
Mobility related Social Norms	<input checked="" type="checkbox"/> It is internationally known the environmental attitudes of people in Nordic countries which have a long-standing tradition of working together on matters related to nature and the environment.
Knowledge about the Action	<input checked="" type="checkbox"/> Before and after the implementation the public was informed by public meetings, media, TV, radio, websites, leaflets, notices on the streets, letters and customer services.
Perceived Effectiveness and efficiency	<input checked="" type="checkbox"/> According to Eliasson and Johnsson study (2011) A large proportion of the respondents believe that the charges have had positive effects. In particular, a large majority thinks that they have reduced congestion on roads to, from and within the inner city.
Equity	<input checked="" type="checkbox"/> According to Transek (2006) considering the direct-road users congestion charging negatively affect the inner city and Lidingo more than other areas, high-income individuals more than low-income individuals, employed people more than others, households with two adults with children more than other types of households, men more than women. However, in the light of the interviews Henriksson et al. (2011) claims that the public transportation users became more positive about the scheme thanks to better environment and air in Stockholm and fewer delays on buses. As a result, low and middle-income group has gained from the scheme. In general it seems that the scheme has no horizontal and vertical equity problems.
Attribution of Responsibility	<input checked="" type="checkbox"/> According to Kelly et al. (2004) the interviews showed that regarding a sense of environmental efficacy and a belief that their pro- environmental actions would make a difference, the average response of populations in all the Scandinavian countries, was that they felt that they could make a difference.

Socio-economic Factors	<input checked="" type="checkbox"/> According to Transek (2006) considering the direct-road users people with higher discretionary income cross the charge zone more often, and more often by car during congestion charge hours, so it is not surprising that they pay more. Therefore, congestion charging negatively affects high-income individuals more than low-income individuals. On the other hand, low and medium income group who use public transportation more often, enjoy the improvements.
Revenue Allocation	<input checked="" type="checkbox"/> According to the Karlstrom and Franklin (2009), in the trial, revenues were used mainly to support public transit, but in the permanent installation this is an open question. However according to Borjesson (2012), the new Liberal-Conservative government decided to reintroduce the congestion charges, earmarking the revenues for road investments but as part of a more comprehensive, partially government-funded transport investment package.

Table 19. Examination of Stockholm case in terms of factors determining acceptability (Source: self elaborations)

For Schuitema et al. study (2010) respondents completed a questionnaire before and after the trial and according to their study acceptance of the congestion charge was higher after the trial. During the trial respondents witnessed that the charge had more positive consequences like decreased parking problems, congestion, and pollution and less negative consequences like financial cost increases after the trial than they had expected before.

Date	Results	Support road pricing	Source
2001	Against road pricing in Stockholm: 51%	Support road pricing in Stockholm: 38%	Temo poll for <i>Dagens Nyheter</i> newspaper (Vagverket 2002)
Nov 2004	Against tolls: 50%	Support tolls: 43%	Temo poll for <i>Dagens Nyheter</i> newspaper ( <i>The Local</i> 2006a)
Feb 2006	Would vote 'no' if referendum today: 47%	Would vote 'yes' if referendum today: 44%	Temo poll for <i>Dagens Nyheter</i> newspaper ( <i>The Local</i> 2006a)
May 2006	Against Stockholm charge: 30%	Support Stockholm charge: 62% Undecided: 8%	Sifo poll for the Swedish Green Party ( <i>The Local</i> 2006b)
June 2006	Plan to vote 'no' in referendum: 40%	Plan to vote 'yes' in referendum: 52%	Poll for Stockholm City Council's congestion charge office (Savage 2006)
Sept 2006	Voted 'no' in referendum: 46%	Voted 'yes' in referendum: 52%	<i>Transport Times</i> (2006)

Table 20. Support and opposition for the congestion tax in Stockholm (Bird and Morris, 2006, p.22)

According to Eliasson and Jonsson (2011), low car dependence and good transit supply are linked with high acceptability. And the impressions about the charges' effectiveness, and general environmental attitudes are the most important factors. Since there is a strong connection between environmental concerns and positive attitudes to congestion charges, marketing the charges' environmental effects is essential. Therefore in Stockholm in order to have positive reaction from the public, the politicians relabeled the congestion charges to environmental charges and underlined the positive effects on air quality.

According to Kottenhoff and Freij (2009) Stockholm's high initial public transportation share contributed to the acceptance of the road charging package. In the beginning of the trial, the expansion of the public transportation, like new bus services, were highly appreciated and had encouraged people to change their mode of travel. As a result, the existing and extension public transportation had a positive affect on the public to vote

'yes' for the permanent scheme.

Media is an important element in the process of public opinion formation. According to media analysis of the Winslott-Hiselius et al (2009): *'The media analysis of this study shows that the majority (58%) of the pre-trial articles were informative and neutral, explaining the traits and purposes of the trial and 40% were negative. The attitudes in the media changed to a more positive view after the trial started. The change in the positive attitude of the public between autumn 2005 and spring 2006 was reflected in media, although one may argue with the same justification that public opinion mirrors the attitude of the media (since the detailed dynamics of the processes have not been studied). Interestingly enough, and contrary to what seems to have been the intuitive impression of most observers, there was no dramatic change in the proportion of articles expressing a negative view towards the trial during the pre-trial and during-trial periods that were studied. Instead, the result indicates that the increase in positive views that could be observed during the trial was driven by a shift from neutral to positive articles.'*



Figure 34. Some positive media covers after the trial period. (Source: Jenstav, 2007 and Alarik, 2006)

#### 4.2.2.3. POLITICAL ACCEPTABILITY

As it is explained in the section of 4.2.2.1, there was a conflict between different parties. Right wing parties were opposed to the congestion charge however after the 2002 election, the Social Democrats at the national level were force to agree to an experiment in congestion charging. For the first time the opposing parties right and left ring parties formally decided to cooperate and they created a common platform –Alliance- an “Alliance” on all major political issues, including the congestion charges. (Harsman and Quigley, 2010)

Billstrom wasn't a hero of the project like Mayor Livingstone in London case. She, the leader of the Stockholm Social democrats, had before the election promised that there would be no road pricing in Stockholm during the next election period, to accept the charging trial. However national government (Social Democrat Party) force her to accept the charging trial.

Obviously, political acceptability is influenced by the level of public acceptability, which was very low initially. According to Harsman and Quigley (2010), among voters there was a tendency of voting for congestion charging scheme according to general political preferences.

According to Borjesson et al. (2012), power is the crucial factor for the political acceptability. Having the power of decision of the scheme's design, revenues make the



scheme politically acceptable. In Stockholm, not only because of the high political acceptance but, also because the charges have been integrated in the general transport investment planning process. This has solved the power and negotiation issues.

About the legal context, as it is explained in the section of 4.2.1.2 according to Borjesson et al. (2012), since the existing infrastructure cannot be charged, but only taxed according to the Swedish law, it is decided that the charges will be collected as a state tax. Although the city of Stockholm was the responsible body for designing the charging system and conducting the congestion charging trial, the national government had to levy and administer the charges. In other words, the government has the power over both scheme design and revenues.

In addition, Borjesson et al. (2012) added:

*'Although the Government promised to refund the revenues to the Stockholm region, disagreements quickly emerged regarding how revenues should be calculated, how revenues should be used and which vehicles should be exempt. Further disagreements, such as whether and how charge levels should change along with inflation and economic growth, can be expected. Many politicians have stated that their main argument against introducing the congestion charge was the uncertainty about the political power over scheme design and revenues.'*

Therefore, there was a complicated negotiation between national and regional levels about national infrastructure grants. The conflict was solved by 'Cederschiold agreement' by the chief negotiator appointed by the Government in late 2007. According to the agreement, the charge revenues were reinvested in order to fund part of the major transport investment package, which includes road and rail investments. With the agreement that was settled only between centre/right parties on the national and regional levels, support for the charges had been secured from regional politicians of all parties. As a result, the congestion charging scheme were kept but with different main motives and with different opinions on how the revenues should be used. When the Social democrats were elected the main motive was car traffic reduction, which is shifted to investment funding with the Centre/Right parties' election. (Borjesson et al., 2012)

According to CURACAO Study (2009), the existence of the successful forerunner case in London should not be under estimated in contributing to political courage in the Stockholm case. According to Isaksson and Richardson (2009) the Stockholm case shows that form of leadership can differ: *'It might not always be about a single 'hero' decisively leading a process of confrontation and dramatic change, but could equally be the result of a number of different actors working pragmatically together in a climate of uncertainty, managing and adjusting to difficulties in a more incremental manner.'*

### **4.2.3. RESULTS AND IMPACTS OF THE CONGESTION CHARGE**

During the Trial period, the Expert Group consists of eight traffic experts with various specialties; each presented monthly indicators each month and also published the results of the trial. The City of Stockholm conducted ongoing analyses and summaries of these measurements. The goal was to provide an overview of the effects of the Stockholm Trial on car traffic, accessibility, public transportation travel and so on.

#### 4.2.3.1. IMPACTS OF THE CONGESTION CHARGE ON CONGESTION, PUBLIC TRANSPORTATION AND EMISSIONS

##### ***Congestion***

According to the City of Stockholm (2006), the goals of the congestion tax were to reduce the number of vehicles passing over the cordon during the peak hours by 10-15 %. Thus improving accessibility on roads more than what they expected. The trial declined the traffic flow. However when the normal seasonal variations during spring take into account, the reduction is surprisingly stable.

The evaluation of the effects of the charges is mostly based on comparing 2005 measurements (before the charges) with 2006 measurement (with the charges).

As expected, decline in vehicles passing over the cordon to the inner city was the biggest. The reduction was about %20, which is equivalent to 100,000 passages over the charge cordon in an entire day (24 h). Fears of collapse on Essingeleden and other bypass routes were unfounded. Differences everywhere are in fact small if compared to normal week -by- week variations. (City of Stockholm, 2006)

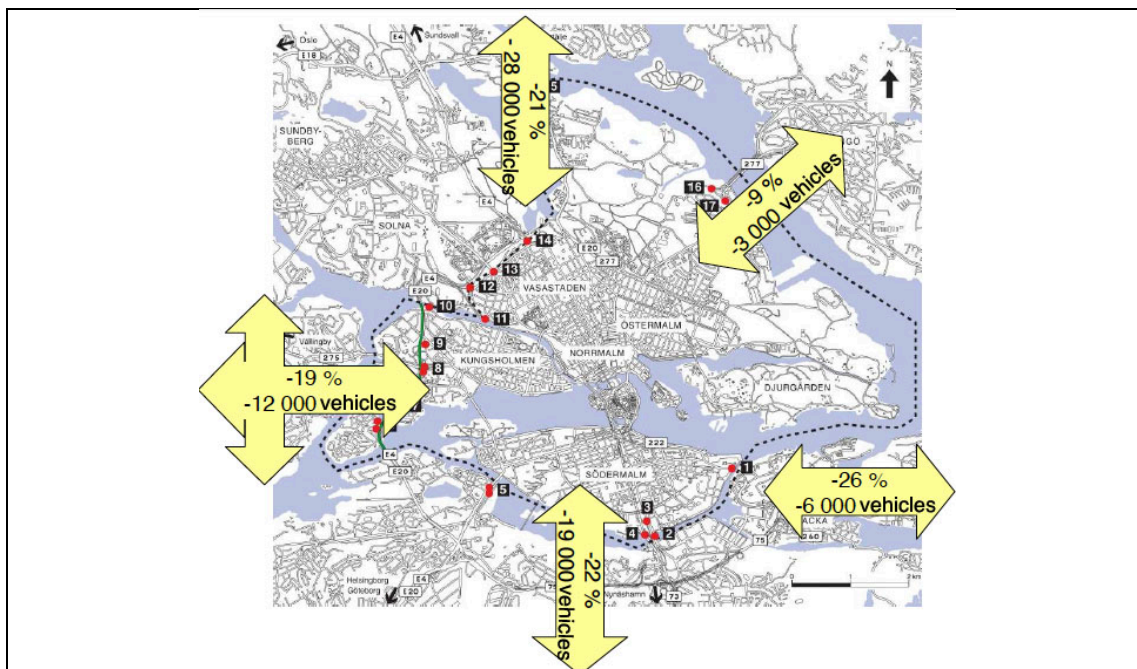


Figure 35. Change in traffic flows over charge cordon during charging period (06:30 a.m. - 6.30 p.m.) per direction. (Source: City of Stockholm, 2006, p.5)

According to Eliasson (2008), the number of kilometers vehicle driven in the inner city, decreased by rather more than 15%, which is less than expected. It should be considered that since the movements inside the cordon were not subject to the charge, residents' trips in the area and journeys of the drivers who use their vehicles inside the zone without passing the cordon were also included traffic in the inner city. They took advantage of the traffic reduction and used their vehicles more. Therefore traffic density in the inner city decreased less than in the charging zone as a whole. Outside the inner city, on the outlying approach roads and outlying streets, traffic volumes fell by just over 5 per cent.

There were serious concerns about the exemption of Essinge bypass since vehicles passing the bypass were exempted. However, traffic increased on the Essinge bypass less than expected. Average daily traffic volumes increased by a few percentage points,

mainly outside the rush hours. The increase on the Southern Link, ring-road tunnel outside the cordon connecting the southwest suburbs with the southeast and the Essinge bypass opened in late 2004, is mostly due to autonomous traffic growth. (Eliasson et al., 2009)

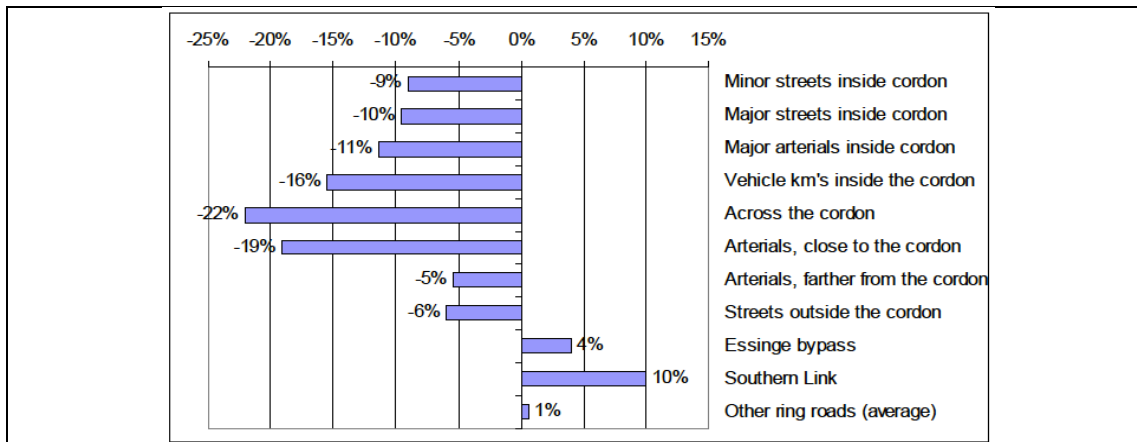


Figure 36. Reduction in traffic density during the charging period in percent (Source: Eliasson et al., 2009, p.243)

The decline in vehicles passing over the charge cordon was biggest during the morning (-14%) and afternoon/evening (-19%) peak periods. The reason why the biggest decline of all was during afternoon/evening peak period is because trips in the afternoon/evening are more flexible because of greater proportion of leisure trips (visits, shopping, entertainment, etc.) However morning trips less flexible considering work-related journeys, it is frequently more important to arrive at a specified time than to leave at a specified time. (City of Stockholm, 2006)

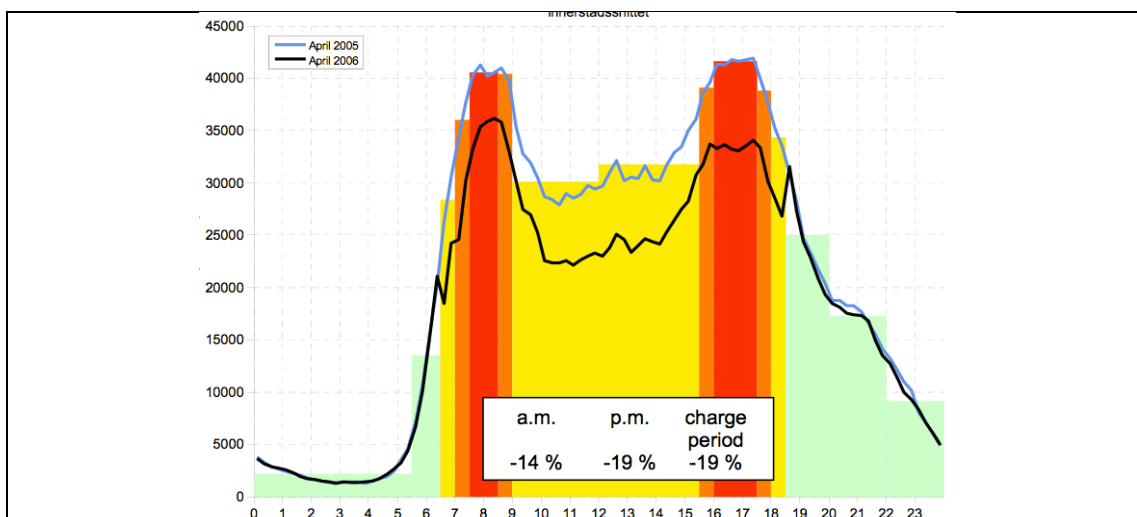


Figure 37. Traffic flow into/out of the inner city zone on an average day in spring 2005/spring 2006 respectively. (City of Stockholm, 2006b, p.24)

In August 2007 (reintroduction of the charges), traffic again decreased around 20% compared to 2005 levels. Because of increasing population, car ownership and rise of the green vehicles from 2% during the trial to 11% in October 2008 traffic has been increased slowly until October 2008. Therefore, car users getting used to the charges and returning to their old driving habits are not the reason of the gradual traffic increase. (Eliasson, 2008)



Figure 38. Number of vehicles across the cordon during charged hours, 2005-2008. Dashed lines indicate the time periods between the end of the trial and the reintroduction. The percentages at the bottom are traffic decreases relative to 2005 (Source: Eliasson, 2008, p.399)

### Public Transportation

As a result of the Stockholm Trial, journeys by public transportation across the zone increased approximately by 5% that corresponds to around 30,000 journeys. The journeys to and from work/school have increased more than the other reasons since the others are more flexible and can be shifted. (Trevictor, 2006)

According to Eliasson et al. (2009), the number of passengers by public transit was 6% larger in spring 2006 than the same period of 2005. It is estimated that 1.5% can be attributed to changes of petrol prices and business-cycle effects, leaving 4.5% to be the result of the road toll.

Number of public transport journeys for different reasons passing the charging zone at least once during a 24-hour weekday period.							
	Work/school	Business trip	Shopping/service	Leisure time	To home	Other	Total
RVU 2004	251,000	25,000	64,000	83,000	266,000	18,000	707,000
RVU 2006	271,000	22,000	59,000	77,000	279,000	19,000	727,000
Percentage change	+8 %	(-12 %)	(-8 %)	(-6 %)	(+5 %)	(+5 %)	(+3 %)
Statistically significant difference	+20 000	No	No	No	No	No	No
Seasonal variation							-2 %

Figure 39. Number of public transport journeys for different reasons passing across the charging zone at least once in a 24-hour weekday period. Base = main reason for public transport journeys across charging zone in a 24-hour period: N=7741(RVU 2006) and N=7 552 (RVU 2004) respectively (Source: Trivector, 2006, p.4)

According to City of Stockholm (2006): 'Accessibility to bus traffic to/from and in the inner city increased. Since inner city timetables were not adjusted to reduced congestion during the trial period, improved accessibility did not significantly shorten the travel times of inner city buses.' However, there are signs that punctuality improved. Buses crossing the cordon that do not have fixed time tables once they have passed the cordon experienced considerably shorter travel times.

Transportation of Stockholm's (SL) onboard surveys on the new buses showed that the

small number of people has switched to public transportation. Therefore, it didn't make a noticeable impact on aggregate levels. The increase in the number of travel with SL was about 2% in autumn 2005 compared to the same period of 2004 however it is estimated that the increase is due to higher petrol prices. (Eliasson et al., 2009)

### ***Accidents***

According to City of Stockholm (2006) although a large number road accident within the charge zone occurred during the charge period, it is clear that the total effect of the Stockholm Trial on the road safety is positive. Because the positive effects of the traffic reduction are expected to be bigger than the negative effects caused by higher speeds. (City of Stockholm, 2006)

However according to Eliasson et al. (2009) by the police reports it has been realized that the total number of road traffic accidents in the city of Stockholm increased by 5% from 2005 to 2006 (the national total increased by a little less than 0.6%) while the number of fatalities decreased from 9 to 7 (the national total increased from 440 to 445).

### ***Emissions & Air Quality***

The reduction of traffic volume results lower emissions of carbon dioxide, particles and nitrogen oxides (the total levels of particles- PM10). The reduction in vehicle kilometers traveled was largest in the inner city, has fallen by approximately 14%. From health point of view it is an important effect for inner city which is a densely populated area. (Eliasson, 2008)

The reduction of carbon dioxide emissions was estimated around 14% in the inner city and 2-3% in the Stockholm County. (Eliasson et al., 2009)

#### **4.2.3.2. SOCIAL IMPACTS OF THE CONGESTION CHARGE**

In 2006 Transek published a study called 'Equity Effects of Stockholm Trail' whose main focus is how the equity effects of a permanent congestion tax system differ among various socioeconomic groups of citizens. The analysis focused only on the direct-road user effects of the congestion tax or the effects that directly affect how citizens travel. (Transek, 2006)

The citizens have been divided into groups according to the following seven criteria:

- Sex
- Residential area
- Level of discretionary income: household income divided by the number of "consumer units" in the household, which roughly corresponds to the number of household members
- Type of occupation: employed, student, etc.
- Type of household: single, two adults with children or without children, etc.
- Age groups
- Native birth or foreign birth

#### ***Sex***

Since both men and women made same amount of journeys by car or public transportation on one average day in autumn 2004. Men used private car more than women and therefore a considerably higher percentage of men's journeys are subject to congestion tax. As a result, men are affected more than women. (Transek, 2006)

According to Transek (2006), if revenues are used to reduce public transport fares women gain the most since they use public transport more often. If the returns are distributed equally to everyone or are used to lower income taxes, men and women gain equally from the measure. (Transek, 2006)

**Residential Area**

For people who live in the city center journeys are shorter and the percentage of journeys by public transportation is larger. In the outer suburbs and Lidingo there are high percentages of journeys by car. However residents of the inner city (before the trial) took nearly twice as many journeys that would have been taxed than did suburban residents, and residents of Lidingo nearly three times as many. (Transek, 2006)

Lidingo residents changed their travel habits the most – the number of charged journeys by car to/from the inner city declined by nearly one third. The reduction for residents of the inner suburbs and the inner city is about 24%. The decline in the outer suburbs was considerably less. Therefore it can be said that people who live closer to the city found a way to change their mode of travel or destination. (Transek, 2006)

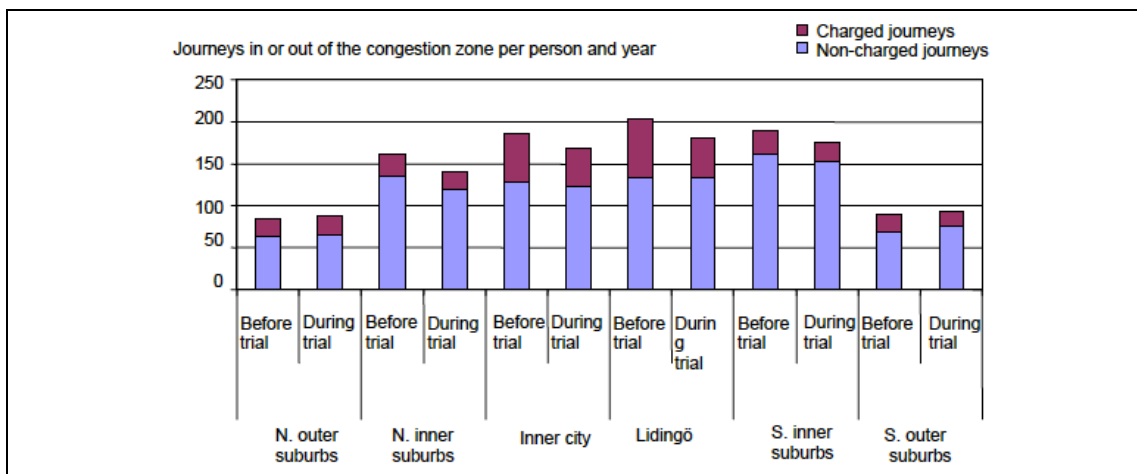


Figure 40. Number of journeys (per person and year) to or from the charge zone (excluding through journeys) (Source: Transek, 2006, p.29)

The study announced that the implementation of congestion tax increased the cost of traveling by car by 5% for residents of the outer suburbs, 11% for the inner suburbs, 18% for residents of Lidingo and 31% for residents of the inner city. The inner city and Lidingo residents paid the most congestion tax. (Transek, 2006)

On the contrary, residents of the inner city made the least travel time gain of all areas. Suburban residents made relatively large travel time gains, despite paying relatively little congestion tax. The reason may be that a large percentage of car journeys from these areas do not cross the charge zone, but still take less time than before. (Transek, 2006)

**Level of discretionary income**

With respect to the calculations of national board of Health and Welfare, the groups with low and low-average discretionary income who took fewer charged journeys used public transportation more than other groups. (Transek, 2006)

For people with high incomes, public transportation journeys were shorter. Since they live closer to city center and they traveled by public transportation to and from the inner city more often. On the contrary they drove car more often therefore their

journeys charged more. (Transek, 2006)

The group with average and low average income reduced the number of charged journeys to and from the inner city the most at 30% and 25% respectively. The reductions were 9% and 15% for the group with high-average discretionary income and high discretionary income group. (Transek, 2006)

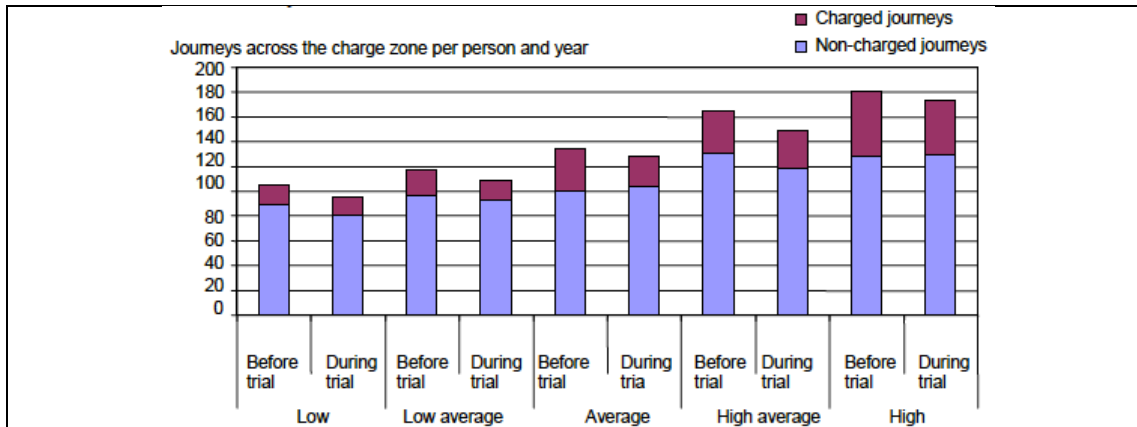


Figure 41. Passages to and from the inner city, per person and year (Source: Transek, 2006, p.34)

Therefore, since people with higher discretionary income crossed the charge zone more often by car during congestion charge hours, they paid more. People with high discretionary income also saved more travel time. There is a clear co-variation with discretionary income: The group with low discretionary income pays about 106 SEK and the group with the highest discretionary income pays about 405 SEK. (Transek, 2006)

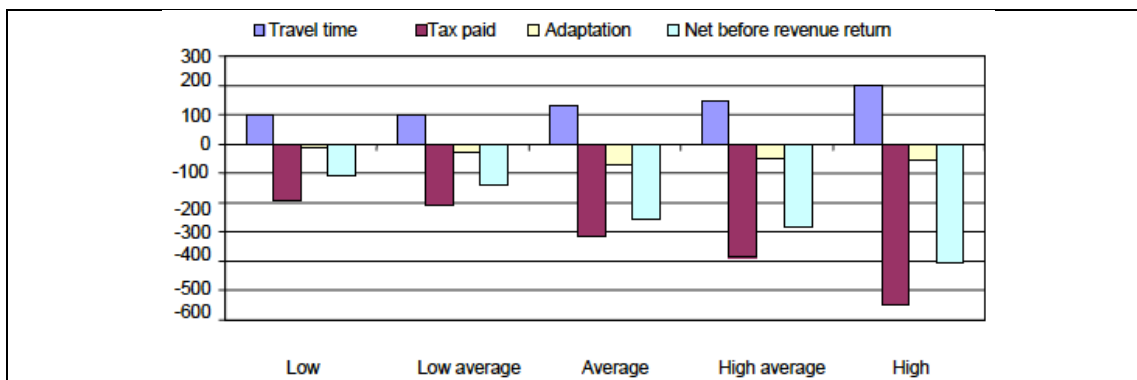


Figure 42. Total road-user effects (SEK/person and year). (Source: Transek, 2006, p.35)

### Type of Occupation

The types of occupation who traveled a lot are students and employed people but employed people travel mostly by car and students mainly by public transport. Since employed people took longer journeys than other, they took considerably more charged journeys than other groups. Employed people who have children cross the charge zone even more often than employed people who do not have children. (Transek, 2006)

Students, job seekers and pensioners took few charged journeys to and from the inner city even before the trial and later. Employed people with no children reduced their journeys (by 18%) more than employed people with children (by 9%), which is less than other groups. Employed people pay considerably more than other groups since they reduced their journeys less than others. (Transek, 2006)

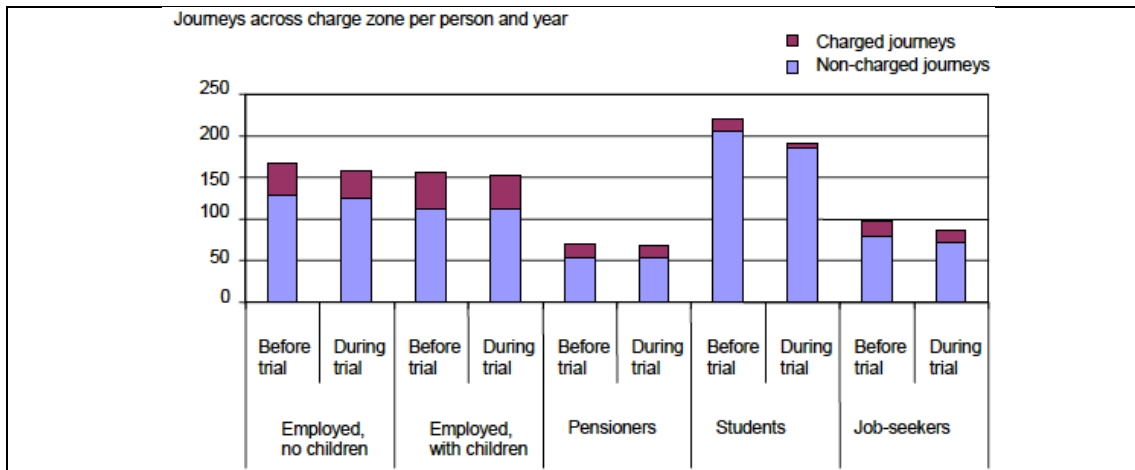


Figure 43. Passages to and from the inner city, per person and year. (Note that the number of journeys to/from the inner city normally declines by about 6% between September and April.) (Source: Transek, 2006, p.38)

### Types of Households

The study defined six types of households:

- Single adults with no children in the home
- Two (or more) adults with no children in the home
- Single adults with teenagers in the home (youngest child older than age 12)
- Two (or more) adults with teenagers in the home
- Single adults with children in the home (youngest child age 12 or younger)
- Two (or more) adults with children in the home

According to the Transek's study, households took larger percentage of public transportation journeys inversely proportional to the number of children. In other words, households without children traveled by public transportation more than households with children. (Transek, 2006)

In addition households with two adults take more charged journeys than households with one adult and when there are teenagers or children in the household the number of charged journeys increases. Therefore, households with children pay the most congestion tax and make the greatest gains in travel time. (Transek, 2006)

Moreover, single adults with children are affected less than families of two or more adults with children. Single adults with teenagers are affected less than families of two or more adults with teenagers. Single adults with no children are affected less than couples. (Transek, 2006)

### Age Groups

During the trial, the youngest group reduced the number of charged journeys to and from the inner city more than the people aged 20-29 and 74-84 who reduced the number of charged passages by 29%. The percentage of the reduction of this type of journey 18% for people aged 30-49, 7% for people aged 50- 64 and 15% for people aged 65-74. (Transek, 2006)



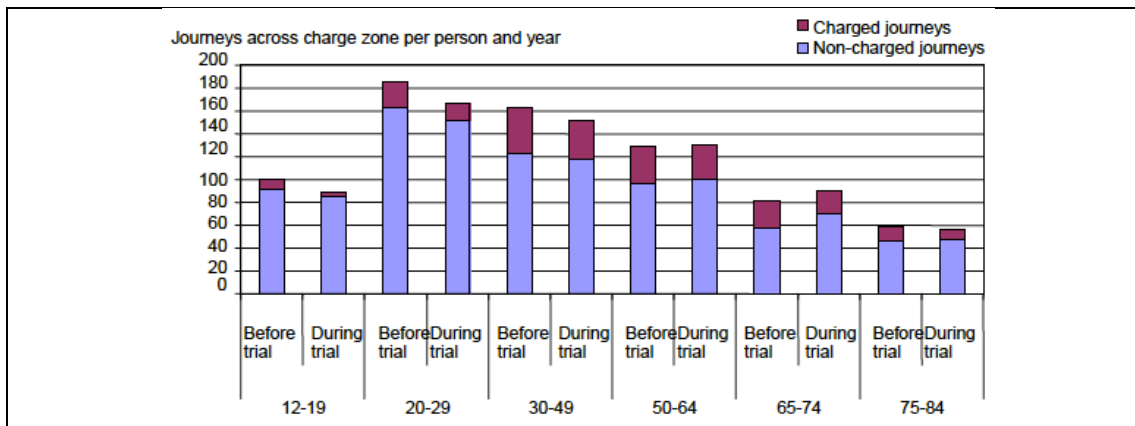


Figure 44. Passages to and from the inner city, per person and year excluding through journeys. (Source: Transek, 2006, p.46)

Therefore, while younger people use public transport more often, middle-aged people travel more by car and also take charged journeys considerably more often. So middle-aged people paid considerably more congestion tax than other groups. On the other hand they had the greatest time gains and the highest adaptation costs. Older and younger groups lost less. (Transek, 2006)

### ***Native-born and Foreign-born***

Foreign-born people take approximately 15% fewer charged journeys than native-born people due to differences in income and residential area. (Transek, 2006)

Native-born people reduced the number of charged journeys to and from the inner city by 19% and foreign-born people by 10%. Both groups reduced the total number of journeys to the inner city by 6%. Implementation of congestion tax increased the cost of travel by 8% for native-born drivers and 9% for foreign-born drivers. Native-born people pay one-third more than foreign-born people and save one fourth more travel time. (Transek, 2006)

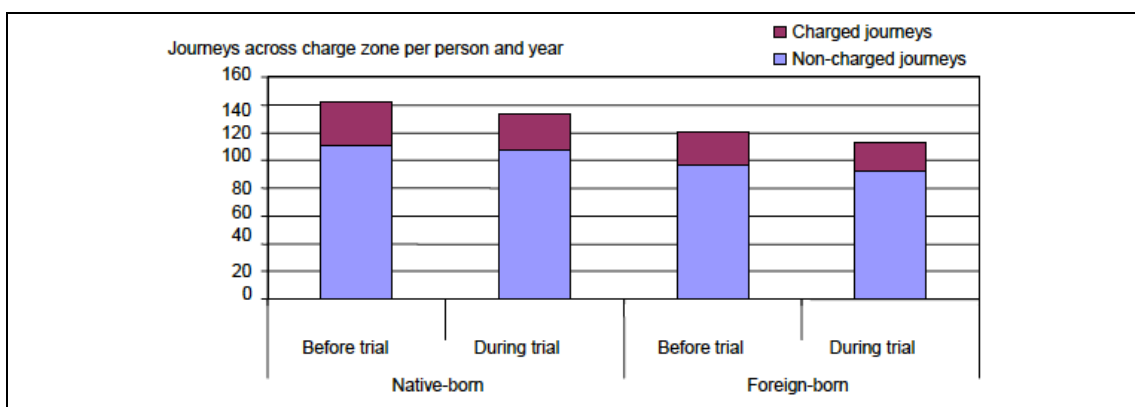


Figure 45. Journeys to and from the inner city, per person and year (excluding through journeys). (Source: Transek, 2006, p.50)

### ***Conclusion***

Congestion taxes negatively affect

- the inner city and Lidingo more than other areas
- high-income individuals more than low-income individuals
- employed people more than others
- households with two adults with children more than other types of

- households
- men more than women

The residents who paid the most congestion tax, also enjoyed the greatest time gains with two exceptions. First in the inner city residents paid a lot of congestion tax however time gains were small. Second are the residents of the northern outer suburbs since they paid limited average of tax, their time gains are relatively large. (Transek, 2006)

According to Transek (2006), the total equity effects of the congestion tax system depend in part on how direct road-user effects (time gains and changes in travel costs) affect different groups and in part on how citizens benefit from the revenues.

*'If the revenues are used for public transport those who gain most from the measure as a whole are young people, low-income individuals, single people, women and residents of the inner suburbs. These groups pay relatively little congestion tax (on average) and use public transport more often than other groups. The main groups that would, on average, be adversely affected by the measure as a whole are employed people with children, high-income individuals and residents of the inner city and Lidingo. These groups pay relatively high congestion tax and use public transport less often than other groups.'*

*If the revenues are used to lower the income tax rate high-income individuals, senior citizens, single parents and residents of the northern suburbs will make a net gain. Residents of the inner city and Lidingo will sustain a net loss if such a measure is taken.'*

According to City of Stockholm's study the winners and the losers of the trial were:

WINNERS	LOSERS
Public transportation travelers who get better choice	Those who drive a car over the charge cordon and for various reasons cannot adopt their travel and who don't think more time is worth money
Those who drive cars without passing the charge cordon and therefore have shorter travel times at no extra cost.	Those who are 'forced off' the roads
Cyclists who appear to have a better traffic environment	Public transportation passengers who experience more public transportation congestion.
People who value their time highly and think that more time is worth money	
Commercial drivers who gain a better work environment (bus drivers, taxi drivers, truck drivers, etc.)	

Table 21. The winners and the losers of the Stockholm Trial (Source: City of Stockholm, 2006)

#### 4.2.4. LESSONS LEARNED

Stockholm case is well known successful example of congestion charging scheme thanks to its successful legitimacy, management and results. According to Isaksson and Richardson (2009) the Stockholm case shows that London's strategy, single hero leading a process of confrontation and dramatic change, is not the only solution for being acceptable. Stockholm's success is the result of a number of different working pragmatically together in a climate of uncertainty, managing and adjusting to difficulties

in a more incremental manner. In addition Stockholm's opportunity was having the same parties (SDP together with their left-wing allies) holding a majority in local government and in national legislator help in approving the proposal made by the local government.

Isaksson and Richardson (2009) claims: *'The strategy that evolved over time was highly incremental in nature: it was not conceived in advance, in an abstract way, but rather it was born of necessity. The city leaders chose a clearly pragmatic approach, grounded in compromise, yet subtly designed to avoid openly confronting the status quo. The decisions that were being taken were sometimes risky in themselves but were over all designed to maintain public acceptance and meet political needs.'*

Thanks to the 'first trial then referendum' decision of Stockholm city leader, the power of giving a decision was on the public and they were ready to vote in favor of the scheme. Therefore, the strategy of 'trial+referendum' enabled to gain acceptance and avoid by conflict increasing knowledge of effects (either positive and negative) to the votes. (Isaksson and Richardson, 2009)

The lessons that should be taken into account from Stockholm case are:

- The system had clear and measurable objectives and the system was visibly designed with these objectives in mind, which were fulfilled.
- The information campaign was successful. The public was well informed by flyers, letters, signs, and advertisements on radio, television, website, Customer Service and public meetings. Before the trial everyone already knows about how and where to pay the charge.
- Payment methods were clear and easy for drivers whether direct debit, but it the counter at Pressbyrå kiosks or 7-Eleven shops throughout the country, the Internet using a credit or charge card, at banks or Internet banking
- Thanks to the efforts of the Road Administration, the system was customer-friendly- clear, easy to understand, worked seamlessly.
- According to Eliasson (2008), the improvements in travel times and urban environment were visible right from the start. Therefore, the potency of road pricing had been overwhelmingly proved.
- The media explained and evaluated what was happening objectively and these news was able to change the mind of those who underestimate the benefits of the scheme.
- During the trial, the expert group consisting of eight traffic experts with various specialties presented monthly indicators each month and also they published the results of the trial. The City of Stockholm conducted ongoing analyses and summaries of these measurements. Therefore, the public was kept up to date about the results of the trial.
- The scheme was not a stand-alone policy. After the trial, it was decided that the charging scheme should be complemented by public transit extensions —several new bus lines, additional capacity on commuter trains and subways, and more park-and-ride facilities. These extension extensions were done before the permanent scheme.

- Since the results of the surrounding municipalities were decided to be insignificant and the City of Stockholm made the sole decision for the scheme, thanks to the agreement between Transportation of Stockholm and the government during the trial, public transportation has been improved. This created opportunities for extension of the transport system by many new buses, bus lines, park-and-ride facilities. Therefore, people who use public transportation more (in general low and medium income group) were not affected negatively, instead those who continue to drive private car (high income group) were more impacted by the trial.

## 5. MILAN CASE

Milan, the capital of Lombardy Region and the second largest city in Italy, is not only the main industrial, commercial and financial centre of Italy but also world fashion and design capital. The city has a population about 1.3 million however the metropolitan area, the 5<sup>th</sup> largest in European Union and the largest in Italy has an estimated population of approximately 4.4 million. (wikipedia)

Milan road system is characterized by a high rate of traffic congestion. It was calculated that traffic costs the city about 5 billion Euros a year, in terms of damages to buildings, health and loss of time because of congestion. (Municipality of Milan, 2006) Due to a high number of vehicles per inhabitant (600 cars, 730 vehicles –cars and motorcycles- per 1000 citizens in 2009) and its geographical position Milan is one of the most polluted cities in Europe (third highest concentration of particle matter (PM10) among large European cities, both in terms of average annual level and days of breaching a European Union limit of 50 micrograms per cubic meter, according to a 2007 study of 26 European cities by the environmental group Legambiente and the research institute Ambiente Italia, and sponsored by Dexia SA.). (PWC, 2009)

In addition according to 'Strategy for Sustainable Mobility In Milan' report by Milan Municipality in 2006, in the Milan Council district the total daily movement of people is 4.757,000, of which 47% are for entering and leaving the city boundaries and of 53% of movements (2,521,000) generates inside the city itself. (Municipality of Milan, 2006)

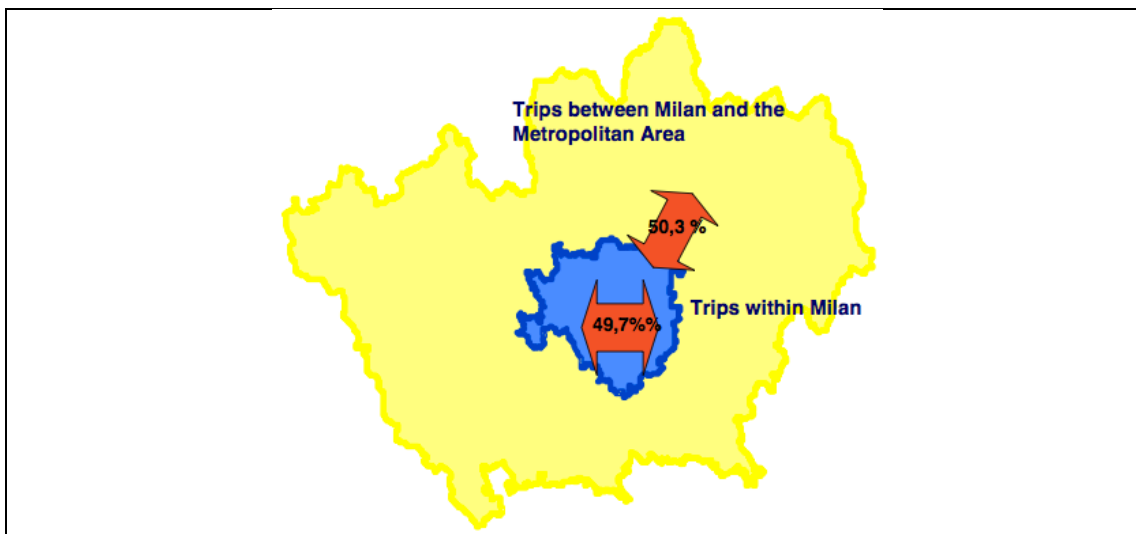


Figure 46. Distribution by typology in relation to movements of people (Source: Municipality of Milan, 2006, p.9)

31% of the movements with the outside are made with public transportation. The rate of using public transportation reaches %47 inside the city. Consequently, the problem is focused on the interchange network with the surrounding municipalities, both the near municipalities and those farthest away. It is underlined in the report that it will be necessary to work to encourage modal transfer to public transport as the transfer modal. (Municipality of Milan, 2006)

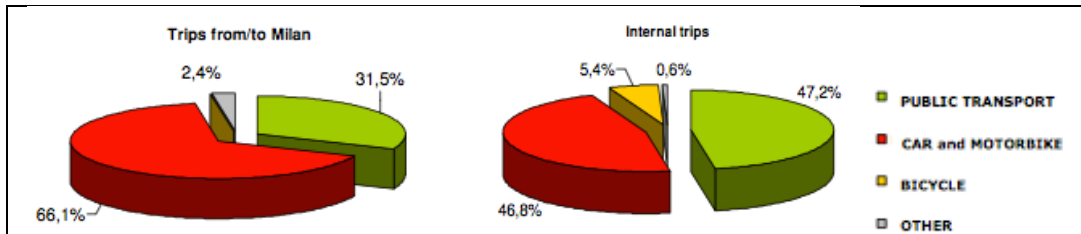


Figure 47. Modal distribution related to people's movements (Source: Municipality of Milan, 2006, p.11)

Everyday 841,000 non-residents entering to the center of Milan, 510,000 of which use private transport (410,000 cars carrying an average of 1.2 people and 21,000 motorbikes and scooters referable to non-residents) and 311,000 of which use public transport (176,000 by train, 71,000 by metro and 65,000 by above ground public transport lines). (Municipality of Milan, 2006)

In order to reduce the negative externalities of private transport on the city, several measures have been implemented (exclusions based on license plate numbers, "car-free days" and so on) but the situation has kept its severity. So beyond these alternative measures, road pricing scheme have been considered. Therefore the pollution charge system- Ecopass was introduced in 2008. In 2012, the scheme was turned into congestion charging scheme called Area C because of the increasing ineffectiveness of Ecopass due to old cars substitution (at the end of the period less than 15% of vehicles were paying, the rest being included in the low polluting exempted classes).

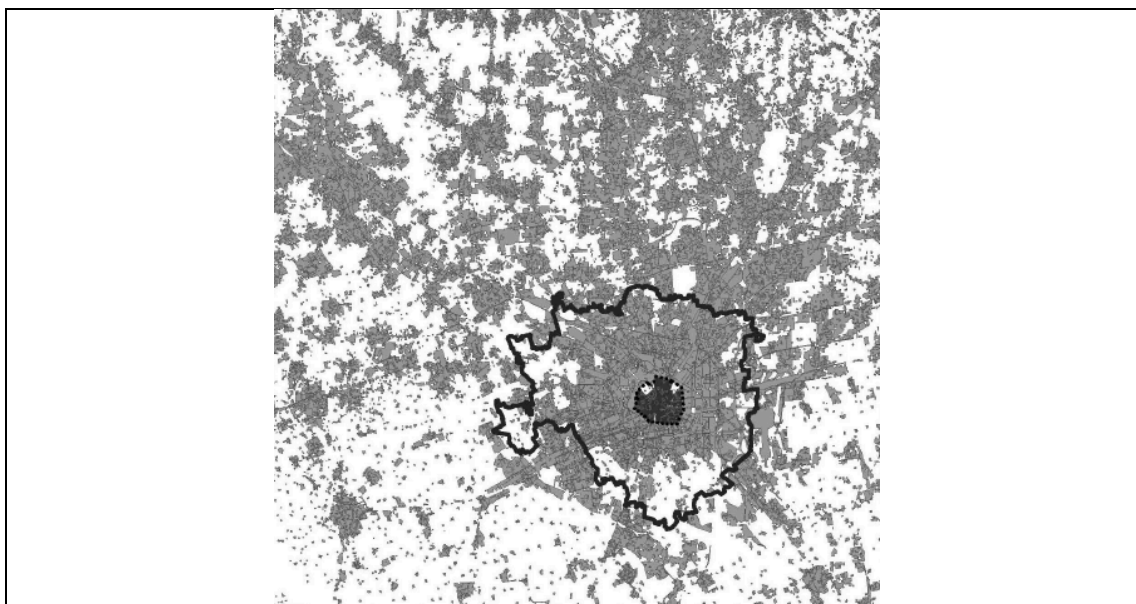


Figure 48. Metropolitan area, Milan Municipality and the border of the scheme (Source: Beria and Boggio, 2012, p.11)

The area, which is based on the same designated traffic restricted zone (ZTL), Ecopass and Area C corresponding to central Cerchia dei Bastioni area, encompasses about 8.2 square kilometers (4.5% of city surface) and 77.000 residents (4.5% and 6% of the city total, respectively).

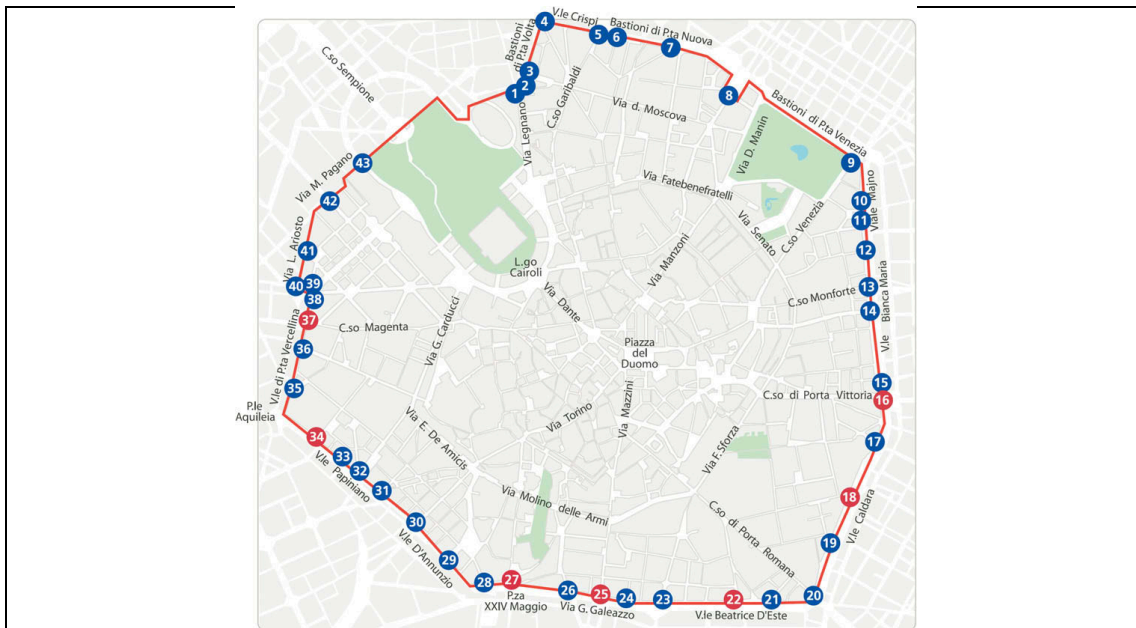


Figure 49. The charging zone –Ecopass and Area C– and the entry points (Source: Rotaris et al., 2010, p.361)

The following sections will discuss firstly the former Ecopass and then the new Area C.

## 5.1. ECOPASS

### 5.1.1. CONTEXT DESCRIPTION

Ecopass, a cordon toll, was a pollution charge implemented as a one-year trial on January 2, 2008. According to Croci (2010), the area was defined on the basis of high congestion, easy access control and escape and high level of public transport service. However according to Danielis et al (2011), The charging area is relatively small compared to London (22 km<sup>2</sup> before 2005, and 40 km<sup>2</sup> after 2005) and Stockholm (30 km<sup>2</sup>), but is comparable to Singapore (7 km<sup>2</sup>) and the choice of the location and of the dimension of the charging area has been based on the historic urban layout, rather than on theoretical transport planning considerations. Moreover, it is one of the most sensitive areas of the city, including the majority of historical monuments and having the streets based on the medieval city structure.



With the new bus lanes, increased bus frequency, increase in parking restriction and fees, park and ride facilities and an underground network extension, Ecopass is the part of a wider transportation policy package. (Municipality of Milan, 2006)

Later it was extended until December 31, 2009 in order to conduct a public consultation before voting if the charges become permanent. However the current scheme was extended one more time until December 31, 2011.

#### 5.1.1.1. OBJECTIVES OF THE SCHEME

Ecopass was designed with the aim to restrict access to the central area of Milan by charging the most pollutant vehicles. Its objectives are:

- To make the air cleaner by reducing PM emissions in the “Cerchia dei Bastioni” area by 30%, with a positive fallout on the surrounding area of the city as well;
- To reduce congestion by reducing the number of incoming cars by 10% and thereby speeding up public transport in the area;
- To boost public transport through the re-investment of the pollution charge revenues. (Mainero, 2008)

#### 5.1.1.2. SCHEME DESCRIPTION

Since it was a pollution charging scheme, drivers had to pay the charge depended on the vehicle’s engine emissions standard traveling within a designated area – ZTL or Cerchia dei Bastioni- on weekdays from 7:30 to 19:30.

Thanks to Automatic Number Plate Recognition (ANPR) technology installed at each of 43 gate, the plate numbers of the vehicles can be read and send to a central database in order to compare with the list of allowed plates.

As it is a pollution charging scheme, the tariffs depend on the vehicle’s Euro category and petrol/diesel engine. There is no differentiation according to access time of the vehicles. Euro categories are defined in EEC/EU directives and are grouped in pollution classes.



Toll classes	Definition
Class I	Liquid propane gas-methane-electric-hybrid
Class II	Gasoline Euro III, IV or more recent Diesel Euro IV without anti-particulate filter (up to 30/06/08) Cars and freight vehicles diesel Euro IV or more recent with anti-particulate filter
Class III	Gasoline Euro I and II
Class IV	Gasoline Euro 0 Diesel cars Euro I-III Diesel goods vehicles Euro III Diesel buses Euro IV and V
Class V	Diesel cars Euro 0 Goods vehicles Euro 0-II Diesel buses Euro 0-III

Figure 50. Toll classes based on Euro emission standards (Source: Rotaris et al., 2010, p.361)

Single daily entrance tickets are value of 2€, 5€ and 10€. There are some discounts for those who enter the zone less than 100 times per year %50 reduction to 50€ (class 3), 125€ (class 4), 250€ (class 5) for the first 50 entries and %40 reduction to 60€ (class 3), 150€ (class 4), 300€ (class 5) for the successive 50 entries. In addition, for the residents of the charging zone the yearly pass is 50€, 125€ and 250€ respectively.

Toll classes	Daily charge	Discounted multiple entries (max 100 entries per year)		Yearly pass for residents
		50% Rebate (first 50 entries)	40% Rebate (successive 50 entries)	
Class I			Free	
Class II			Free	
Class III	€ 2	€ 50	€ 60	€ 50
Class IV	€ 5	€ 125	€ 150	€ 125
Class V	€ 10	€ 250	€ 300	€ 250

Figure 51. Ecopass tariffs for cars (Source: Rotaris et al., 2010, p.362)

One ticket allows for as many times as needed during a single day. The car (or goods vehicle) driver has to pay the charge within 24 hours. Charges can be paid in advance buying tickets for single or multiple entrances. Payments can be done by telephone, via internet, in designated banks or direct debit or authorized ticket sellers (shops, newsagents, public transportation information points).

Any motor vehicle built before the Euro emission standards were in force, is not allowed to enter the restricted zone (ZTL), as these vehicles have the worst polluting engines. This is however a restriction in force in the entire Lombardy region since 2007. A number of categories are instead exempted. These includes cleaner vehicles, motorcycles and scooters, public transportation, vehicles for handicapped people, army and police (state and local) vehicles and vehicles for public services, ambulances and from 10 a.m. to 16 p.m., vehicles transporting exclusively perishable and refrigerated food products, provided a permit is purchased from the municipality. (Rotaris et al., 2010)

## 5.1.2. HISTORY OF THE POLLUTION CHARGE

### 5.1.2.1. BIRTH OF THE POLLUTION CHARGE

As Fedeli and Valsecchi (2008) explain the history of the pollution charge of Milan:

Laws concerning the reduction of air pollution in Italy date back to '60es and 70'es. After that numerous actions like the institution of the national health care service (1978), standardization of the quality of air (DPCM 30.031983) and Piani di Risanamento dell'Atmosfera' (DPR 203/1988) were done.

In 1991, due to the severity of the problem in Italian urban areas, the Ministries of Environment and Urban Areas established standards for pollution in urban areas based

on the concept of 'limits of attention' and 'alarm'. In 1994 these standards have been reformulated once again and criteria for the individuation of emergencies were instituted.

In 1999 based on the European directive(92/72), the quality objectives became law which force cities of more than 150,000 inhabitant to:

- introduce limits to urban car traffic in the case of the overthrowing of limits and levels of attention;
- present, at the end of the year, a report on the quality of air and to promote a programme every year. In the following years laws were promoted concerning the quality of fuel.

The law (DM 60/2002), which in 2002 introduced the obligatory monitoring of values and stated the necessity to evaluate and manage the quality of air and also the obligation to inform the public in case of overcoming the alarm levels. With the elimination of the obligation for cities to edit the year report on the quality of air, the formulation of the regulatory framework has shifted to the regional level.

Therefore in 2006-2007 Lombardy Region has promoted its new plan for crisis situation in the sphere of atmospheric environment. In June 2006 the law project which change the regional approach based on crisis' situation into a general framework of action which should respond more proactively to the role the Region can play in this field of policies. The new law project was part of the regional action programme 2005-2010 presented in august 2005 and also linked to the new norms in environmental field introduced by the D Lgs 152/06 (Norme in materia ambientale) whose aim is to guarantee restrictive emission indicators and reinforcing the regional role in this policy field.

Meanwhile the City of Milan has published its Action Plan for the reduction of congestion and pollution which was concentrated just on the city of Milan based on pollution charging. Therefore the plan has led to a wide discussion since it is based on municipal basis rather than a metropolitan scale. So it has anticipated the regional legislative process.

#### **5.1.2.2. IMPLEMENTATION PROCESS**

As Fedeli and Valsecchi (2008) explain the implementation process of the pollution charge of Milan:

In 2002 by Municipality of Milan's transport authority "Agenzia Milanese Mobilità Ambiente" (Agency for the mobility and environment of Milan, hereinafter AMAT) published a paper called "Studio per l'introduzione del road pricing a Milano", presenting the possible introduction of a kind of road pricing in Milan. The report suggested three different scenarios in terms of different areas and different level of charges with possible outcomes. Only the inner circle was selected to be subject to the tariff. However the city administration didn't follow the study. (Silva, 2007) In addition, the report has remained as a 'secret' and never distributed to the public.

The possibility of introducing road pricing re-emerged in 2006. Region Lombardy declared its new plan for the elimination of PM, by 2010. The plan was the consequence of the results of the studies promoted by the Joint Research Center, which defines the region as one of the most polluted areas in Europe, after Benelux.

In the same days Legambiente one of the most important environmental association in

Italy and *Il Sole 24 Ore* the most important Italian economic newspaper promoted inquiry shows that preoccupation about environmental pollution is shared by Milan citizens. According to that traffic is seen as a problem, more than pollution (43% against 40%).

The new mayor Letizia Moratti had proposed the introduction of a form of road pricing especially a pollution charging scheme in its agenda in August 2006, later introduced in the City's Urban Mobility Strategy. The general plan is approved by the city council and announced to be published on internet 6 of November 2006. The pollution charge should start, in this first hypothesis, on 19th of February 2007 with simple techniques for payment, and then officially in October 2007 with a more advanced technical support.

The proposal was different from any of the cases presented in the 2002 report; is related to an area of 60 square kilometers, 33% of the municipal territory; affecting 77% of resident population and 65% non resident. It was very difficult to vote this proposal for governing majority however Letizia Moratti declared that she would be ready for promoting a consultation among political forces, institutions and stakeholders in order to overcome conflicts and to find a common solution.

After the president of the Province's declaration of support, Moratti announced that a confrontation with the surrounding 32 municipalities would start. Also Assessore Croci declared that since this is a shared project not a plan of municipality, in order to improve the quality the collaboration and responsiveness of every citizen is very important.

The Region entered the debate and proposed the steering committee in order to improve the situation. Newspapers reported that there were some conflicts in the whole party of the Mayor in particular Silvio Berlusconi, the national leader of the party of both the major and the president.

The result of the face-to-face meeting of the president of the region Formigoni and Moratti was also contradictory. Formigoni asked for transportation improvements before the introduction. Despite this confrontation, the steering committee promoted a new meeting 'conference of mayors' between Moratti, the president of the Region, the president of the Province and the mayors of 32 municipalities who asked the ticket to be accompanied by a clear program of intervention linked with public transportation, metropolitan pricing and by a program of investments of money earned.

After the meeting Moratti declared that despite the opposition of Berlusconi, she would proceed alone and the scheme is not dead. On 28<sup>th</sup> of November the regional law as presented on the media as first regional law in the field, is approved. The debates have started again on the media and between some civil society associations. It was a critical period for the city however all major political governing forces was trying to limit the air pollution levels and avoid stops to traffic or any other kind of intervention.

16<sup>th</sup> of January a new scheme which is based on the Cerchia dei Bastioni area with lower prices is presented as a part of an action plan including other relevant interventions like improving public transportation. According to Fedeli and Valsecchi (2008) the scheme would concern more than 110.000 cars entering the city and 20.000 commercial vehicles.

With the proposal presentation, some associations like Genitori Antismog, Altroconsumo, Osservatorio per Milano, some newspapers, some politicians from the

government coalition declared their opposition. The Region and the Province has decided to back out themselves from the decisions of the city of Milan.

The 30<sup>th</sup> of January the municipality announced that some certain category of vehicles will be banned immediately from entering the city and in spring the scheme will be introduced.

Due to the polemics the regulation of the scheme re-voted in the city council and it is approved to step forward the introduction of the Ecopass on the Cerchia dei Bastioni area. However the debates haven't finished; the Region claimed that the problem should have been solved only on a large scale.

19<sup>th</sup> of July Moratti threatened her coalition that they had to support her otherwise they should have found a new mayor. At the end of July the city council had to decide and the scheme is approved. The majority defines the ticket as a false ecological policy, on the contrary the green party asks for responsibility towards the problem and support for the mayor.

The first day of October the project was finally approved. The government majority agreed on the base of a reduction of prices for residents, and the elimination of the obligation to buy a public transportation yearly ticket to obtain discounts. In the two last months of 2007 they concentrated on the technical implementation of the project. Informative letters sent to all families and a press campaign had launched. It was about the general issues "more quality in your life" and then concerning the ticket. And finally the scheme has received a new name of ECOPASS to recall that its main purpose is environmental.

Since the criticisms haven't finished, the mayor had to support her political programme stubbornly. Finally the scheme has introduced as a one-year trial on January 2, 2008.

#### **5.1.2.2.1. PUBLIC ACCEPTABILITY**

Although Moratti claimed that there would be a process of consultation, in Ecopass case there wasn't a clear consultation process. During the year of 2007, she had unsuccessful meetings just with the mayors of the 32 municipalities. The public was informed essentially by mass media. After the every detail of the scheme had defined by the city council in 2008, an informative letter sent to all families by the mayor and also a press campaign has launched.

During the implementation process, several newspapers and associations conducted online polls. According to the poll of 'Corriere Della Sera'-newspaper- the majority of citizens (53,9 %) were against to the scheme in 2006. (Fedeli and Valsecchi, 2008)

Moreover since some environmental associations like Genitori Antismog focused on the achievement of more transparency on both decision making and the production of knowledge and the promotion of a new more legitimate and effective set of policies. Altroconsumo, consumers' association, criticized the scheme in term of exceptions on Euro4 and claimed that values are not worrying at that time. Independent association, Osservatorio per Milano, declared that the scheme is useless. Also the campaign called "Cosa respirano i tuoi capelli" promoted by the International Hair Research Foundation (IHRF) with Chiama Milano and the Eurispes-ACI report, promoted by the national car drivers club, showed that citizens feel obliged to use the car for having no other alternative (29,1%); since public services are not efficient (18,7%), or too much binding (17,6%), in particular if one aims at displacing several times during the day (11,1%).

(Fedeli and Valsecchi, 2008)

According to Fedeli and Valsecchi (2008) both Moratti and Formigoni were not interested in gaining public opinion support however they prefer to support their policies with a sort of foreign affairs policy, they presented their projects abroad (EU, USA) and tried to get indirect support from this public presentations. On the other side they seemed to be proposing an image of great commitment to the environmental problems, without really relating to public opinion or civil society association. Actually, it is likely that the main motivation behind this policy was to demonstrate that everything possible was done against pollution to avoid negative judgment of European Commission on the excessive pollution.

Since there wasn't a true consultation process, the role of media was very important. The Ecopass was one of the main arguments in the press all over the examined years. Sometimes institutions blamed media for being not reliable, giving partisan information, producing more preoccupation than needed and being one-sided (center-left over center-right). Therefore, there was a problem of communication between institutions and public through press because of general mistrust in institutions and their actions.

On the other hand, the processes are not transparent and finding official documents were not easy because communication and giving official information are not so important for the institutions. As a result, news was drawn on the press and most of the actors interviewed declared to be essentially informed by the press. Uncertainty and partiality were central on the interviews.

If the Ecopass case examined by issues determining acceptability explained in the literature review (Chapter 3), it is seen that the case is not acceptable.

Factors Determining Acceptability	Milan - Ecopass
Problem Perception	<input checked="" type="checkbox"/> Due to a high number of vehicles per inhabitant (600 cars, 730 vehicles -cars and motorcycles- per 1000 citizens in 2009) and its geographical position Milan is one of the most polluted cities in Europe. Both politicians and the public were aware of that.
Important aims to reach	<input checked="" type="checkbox"/> The aims are clear and strategies are consistent with the aims: pollution must be reduced.
Mobility related Social Norms	<input checked="" type="checkbox"/> People's attitude about private car in Milan is in favor of private car transportation, as very high car ownership rates show. Car drivers do not intend to change their mode of travel. There is however a sort of "polarization" among citizens, with environmental concern increasing in some classes.
Knowledge about the Action	<input checked="" type="checkbox"/> The public was not informed enough and they didn't involve to any process of the scheme. After every detail of the scheme had decided by the city council, the letters of the mayor were sent to all families.
Perceived Effectiveness and efficiency	<input checked="" type="checkbox"/> According to Valsecchi and Fedeli (2008), Milan is in a larger urban region, where the problem of air pollution cannot be defeated or treated inside a municipal perspective. Similarly according to Goggi (2011), the reduction of pollution in a tiny area is irrelevant to the general levels of pollution in the city. So, from the strict emissions point of view, Ecopass is slightly effective only locally.
Equity	<input checked="" type="checkbox"/> Since the effects are not equal for different group of people, it shows that the scheme has horizontal and vertical equity problems because of the different charge levels depending on the vehicles

	emission standards.
Attribution of Responsibility	<input type="checkbox"/> Croci, the assessor of Transportation and Mayor Moratti were quite committed with Ecopass together with some civil associations. However people's attitudes to the environment quite low than other countries. For instance, according to European Commission (2008) in Italy there is a belief that public authorities should always choose the least expensive products, regardless of whether they are produced in an environmentally friendly way or not. The study shows that there is unwillingness to pay in order to protect the environment.
Socio-economic Factors	<input checked="" type="checkbox"/> The charges are depended on the vehicles emission standards. So the old car owners in general low-income group has to pay more. However high-income group who can afford new less polluting cars pay less.
Revenue Allocation	<input type="checkbox"/> It is announced that the revenues will be used in order to improve the public transportation and finance new public transportation services. However since there is no transparency, it is not clear how the revenues are used.

Table 22. Examination of Milan- Ecopass case in terms of factors determining acceptability

#### 5.1.2.2.2. POLITICAL ACCEPTABILITY

Starting from 2002, politicians, even in the same parties, have never agreed on how to introduce the charging. Because of that the design of the scheme has changed two times. It seems that in order to be made more acceptable, the features of the scheme has been weakened.

	2002	2006	2008 (Ecopass)
<b>Area</b>	Three alternatives are studied: - The 'Cerchia dei Bastioni' 7 km <sup>2</sup> - The 'Cerchia Floviaria' 29.2 km <sup>2</sup> - The city boundary 181 km <sup>2</sup>	60 km <sup>2</sup> (33 % of the city area, affecting 77% of resident population and 65% non resident)	The 'Cerchia dei Bastioni' 8.2 km <sup>2</sup>
<b>Objectives of the Scheme</b>	The analysis aims at assessing the feasibility of a road pricing scheme that would result in • Reduction of congestion and environmental protection • Preservation of the accessibility of the city • Generation of revenues to finance infrastructures	The scheme is officially called 'pollution charge', with the objectives of: • Reducing traffic • Reducing pollution • Financing public transport • Financing environmental policy projects	It is also a pollution charge and its objectives are: • To reduce PM emissions • To relieve congestion by reducing the number of incoming cars to the area • To boost public transportation through the re-investment of the revenues.
<b>Design of the Charge</b>	Cordon pricing Charge is for all vehicles between 7 a.m. and 7 p.m. Hypotheses of charge levels: 1, 2 and 3 €	The charge is depended on the vehicle's emission standards	The charge is depended on the vehicle's emission standards. Single daily entrance tickets are value of 2€, 5€ and 10€.

Table 23. Different alternatives of the charging scheme (Source: Self elaboration with data from Silva, 2007)

Since there are 188 municipalities in the province, just the 32 closest municipalities were invited to the first consultation, the others were excluded. The consultation process was not successful, the first meeting produced immediate conflicts and Mayors invited to abandon the meeting. According to Valsecchi and Fedeli (2008), Moratti behaved independently from her political coalition except Berlusconi, not interested to come to compromises and also the City of Milan wasn't interested in any real interaction with the other municipalities.

Even inside the City of Milan, there were a lot of criticism and discussions about the scheme. Rosati, the local representative of Unions claimed that the scheme wasn't open to discussion with local actors and also there was a lack of information about the duration, monitoring of the scheme, neither an engagement on the use of resources. In addition there was a problem of institutional relationships: the municipality acted as in autonomy in one direction, while the region announced the augmentation of prices on public transportation in another. (Valsecchi and Fedeli, 2008)

While majority defined the ticket a false ecological policy like the previous mayor Albertini, as part of the opposition, green party asked for responsibility towards the problem and supported for the mayor.

On the first days of October the project is finally approved. Nevertheless criticisms have never stopped. The party Lega Nord asked for a referendum for the general closure of the city center to cars. Also at the end of October the Court of Auditors, asked for clarification concerning the economical sustainability of the Ecopass. On the other side just Green party were in favor of the scheme in order to be responsible for the problem. (Valsecchi and Fedeli, 2008)

In addition, there were also some active civil societies, which have developed specific roles and competences, in the press and political debate. For example MAMMEantismog (Genitori anti smog) had asked to see the preliminary studies, which should be public, but actually they are denied the access to them. FIAB and Ciclobby, tried to promote the use of bicycles in all the possible urban spaces and trying to enhance policies supporting cycling all over the city.

As a result, even the scheme was not accepted politically, it was introduced thanks to the Mayor Moratti's 'stubbornly' supporting as Valsecchi and Fedeli's words.

### **5.1.2.3. RESULTS AND IMPACTS OF THE POLLUTION CHARGE**

During the Ecopass trial period, in the website of the Milan Municipality report of the results has published every year by AMAT. In the reports, the impacts of the scheme on congestion, public transportation, emissions and road safety have been explained. However, the social impacts have never been evaluated. In addition information about the revenues were always very superficial. Therefore since the reports were not so detailed they were not on the centre of the discussion. In other words the transparency was only on the emissions, for the other issues the transparency was limited.

#### **5.1.2.3.1. IMPACTS OF THE POLLUTION CHARGE ON CONGESTION, PUBLIC TRANSPORTATION AND EMISSIONS**

##### ***Congestion***

According to AMAT report (2011), the reduction of traffic in the Cerchia dei Bastioni is 16.2%. When it is considered in constant traffic overall citizen influenced by all the other active policies to address the demand (e.g. charging for parking on the road) and overall economic conditions (economic performance, cost of fuels, etc.), the real effect of the measure on reducing traffic in the area is reduced to a range between 6% and 7%.

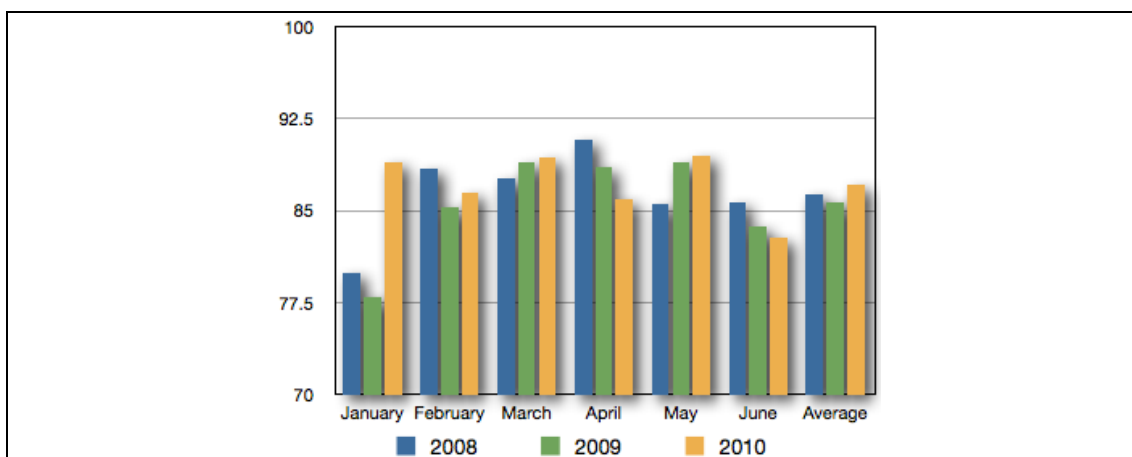


Figure 52. Variations of Traffic in the charging zone (Source: Self elaboration with data from AMAT, 2010a, 2010b)

The Ecopass scheme has decreased the number of vehicles entering daily the Ecopass area, from 90,580 in the year 2007 to 76,114 in the first half of the year 2010. The drop has been very relevant in the first year of application of the measure (-21%) but the number of vehicles actually increased in the years 2009 and 2010 relative to the year 2008 thanks to older vehicles substitution. So in the first year there were positive effects both on the environment and on congestion, however the effects started to reduce and stopped. (Danielis et al., 2011)

	Vehicles paying the toll			Vehicles not paying the toll			Total		
	Goods	Passenger	Total	Goods	Passenger	Total	Goods	Passenger	Total
Before Ecopass	9,738	28,341	38,079	3,302	49,199	52,501	13,040	77,540	90,580
2008	5,116	11,206	16,322	4,493	50,914	55,407	9,609	62,120	71,729
2009	3,961	8,294	12,255	5,804	57,038	62,842	9,765	65,332	75,097
Jan-June 2010	3,749	7,820	11,569	5,772	58,773	64,545	9,521	66,593	76,114
Before Ecopass	100%	100%	100%	100%	100%	100%	100%	100%	100%
2008	53%	40%	43%	136%	103%	106%	74%	80%	79%
2009	41%	29%	32%	176%	116%	120%	75%	84%	83%
Jan-June 2010	38%	28%	30%	175%	119%	123%	73%	86%	84%

Table 24. Average number of daily entries in the Ecopass area (Source: Danielis et al., 2011)

The reduction of traffic in the whole city between 2008 and 2009 is 1.7%. However between 2010 and 2009 there is 0.2% increase. In 2010 the average traffic for the first half the year is similar with the corresponding period in 2009 (-6.6% compared the reference period, corresponding to an increase of 0.2% compared to first half of 2009). Consequently, the charging had a positive but absolutely marginal effect on the city as a whole.



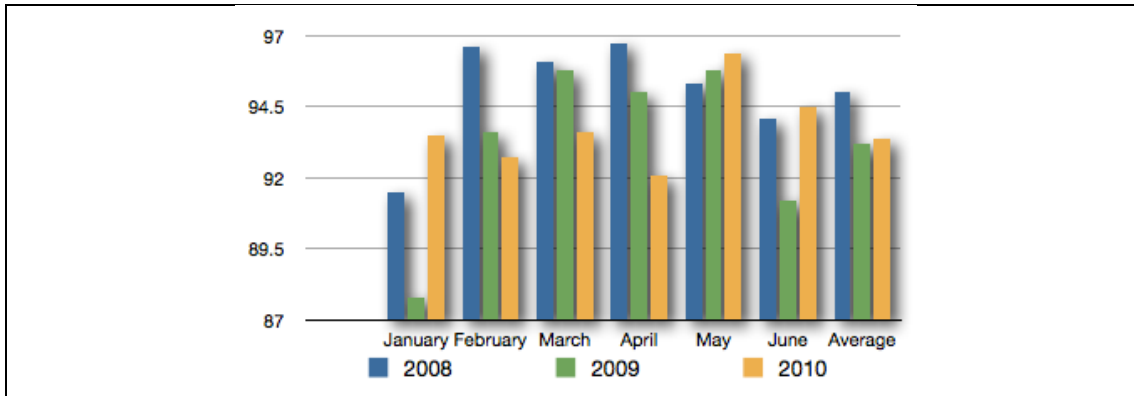


Figure 53. Variations of Traffic in Milan (Source: Self elaboration with data from AMAT, 2010a, 2010b)

**Public Transportation**

According to AMAT report (2011), the number of subway passengers traveling to the Cerchia dei Bastioni increased by 12.5 percent. In 2009 the passengers who used the metropolitan area to go to Ecopass were on average 273,544 to days, with an average increase of 13,899 passengers / day (+5.4%) compared the reference period pre-Ecopass (2007). The highest values were detected in March, the month in which the average daily passengers using the subway to go to Ecopass area was more than 297,300 passengers / day, an increase of about 15,500 passengers / day compared to the same month in 2008. Comparing 2009 data with those of 2008, however, it is observed that there is a slight overall reduction of the passengers in the Congestion Charging Zone (- 0.8%). Such reduction also applies to passengers traveling outside the Congestion Charging area, but it is an insignificant decrease of 0.3% since.

During peak hours, 10000 new seats per day became available and 1300 journeys were done by trams or buses. (Mainero, 2010)

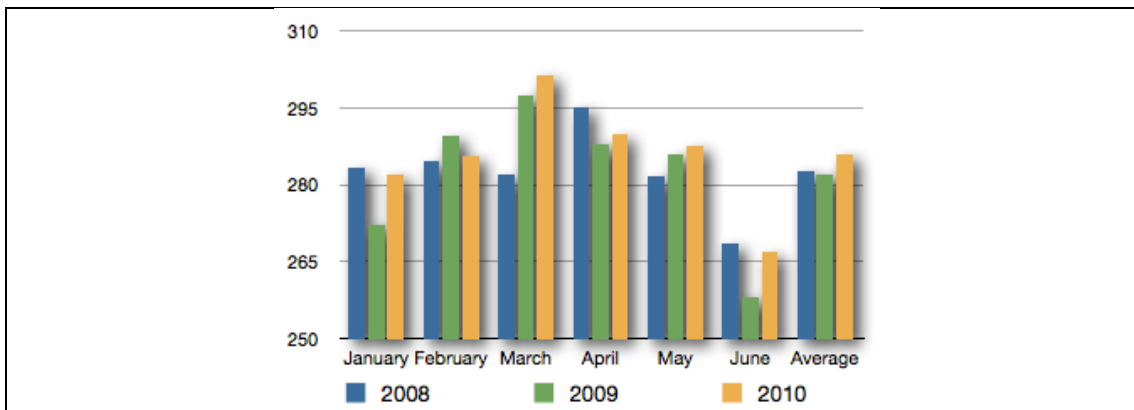


Figure 54. Numbers of daily subway passengers traveling to Ecopass area (Source: Self elaboration with data from AMAT, 2010a, 2010b)

In the first six months of 2010, passengers that used the subway to go to the charging area were an average of 281,908 per day (+10.1% compared to the reference period). Comparing data from the first half of 2010 with those of the corresponding period of 2009, confirming the slight increase in passenger detected in first quarter (+1.3%, corresponding to more than 4,000 passengers in the day).

Data of passengers traveling outside the Congestion Charging show almost similar trend with the data found for the area Ecopass, but with a highest increase compared to 2009 (+3.9%) comparable to the magnitude that observed in the first quarter.

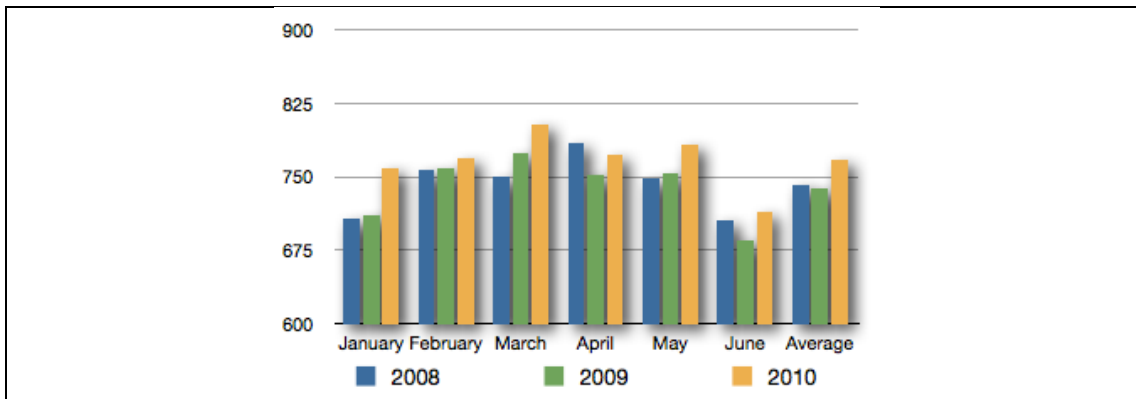


Figure 55. Numbers of daily subway passengers traveling from Ecopass area (Source: Self elaboration with data from AMAT, 2010a, 2010b)

In 2009 it was found that there is a 6.8% increase of commercial speed of Public Transport in the Ecopass area, compared to the reference period (from 8.67 km / h to 9.26 km / h). The situation is rather unchanged compared to 2008, when the average commercial speed of public transport was equal to 9.25 km / h. In 2010 there was an 8,4% increase of overall commercial speed of the of Public Transport in the charging zone compared to the reference area Ecopass (from 8.67 km / h to 9.40 km / h) The average speed recorded between January and June of 2010 also appears to be higher even than the corresponding period of 2009 (+1.2%).

### Accidents

According to AMAT report (2011), the reduction in accident rates in the Cerchia dei Bastioni is 21.3 percent. The data of accidents transmitted by the Municipal Police shows that there is a significant reduction of accidents in the charging area during 2009: this reduction is equal to 10.5% compared to 2007 (-13.5% if the only injury accidents), but less significant than that recorded in 2008 ( accidents increased by 3.4%, +1.1% with respect to injury accidents). It is also noted that monthly incidents show a good correlation with the trend of traffic, except for the month of October when it was found the most number of accidents, contrary to what would be expected considering the traffic peak in November in 2009.

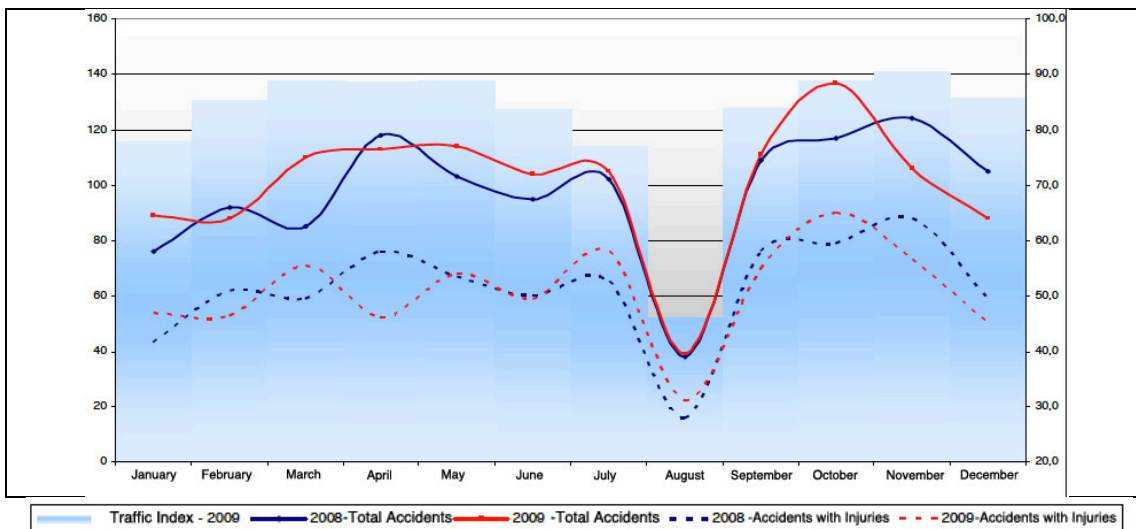


Figure 56. Accidents in the Ecopass area during the charging hours (Source: AMAT, 2010a, p.45)

In the course of first 6 months of 2010 the reduction of accidents in the area of Ecopass, during the charging hours, equals to 10.1% (- 15.3% when considering only the accidents with injuries). However it is noted that the accident in the overall area increased over the first year of implementation of the measure (+9.3%) and almost unchanged compared to 2009 (+0.8%).

Like 2009 data, 2010 confirms substantial decline in accident rates outside the Congestion Charging which reduced 9.5% compared to 2007 (-17.2% in case of accidents with injuries). There is however statistically significant change in the number of deaths in road accidents recorded in the periods in question. (AMAT 2009, 2010)

### ***Emissions & Air Quality***

The PM10 exhaust is a pollutant emerging mainly from the diesel-engine vehicles without particulate abatement system, more specifically, dated heavy vehicles and also on motorcycles with 2-time engine. According to AMAT report (2011), before Ecopass 43,4% of vehicles accessing the area belonged to most polluting classes 3, 4 and 5. By the end of 2009 only 14.4% of vehicles belonged to these classes. Vehicles entering the area, belong to classes 3, 4 and 5 reduced by 67.8% (-25.824 vehicles per day). Vehicles belong to class 1 and 2 increased by 19,7% (+10.341 per day). Therefore, the reduction of PM10 emissions in the exhaust Ecopass area in 2009 is lower than estimated for 2008 (490 kg, -17%). This is the main outcome of Ecopass: polluting vehicles were actually reduced drastically and citizens had an incentive to substitute older vehicles more rapidly than normal ratios.

The estimated reduction in exhaust emissions of PM10 in the area Ecopass first half of 2010 is lower than the same period is estimated to 2008 (270 kg) than for 2009 (200 kg). The marked variability of monthly emission factors is closely linked to change in ambient temperature: low temperatures cause higher factors (and vice versa) because of higher air emissions due to the engines not yet fully operational ("cold emissions").

According to Danielis et al. (2011), while European Directive 2008/50/CE recommends a value lower than 35, in 2010 the number of days whose average daily value exceeded the 50 µg/m<sup>3</sup> threshold was equal to 86. However, this value is lower than in 2002 (166 days) or in 2008 (111 days). The year before the Ecopass in 2007 the number was as high as 132 days. Therefore Milan's measures are not satisfactory not only before the Ecopass but also after that. This fact is, however, also due to structural and meteorological characteristics of the area.

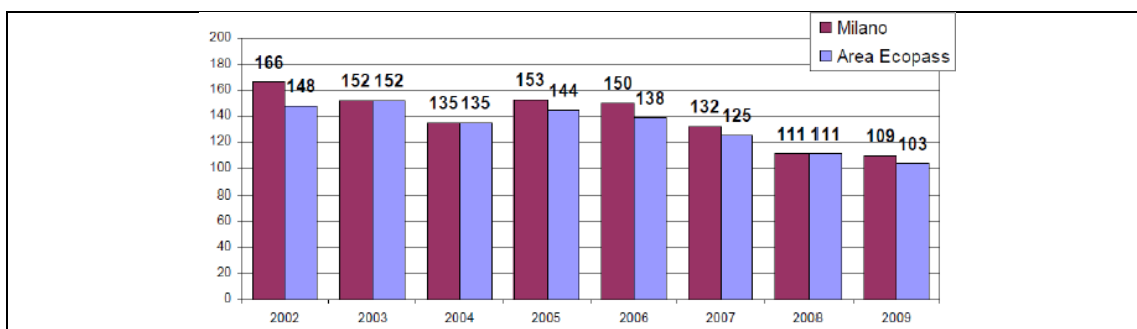


Figure 57. Average yearly number of days exceeding PM10 concentration limit (Source: Croci, 2010)

### **5.1.2.3.2. SOCIAL IMPACTS OF THE CONGESTION CHARGE**

According to AMAT report (2011), in 2010 41,3% of the residents' mode of mobility was private car. Significantly, 50,68% of them charged less than 40 times and more than

20% of the total residents paid discounted charge for the first 50 entrances. Less than 12,39% of the total residents paid discounted charge for the successive 50 entrances and also the average number of days per year of usage of residents' cars is 56 (one time every 4 days). Residents generated 11% of the traffic in the charging zone. As a result, the percentage of the residents who affected by Ecopass was very low and most of the residents enjoyed the safer and quieter roads, faster public transportation, and so on.

mode of travel	% displacement	N. of Entrance	% cumulative
		Walking	13,5%
Cycling	5,7%	6 - 10	21,00%
Public Transportation	29,7%	11 - 20	33,23%
Taxi	1,6%	21 - 40	50,68%
Motorcycle	8,2%	41 - 60	63,32%
Automobile	41,3%	61 - 80	72,88%
		81 - 100	80,16%
		101 - 120	86,10%
		121 - 140	91,11%
		141 - 160	95,32%
		161 - 180	98,17%
		181 - 200	99,74%
		>200	100,00%

Table 25. Mode of travel of the residents during the charging hours (Source: AMAT, 2011, p.17)

Table 26. Number of entrance of the resident drivers (Source: AMAT, 2011. p.18)

Same trend is relevant also for the commercial vehicles, which generated 11% of the traffic in the charging zone. 75,4% of the commercial vehicles entered to the charging zone no more than 10 days in the year of 2010 and only 2.3% of them were charged for more than 100 days. The reason of that the commercial vehicles had arranged their travel off-peak, before the charging hours. Therefore, commercial vehicles weren't affected as much as their expectations.

N. of Entrance	Vehicles	%	cumulative
1 - 5	98.025	64,7%	64,7%
6 - 10	16.238	10,7%	75,4%
11 - 15	8.115	5,4%	80,8%
16 - 25	9.016	6,0%	86,7%
26 - 50	9.699	6,4%	93,1%
51 - 75	4.387	2,9%	96,0%
76 - 100	2.363	1,6%	97,6%
101 - 125	1.422	0,9%	98,5%
126 - 150	906	0,6%	99,1%
151 - 175	639	0,4%	99,6%
176 - 200	497	0,3%	99,9%
more than 200	184	0,1%	100,0%
<b>Total</b>	<b>151.491</b>	<b>100,0%</b>	

Table 27. Number of entrance of the commercial vehicles during the charging hours (Source: AMAT, 2011, p.21)

However the percentage of non-residents who travel to the charging zone during the charging hours chose to travel with public transportation was 64,6% and by private cars 19,5%. Therefore, most of the non-resident travelers are not affected by the charge and even they enjoy the faster and more frequent public transportation (gains). On the other hand, they could be further exposed to over-crowded buses or tram (loses). The ones who chose to travel with their private cars, might value their time highly and think that more time is worth money. Therefore they gained more time thanks to faster traffic.

On the other hand according to Goggi (2011) claims that Ecopass is a socially discriminating measure because who owns a new car and who can afford to change cars

with a more recent and less polluting weren't affected at all. However the low and middle-income groups who need to use car for their transport needs were affected. He underlines that this may sufficiently prove that the ideological nature of Ecopass: a measure with a strong symbolic charge (pollution control), which is socially discriminative and uncertain in effectiveness.

#### **5.1.2.4. LESSONS LEARNED**

Ecopass is well known case thanks to Moratti and Croci's foreign policy. However; it wasn't very successful in reducing total air pollution outside city centre. The system had clear objectives however the area was very small compared to other cases. Therefore it wasn't so convincing that the scheme could solve the air pollution problem. The effects in terms of congestion, the policy's secondary aim, are instead present, but limited to the charged area. Moreover, car substitution determined a progressive decline in Ecopass effectiveness.

According to Goggi (2011), in the first year of Ecopass (2008) the weather was a very rainy and windy. This has enabled Ecopass supporters to sing victory, but the winter 2010-2011 was much worse (almost like that of 2001-2002), the threshold exceedances of PM10 were numerous. Therefore it is understood that pollution charging scheme couldn't be successful to tackle with the problem.

In fact the scheme accelerated the transformation of the motor vehicles. People (in general high income group) who can afford changed their car with eco friendly or less polluting cars in order to avoid the charge. Therefore the problem of traffic didn't change. According to Goggi (2011), Ecopass has not changed the look of the center of Milan: just about the same traffic, the same car in the second row, the same landscape polluted by the presence of cars everywhere. As always happens to the measure ideological and symbolic, the Ecopass proved a placebo.

As discussed in Rotaris et al. (2010), since the technology (also cameras) was already in place thanks to the pre-existing traffic control measures, the policy was relatively easy and inexpensive to be implemented. However the Mayor Moratti had some difficulties to convince the city council. Even some politicians from her political party were against the scheme. In order to have political acceptance she defended the scheme stubbornly like London's 'hero' Livingstone. In fact, she threatened her coalition that they had to support her otherwise they should have found a new mayor. Maybe she couldn't spend her time for the knowledge of the citizens since she were busy with the political oppositions.

Because of the lack of information, the role media was very important than other cases. It was the only source of the information. Because of that according to Danielis et al. (2011), there were a high number of fines which means complains, court trials and dissatisfaction from a number of citizens. Also lack of transparency about the revenues whether they were reinvested was the central question of the citizens.

Ecopass case shows the power of the problem perception. The air pollution problem was very concerning and well known among the citizens. Although there wasn't enough information about the scheme, they agreed that something has to be done.

The scheme was not a stand-alone policy. It was a part of a wider transportation policy package with the new bus lanes, increased bus frequency, increase in parking restriction and fees, park and ride facilities and an underground network extension. (Urban Mobility Strategy of Milan 2006 - 2011, 2006)

## 5.2. AREA C

### 5.2.1. CONTEXT DESCRIPTION

Area C, congestion charging scheme, replaced the previous pollution charging scheme- Ecopass. Area C is introduced on January 16, 2012 based on the same designated traffic restricted zone (ZTL). Therefore it encompasses about 8.2 square kilometers like Ecopass. As a result of referendum held on 11<sup>th</sup> of July 2011, it is as an 18-month trial.



#### 5.2.1.1. OBJECTIVES OF THE SCHEME

The objective of the Area C – Congestion Charging Scheme are:

- Substantially reduce the traffic and the presence of vehicles in the center, determining the conditions of implementation of regeneration, protection and development of public transportation networks and services of "soft mobility" (pedestrian, cycling, traffic at moderate speed) and consequently increasing accessibility and use of the area;
- Improve the overall quality of urban life, and then promote its attractiveness by reducing the number of accidents, the noise, local pollutants, the perception of insecurity and degradation linked to the excessive number of cars parked illegally and moving, retraining, and animating pedestrian areas,
- Raising revenue deriving from the charging of externalities produced by private car, to be allocated to finalize and bound implementation of the interventions and, more in general, the implementation of air pollution policies in order to abate the problem and development of sustainable mobility. (AMAT, 2011)

#### 5.2.1.2. SCHEME DESCRIPTION

Starting from January 16, 2012, every vehicles entering the city centre has to pay the charge on weekdays from 7:30 to 19:30. Since it is a congestion charging scheme, the charge is not variable depending on the vehicle's emission standard. It is set to 5 euro for every vehicle (excluding discounts). Also the technology, the infrastructure and the management of the scheme are the same with Ecopass.

However some of the exemptions and reductions have changed, mainly to fulfill through the fixing of minimum standards the environmental goals of the scheme. With the Area C, the area is forbidden for diesel Euro 3 and below, gasoline Euro 0 and private vehicles over 7 meters long. Until December 31, 2012, there is no charge for hybrid, bi-fuel, CNG and LPG vehicle, tour buses fueled by diesel Euro 3, Euro 3 diesel vehicles of residents in the zone. (areacmilano.it)

Mopeds and motorcycles (class Euro 1 or later), cycles, vehicles belonging to the Armed Forces, the Police, the Local Police, the Italian Red Cross, hospitals, local health authorities, the Fire Brigade, Civil Defense, vehicles used for public utility services – ambulances-, vehicles owned by public entities by diplomatic and consular corps, vehicles of disabled people, vehicles used for public transportation services or taxis are exempted as well.

Engine class →	Gasoline					Diesel					Hybrid / bi-fuel	Electric	Scooters			
	Euro levels →	5	4	3	2	1	0	5	4	3				2	1	0
non-residents	€5					banned	€5						banned	free <sup>1</sup>	free	free
residents <sup>2</sup>	€2					banned	€2						banned	free <sup>1</sup>	free	free
commercial	€3					banned	€3						banned	free <sup>1</sup>	free	NA
public service <sup>3</sup>	free					banned <sup>4</sup>	free						banned <sup>4</sup>	free		NA

1. until 2013  
2. residents have also 40 free accesses per year  
3. includes public transport, emergency vehicles, taxis  
4. with exceptions

Table 28. Area C tariffs and exemptions (Source: wikipedia)

Residents inside the area have 40 free accesses per year and after the 40<sup>th</sup> entrance they have discounted fare of 2 euro. Similarly, also for the registered vehicles (typically vehicles associated to commercial activities) exist some discounts: the charge is 5 euro for the daily access including 2 hours of free parking in the designated blue spaces or 3 euro for the daily access without parking permission included.

The charge must be paid on the day of entrance or within the following day. One ticket is valid for whole day with no limitations. It can be paid by buying coupon available at tobacconist, newsagents, ATM Points (Milan transport company), in Banca Intesa Sanpaolo cash machines, Pay and display machines, direct debit card or via call center, Telepass and website.

### 5.2.2. HISTORY OF CONGESTION CHARGE

The history of the Area C is not so old. Congestion charging scheme was one of the three alternatives proposed in the report by Agency for the mobility and environment of Milan (AMAT) in 2002. However, in 2006 Moratti proposed a pollution charging scheme in city scale and finally in 2008 Ecopass -pollution charge- has introduced in the city center it was again different than the proposal suggested in 2006.

Because of the Ecopass' increasingly ineffective results in the last years, the Mayor Moratti had to face political opposition within her own coalition. She commissioned the Ecopass Committee (an expert group created by the local authorities) to assess the effects of the Ecopass and validity of possible alternatives. Assessor of transportation, Mr. Edoardo Croci, became an advocate of the policy and Ecopass Committee had published a paper however their conclusions were not made public since the administrative elections were very close.

Thanks to the electoral propagandas the congestion charging scheme has become one of the most important topics of the agenda of the Milan city.

#### 5.2.2.1. BIRTH OF CONGESTION CHARGE

In August 2010, former councilor Croci, green politician Fedrighini and radical politician Cappato successfully promoted a collection of signatures of citizens for five referendums on the environment, among which one is about Ecopass. The newborn Association Milano-Si-Muove proposed improvement of public transport, the extension of Ecopass and making pedestrian zone of the center. They collected over 125,000 signatures (25,000 signatures for every topic) by November 2010 within 4 months and they presented these signatures to the municipality for a referendum call. At the end, the City Council is approved to make a referendum on the same day of the national referendum

of 12-13 June. (Galeotti, 2011)

Before the referendum on 30<sup>th</sup> of May, Giuliano Pisapia was elected as a new mayor of Milan. In his program he stated that "we need to reduce congestion and the use of private cars in town through a mix of interventions: congestion tolls..." in his electoral program elected as a new mayor of Milan. The Moratti administration, which introduced the Ecopass, lost the election even she promised that there would be no charge for the residents.

With the result of the referendum (79% yes) the extension of the Ecopass has approved by the citizens and the new Mayor Pisapia had to decide soon how to change it.

#### **5.2.2.2. IMPLEMENTATION PROCESS**

In order to understand the results of the Ecopass and decide how the scheme will be, the former city administration asked to Ecopass Commission four questions:

- Evaluate the impact of the Ecopass policy on the environment and on traffic.
- Evaluate the possibility of extending the paying area: a) up to the city border, b) up to "Circonvallazione filoviaria" (corresponding approximately with the before IIWW city).
- Evaluate other policy alternatives such as: a) an even-odd plate number policy, b) a traffic ban within the Navigli area.
- Evaluate what would happen in the coming years if the paying area is left as it is, and if some policy adjustments are implemented such as a toll simplification, a fee reduction and an adjustment of the current freight transport regulation. (Danielis et al, 2011)

The idea of extension of the charging area and the changes in the number of classes subject to the charge has come from the Ecopass Commission and the advocacy groups. In the report a move from pollution charge to a congestion charge, or at least to a combination of pollution and congestion charge, is suggested. At the same time, it is requested to strengthen public transport, increase the pedestrian-only areas and promote alternative modes of transport (e.g., cycling), fuels (e.g., methane) or vehicles (hybrid or electric). According to the report the number of the fee-paying classes to some of the ones not-paying and reducing the fee in Ecopass should be increased. Also it is suggested that the fee structure should be simplified and there should be two fares only, one for cars and freight light duty vehicles and one for tourist buses and heavy duty vehicles. In addition green traffic and transport policies like reducing the number of parking places, reserved and protected lanes for public transportation, cycling lanes, bike sharing and car sharing have been recommended. (Danielis et al, 2011)

On 3<sup>rd</sup> of November 2011, AMAT report including important points from Ecopass, information about the new scheme published. After that people has started complain about the new features of the scheme. This is in line with Goodwin (2006, as cited by Bird and Morris, 2006) claims in his cycle: more details more complains. However, as a result of the consultation meetings, the Milan City Council approved a new regulation for access to the inner city (Cerchia dei Bastioni), which will come into force starting from January 16, 2012 as an 18-month trial.

#### **5.2.2.2.1. PUBLIC ACCEPTABILITY**

On 12<sup>th</sup> of June 2011 the referendum took place in order to have the approval of the public for the extension of the Ecopass.



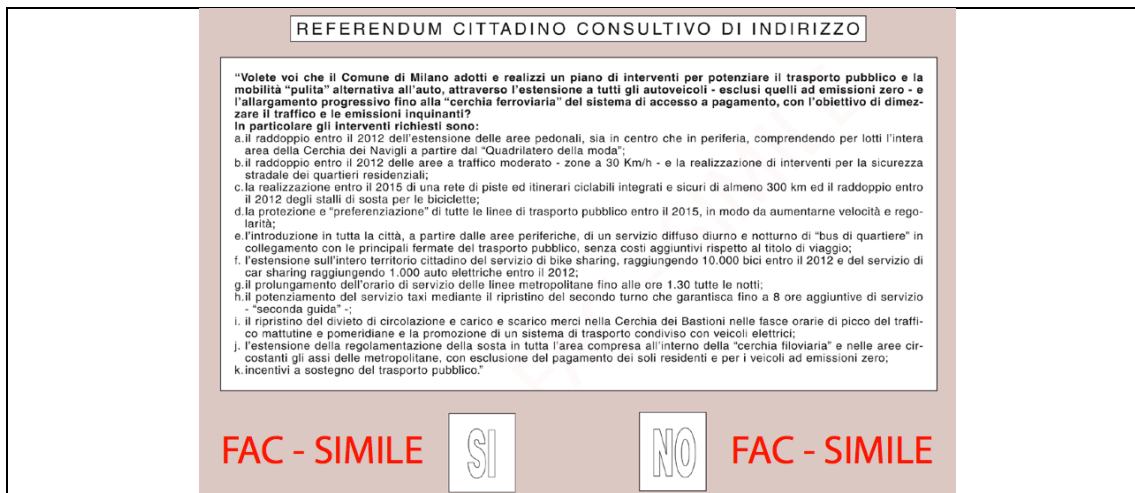


Figure 58. The ballot of the first topic about Ecopass’ future of the referendum. (Source: MilanoSiMuove)

The question of the referendum was:

*Do you want that the Municipality of Milan adopts and realizes a plan of interventions to empower the public transport and the “clean” mobility alternative to cars, through the extension to all vehicles (excluding the zero emissions ones) and the progressive broadening of the cordon charging, with the goal of halving traffic and pollution? (Beria and Boggio, 2012)*

*In particular, the interventions required are:*

- a. doubling the extension of pedestrian areas, both in the center on the outskirts, including lots for the entire area of the ‘Cerchia dei Navigli’ from “the neighborhood of fashion” by 2012 ;*
- b. doubling the areas of moderated traffic (areas 30 km / h) and the implementation of measures for road safety of residential neighborhoods by 2012 ;*
- c. the creation of a network of trails and bicycle routes integrated by 2015 and secure at least 300 km by 2012 and doubling of parking spaces for bicycles;*
- d. protection and making preferable of all public transportation lines by 2015, so as to increase speed and regularity;*
- e. introduction of widespread service from suburban areas day and night of “bus district” in connection with the main public transportation stops, at no additional cost compared to the ticket across the city;*
- f. extending throughout the city’s bike sharing service, reaching 10,000 by 2012 bikes and car sharing service reaching 1,000 electric cars by 2012;*
- g. the extension of the service of the underground lines until 01.30 a.m. every night;*
- h. the upgrading of the taxi service by restoring the second shift that will guarantee up to 8 additional hours of service;*
- i. the restoration of the movement and loading and unloading of goods in the ‘Cerchia dei Bastioni’ during the morning and afternoon peak hours and the promotion of a transportation system shared with electric vehicles;*
- j. the extension of the regulation of parking throughout the area inside the “Cerchia Filoviaria” and in the metropolitan areas surrounding the axes, with the exception of payment for residents only and for zero-emission vehicles;*
- k. incentives to support public transport. (MilanoSiMuove)*

The result was clear. The extension of the Ecopass has approved by 79.12% of valid ‘yes’ votes. However, according to Beria and Boggio (2012), the way of composition of the

question was quite generic. Since everybody wants a better environment, the question is composed as such as only people really against Ecopass for personal reasons would say no. In this sense, in the ballot question, promoters introduced a bias. The question, due to Italian law, was asked to citizens as it is, namely as promoters wrote it. Only citizens that followed the media and the meetings knew the context of the scheme. However, unlikely in Stockholm, the citizens voted before the trial period having in mind only the former Ecopass and not its extension and its expected impacts.

Unlikely Moratti's Ecopass, Pisapia gave importance to the knowledge of the citizens and some meetings with the public had been organized although the consultation process wasn't so institutionalized like in London. The information campaign started on January. The Mayor sent a letter to the citizens, signs around the city started to appear, leaflets has distributed.

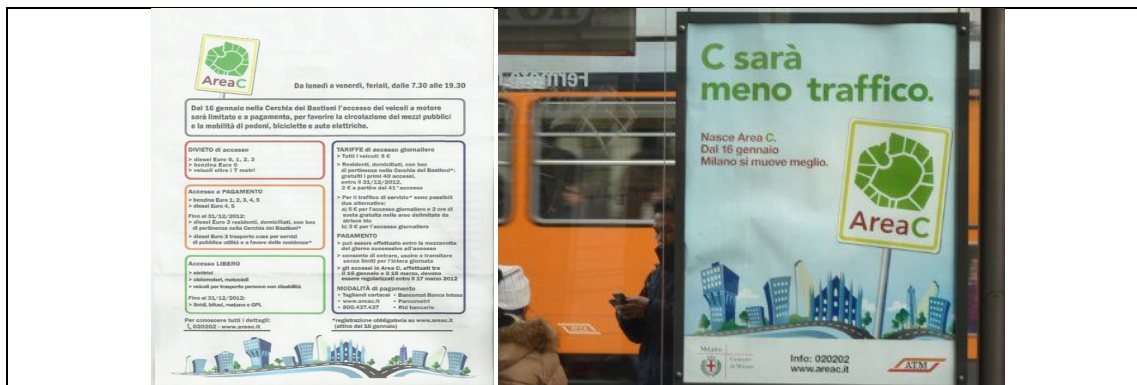


Figure 59. Leaflet and sign in subway (Source: Area C facebook page and <http://www.areacmilano.it/wp-content/uploads/2012/01/AreaC-manifesto.jpg>)

Between 9-15 of January, the new Assessor of Transportation Pierfrancesco Maran with other councilors met some times with the citizens in all Milan zones (1 to 9). Also some sector meetings were held, for example with the shop owners and associations. The contributions and the participation to these meetings were very high. (*Cronaca Milano*)

In the meeting the residents expressed that they don't want to pay to come back their homes. Politician Tiziana Maiolo brought out the Article 3 which is about the principle of equality: citizens resident in the center are the same as everyone else and everyone is entitled to return home without having to pay and Article 16, freedom of movement, and 42 property right. Another citizen told that the referendum was on Ecopass not on a congestion charge. During the meetings the councilors explained the details of the scheme, the reason why Milan needs a congestion charge, the objectives of the scheme and its possible impacts. At the end he said *'The measure can be improved during construction it's an experiment that we want to improve, we want to reduce traffic, not to make money.'*(*Cronaca Milano*) In the light of the meetings some details like discounts for residents had been shaped.

However public meeting have started just before the starting date of the application (16<sup>th</sup> of January) hence during the meetings some citizens contested that public should have been listened before.

Meanwhile, some demonstrations were held against Area C. A group from PDL organized a signature campaign against Area C in order to make a referendum to cancel the Area C on 16<sup>th</sup> of January 2012. They claimed that they were against the Area C because:

- It is a traffic generator to the outside of Area C.
- It is discriminative for citizens who live, work and use services in the center.
- It suffocates the attractiveness of the area.
- It is a tax-free benefits for the community. The revenue will support only the operating costs. It does not constitute any kind of investment in sustainable mobility.
- The referendum betrays an impulse of 12/13 June 2011 (there was about expansion and focus on the environment, both expectations were disappointed). (Masseroli, Corriere, 2012)

They needed 30.000 signatures however they couldn't reach the number.



Figure 60. PDL's campaign and other groups: Area Chiusa and No Area C (Source: nonctassate.it, areachiusa.it and noareacmilano.it)

There are also other groups like AreaChiusa, No Area C against the Area C. They defend that Area C doesn't help Milan, doesn't improve the traffic and it is a just another tax against citizens. They invite the citizens to sign the petition to ask the mayor not to extend the scheme and to abolish both Ecopass and Area C.

If the Area C case examined by issues determining acceptability explained in the literature review (Chapter 3), it is seen that the case is more acceptable than Ecopass scheme.

Factors Determining Acceptability	Milan – Area C
Problem Perception	<input checked="" type="checkbox"/> After the Ecopass' unsatisfactory results, everybody was agree that the problem of congestion and air pollution are still existing.
Important aims to reach	<input checked="" type="checkbox"/> The aims are clear and strategies are consistent with the aims.
Mobility related Social Norms	<input checked="" type="checkbox"/> The people's attitude about private car in Milan where car ownership rates are very high is well known. They do not intend to change their mode of travel. However, "soft" mobility practices are improving among some citizens and general environmental concern is high.
Knowledge about the Action	<input checked="" type="checkbox"/> Compared to Ecopass case, the public was informed this time. After the referendum some meetings with the citizens were held. Also the information campaign has started (leaflets, letters, signs, advertisement on radio and TV)

Perceived Effectiveness and efficiency	<input type="checkbox"/> There isn't general perceived effectiveness in this case. Some people think that the scheme is useless. Some other thinks that the scheme is reducing the traffic.
Equity	<input checked="" type="checkbox"/> The charges are the same for every vehicle. However, the distributional effects are not equal for different group of people. As a consequence, the scheme has horizontal and vertical equity problems. On the other hand, since before the Area C the entrance to the Cerchia dei Bastioni was subject to charge there is longitudinal equity.
Attribution of Responsibility	<input type="checkbox"/> The new Mayor Moratti is quite committed with environmental concerns together with some civil associations. However people's attitudes to the environment lower than other countries. There is unwillingness to pay in order to protect the environment.
Socio-economic Factors	<input checked="" type="checkbox"/> Since low-middle income group live outside of Milan where the public transportation is not still so improved, the low-middle income group is affected more. Similarly, the benefits are concentrated in the very centre of the city, where high-income classes live. However, number of payers from external parts of the city is relatively small, as public transport share in the centre is already high.
Revenue Allocation	<input checked="" type="checkbox"/> It is announced that the revenues will be used in order to boost public transportation. There isn't any official report about the revenues yet however on the newspapers it is possible to find information about how the revenues are being reinvested. And also the first financial report will be announced at the end of July 2012.

Table 29. Examination of Milan- Area C case in terms of factors determining acceptability  
(Source: Self elaboration)

#### 5.2.2.2.2. POLITICAL ACCEPTABILITY

Before the referendum many parties announced that they would vote for yes. Former mayor Moratti has said that she is in favor of the referendum several times. Although PDL and LEGA have declared that they would vote for yes. However the presentation of the new scheme's details, the media expressed the many politicians' opposition.

From 'La Repubblica, 5 November 2011):

*PDL group leader Masseroli Carlo said, "Better call it T area, as a tax, Milan comes ten years after London where they get ready to cancel it."*

*Even the artisans were dissatisfied: "It is unsatisfactory that a decision will cause confusion."*

*Net rejection from the President of the Province, Guido Podesta declared: "A new eco-tax of little utility to penalize the city". The leader of Lega Nord, Matteo Salvini said "a blow to those working and those who live in the suburbs".*

*To announce the battle against the new measure, Riccardo De Corato, vice president of PDL from City Council said: "It is yet another collection from the pockets of Milan: this time it's up to motorists."*

*On the other hand, in the same majority, there were also some politicians who were in favor the scheme: -Carlo Monguzzi, Assessor of the Environment said, "Everyone has to pay. We hope that in six months the concessions are canceled."*

*Simonpaolo Buongiardino from Trade Union clarified "We are pleased with the discount and ask to become permanent. The important thing is to make progress on the logistics system the loading and unloading. Of course, the congestion is still a tax. "*

*From Sinistra e Liberta with the coordinator of Milan Daniele Farina, who praises the method of testing: "It is the era of unnecessary measures that remain alive only because they don't have better ideas: the hallmark of the new measures should be experimental. "*

*As environmentalists, Andrea Poggio from Legambiente said: "It's been an incredible benefit to traders, we just hope that it will be clarified how the revenues will be used soon."*

*Much less satisfied with Marco Accornero, Secretary Milan Craftsmen Union declared: "We had asked for subsidized parking discount, but not as an alternative. This creates confusion. "*

*The Councillor for Productive Activities, Franco D'Alfonso, states that "there will be compared with the category in the table that begins now: everything also depend on progress in terms of loading and unloading."*

*The councilor for mobility, Pierfrancesco Maran said "The economic disincentive is a brave decision we expect positive results as the traffic in London. The proceeds will finance sustainable mobility. "*

From 19 December, La Repubblica:

*PDL group leader Masseroli Carlo said "Area C is useless for traffic and environment and harmful to the economy: the mayor has the courage to write the truth to local people," referring to the letter to families who send Giuliano Pisapia shortly. And his colleague Riccardo De Corato adds: "We invite all the Milanese to a class action."*

According to Garling and Schuiteme (2007), congestion charging schemes may lead to conflicts because of the different political goals. Green parties are in favor of reducing car traffic however the social democrats or conservatives view it as a threat to economic development and to the welfare of society (Johansson et al., 2003 cited by Garling and Schuitema, 2007, p.149). This is relevant also for the Milan's case where right-wing parties like Lega Nord and PDL are opposed to the scheme and left-ring parties like Left Ecology Freedom and Verdi Ecologisti support the scheme. On the other hand there were also some extreme left parties or groups are not in favor of the scheme because they think that the scheme is not sufficiently radical.

### **5.2.3. RESULTS AND IMPACTS OF THE CONGESTION CHARGE**

AMAT (Agency for the mobility and environment of Milan) publishes the current results every month in order to give information to the citizens. Since Area C is an ongoing trial scheme, it is very early to discuss the results. The data of first four months (until 30 April) are available until now. It should be consider that in general because of the uncertainty of the public during the first months the results are very effective however the people's reaction starts to decline therefore, the effects of the scheme start to decrease a bit compared to the first months.

AMAT announced that the indicators have been defined starting from the experience of monitoring of Area C and extending the set in consideration of other European

experiences as a reference and proposals emerged from the work tables turned on before adoption of Area C, with major trade associations and with Councils of the zone (Consigli di zona). ( AMAT, 2012b)

### 5.2.3.1. IMPACTS OF THE CONGESTION CHARGE ON CONGESTION, PUBLIC TRANSPORTATION AND EMISSIONS

#### *Congestion*

According to AMAT (2012d) The overall decrease of incoming traffic to the charging zone compared to the same period of 2011 amounted to 34.3% corresponding to an average about 46,200 entrance/day. In absolute terms, it can be noticed a gradual growth in number of entrances to the charging area until the eighth week, in which the traffic has reached an average of 96,200 entrance/day to settle back down in the weeks of the following values close to 90,000 entrance/day.

Number of week starting from Area C	Average of Daily Entrances 2011(Ecopass)	Average of Daily Entrances 2012(Area C)	Change %	Note
1^	139.542	77.109	-45%	
2^	139.832	80.454	-42%	Except: 26/1/2011 and 27/1/2012 PT strike
3^	129.053	82.776	-36%	1 - 2/2/2012 abnormal (because of snow)
4^	130.379	88.869	-32%	
5^	136.495	90.076	-34%	
6^	139.755	87.227	-38%	
7^	140.496	89.439	-36%	Except: 1/3/2012 public transportation strike
8^	129.671	96.206	-26%	Except: 11/3/2011 public transportation strike
9^	138.903	90.895	-34,6%	Except: 17/3/2011 and 14/3/2012 PT strike
10^	137.205	88.260	-35,7%	
11^	138.125	88.189	-36,2%	Except: 1/4/2011 public transportation strike
12^	136.614	89.324	-34,6%	
13^	144.281	91.016	-36,9%	Except: 9/4/2012 monday Easter
14^	125.731	108.028	-14,1%	Except: 20/4/2012 Design Week
15^	121.519	86.990	-28,4%	Except : 25 April Both in 2011 and 2012
Average of 15 weeks	<b>134.771</b>	<b>88.585</b>	<b>-34,3</b>	

Table 30. Average of daily entrances to the charging area in the first 15 weeks of the measure (Source: AMAT, 2012d, p.5)

There are some exceptions like the 14th week, 16 to 20 April 2012, in which the events of the 'Salone del Mobile' (Design Week) took place, as a result a substantial increased traffic that reaches on average 108,000 inputs/day. The last week of April 2011 and April 30 in particular cannot be considered significant because of the holiday between 25 April and 1 in May. In addition on the days of public transportation strike when the charges are suspended there is a substantial increase in entrance flows that however still remain 15-20% below those of 2011. (AMAT, 2012d)

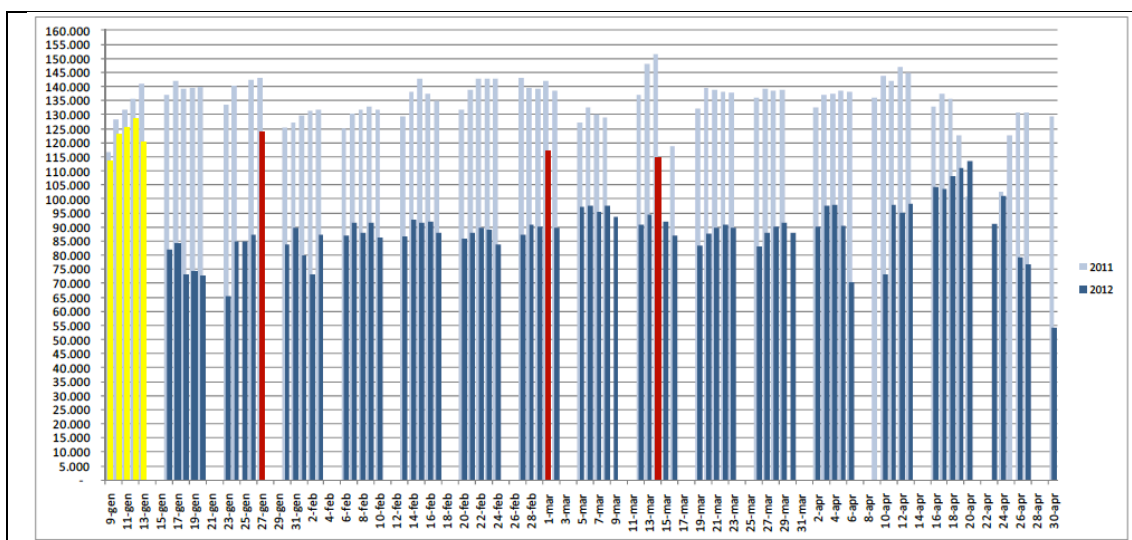


Figure 61. Daily entrances to the charging area in the first 15 weeks of the measure compared with the same period of 2011 (Ecopass) (Source: AMAT, 2012d, p.7)

In the graph, figures in yellow show the first days of 2012 when the Area C hasn't started yet (no charge) and figures in red indicate the days of public transportation strike (no charge).

In the first quarter 2012, total traffic in the whole Milan was almost 7% lower than the same period of 2011. The reduction was found in all periods and all the days of weeks, showing an overall trend of significant reduction urban traffic. On weekdays, the decline was slightly greater during the charging hour (-7%) than that recorded during the whole day (-6.6%) - (AMAT, 2012d)

	2011		2012		Change %	
	0-24	7:30-19:30	0-24	7:30-19:30	0-24	7:30-19:30
Monday	96,55	97,07	89,41	89,40	-7,4%	-7,9%
Tuesday	99,67	99,72	92,00	91,66	-7,7%	-8,1%
Wednesday	101,13	99,98	93,31	91,81	-7,7%	-8,2%
Thursday	98,84	96,41	95,24	92,88	-3,6%	-3,7%
Friday	105,58	102,49	98,77	94,92	-6,5%	-7,4%
Saturday	89,78	83,08	84,35	77,03	-6,1%	-7,3%
Sunday and Holidays	65,90	56,94	59,64	50,39	-9,5%	-11,5%
<b>Weekday - Average</b>	<b>100,33</b>	<b>99,12</b>	<b>93,74</b>	<b>92,13</b>	<b>-6,6%</b>	<b>-7,0%</b>
<b>Week - Average</b>	<b>93,92</b>	<b>90,82</b>	<b>87,53</b>	<b>84,01</b>	<b>-6,8%</b>	<b>-7,5%</b>
<b>Overall Average</b>	<b>93,05</b>	<b>89,76</b>	<b>86,67</b>	<b>82,98</b>	<b>-6,9%</b>	<b>-7,6%</b>

Table 31. Traffic indexes in Milan comparison between 2011 and 2012 (January – April) (Source: AMAT, 2012d, p8.)

There is a significant increase in environment friendly vehicles not considering the segment of authorized vehicles (taxi, public transport and vehicles in the public interest). In the first 15 weeks of the scheme, one of the every six vehicles entering to the ZTL belongs to the group of green vehicles. In pre Area C, the same ratio was 1 to 12. (AMAT, 2012d)

The percentage of green vehicles is more among the other commercial vehicles, where it reaches 21%, than among passenger cars (16%), and has grown significantly from pre Area C, where by 16% and 7%. (AMAT, 2012d)

Considering the segment of vehicles under payment with respect to the period Pre Area C, shows a significant decrease of the entrance of all vehicle classes.

The sharp increase in entrance of authorized vehicles is not linked to the increase of authorizations but to an increase of the accesses to the charging zone, especially as regards:

- Buses or public transport, as a result of the increase of the services;
- Taxis, currently it is not possible to identify how much of the increase corresponds to the increase of demand of Area C and to the variation of path in order to enjoy the less traffic in the internal roads of charging zone. (AMAT, 2012d)

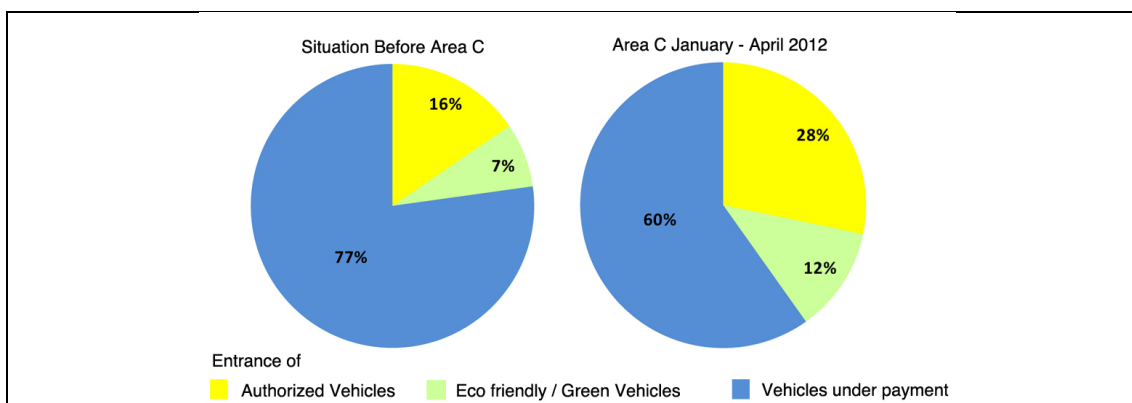


Figure 62. Division of entrances according to Vehicle Classes (Source: AMAT, 2012d, p.10)

### Public Transportation

Comparing the weekdays of the period between January 16 (starting date of Area C) and March 31, 2012, it is noticed a significant increase in overall commercial speed of the public transportation system within Area C.

The increases are more significant for the bus lines, which they reach 5% increase for the entire time period of Area C, with a maximum of 6.6% in the morning peak between 8:00 h and h 10:00 am. The gains of commercial speed of tram lines are slightly less significant, respectively 4.1% and 4.4% in the whole time period of Area C and during peak hours of the morning. (AMAT, 2012b)

	Area C					
	Average Commercial Speed [ km/h ]					
	Urban Buses			Urban Trams		
Year	2011	2012	Change	2011	2012	Change
<b>time period</b>						
<b>0-24</b>	12,3	12,86	<b>4,6%</b>	9,49	9,74	<b>2,6%</b>
<b>from 8:00 to 18:59</b>	11,03	11,58	<b>5,0%</b>	8,75	9,11	<b>4,1%</b>
<b>morning peak (from 8:00 to 9:59)</b>	10,3	10,98	<b>6,6%</b>	8,44	8,81	<b>4,4%</b>

Table 32. Commercial speed of public transport in Area C: average weekday from January 16 to March 31 (Source: AMAT, 2012b, p.5)

The analysis of the speed for each month in the morning peak times, shows a slight gradual decline between January and March (from 9.9 to 9.7 km / h), correlated with the increase of traffic in the same period. Changes compared to 2011 reaches a peak in January, an increase of 10.4%. (AMAT, 2012b)



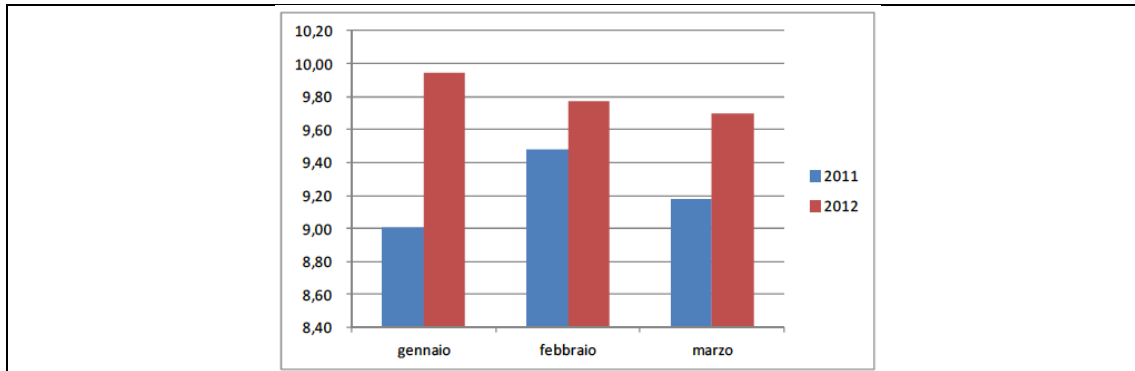


Figure 63. Commercial speed of public transport in Area C: monthly comparison of average of the morning peak hours (Source: AMAT, 2012b, p.5)

Until now official information about the number of passengers of the public transportation haven't published yet. However, in the newspapers there some comments and declarations about this. In February Carra, has reported in 'La Repubblica', Azienda Trasporti Milanesi - ATM (public company responsible of public transportation of Milan) sales of monthly and annual subscription cards has increased one third in January 2012 compared to January 2011. Behind the boom of subscription card, there is Area C, which has pushed people to leave their vehicles at house in order to save money. However the usage of single tickets has reduced 9% in the first 30 days of the year 2012 because of the nearlt contextual rise of its price from 1 euro to 1.5 euro. An explosion of subscriptions in the last month (January) resulted at east 1.4 million more trips by public transportation network. In June same author has announced in 'La Repubblica', the best month from the beginning of the year until now is May with more than 32% increase of the monthly and yearly subscription compared to the same period of 2011. It should be considered that probably the new routes opened and especially the economic crisis has played a role in the rise of the usage of the public transportation.

### ***Accidents***

Since the number of cars entering the charging zone the roads are safer. In first month of the scheme there is a significant the decline in accident rates: over the same period last year, in fact, within Area C accidents fell by 51.75%. (Milan Municipality, 2012) Accident rate has fell out of the charging zone as well. It is claimed that according to the results of the first month of Area C the rate of accidents declined by 44% out of the charging zone. (La Repubblica, 18 febbraio 2012)

### ***Emissions & Air Quality***

In the report of AMAT, air emissions are divided into six macro classes:

- Class 1 - Electric Vehicles
- Class 1b - hybrid (thermal / electrical) and fueled with LPG or CNG
- Class 2 - Gasoline-powered vehicles Euro 1 and later vehicles powered diesel Euro 4, Euro 5 or Euro 6 and equivalent from the point of view mass emissions of particulate air pollution
- Class 3 - Euro 0 gasoline powered vehicles, vehicles powered by diesel Euro 0, Euro 1 or Euro 2, two-stroke motorcycles Euro 0
- Class 3b - vehicles powered by diesel Euro 3
- Motorcycles (with the exception of two-stroke motorcycles Euro 0) (AMAT, 2012c)

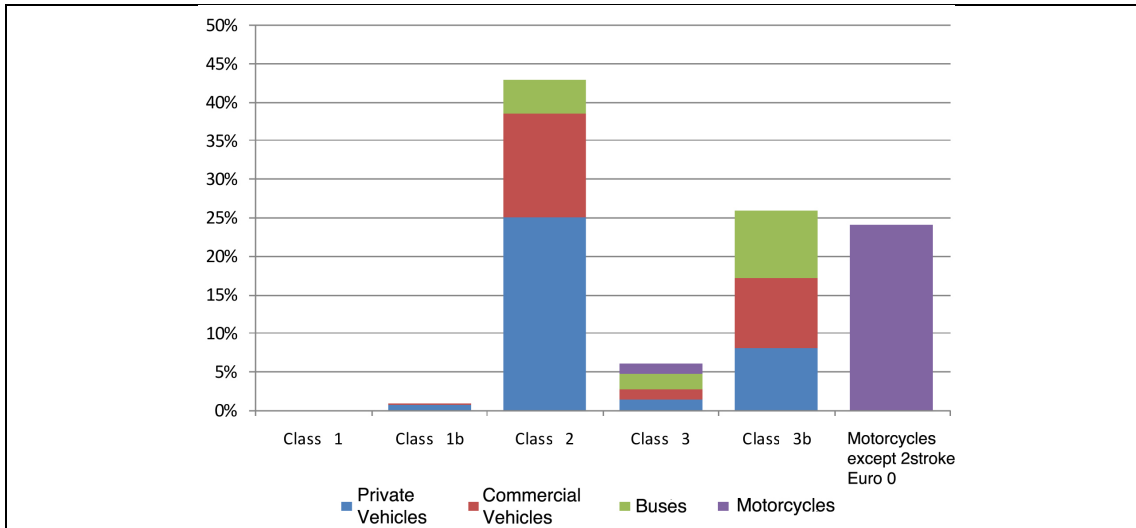


Figure 64. Contribution of the Vehicles to the Total PM10 exhaust emission between January and April during the charging hours (Source: AMAT, 2012c, p11)

In the period from January to April and during the charging hours on weekdays (excluding special days like snowy days and days of public transportation strike), more than 40% of the contribution total PM10 exhaust emission is due to vehicles Class 2 (Euro 1 diesel vehicles substantially later and Euro 4 diesel cars and higher or equivalent from the standpoint of particulate emissions), while vehicles belonging to Class 3b (motor vehicles diesel Euro 3 or equivalent) and motorcycles will each provide 25% about the total emissions of PM10 exhaust. (AMAT, 2012c)

For the daily averages of PM10 emissions exhaust during the whole day (00:00 - 24:00) in the period from January to April, it can be observed that the average emissions on the days of 'Area C' are lower than on weekdays about 1 kg / day. With regard to the cars, the relative contribution of emission on the days of 'Area C' is the lowest compared to all other types of day (including also the holidays), with the exception of the car free between 08:00 and 18:00. Also note the significant increase in emissions from passenger cars in days before holidays compared to weekdays of Area C (+35%), and the reduction of the emission of industrial vehicles and motorcycles in the days before holidays and especially on holidays. (AMAT, 2012c)

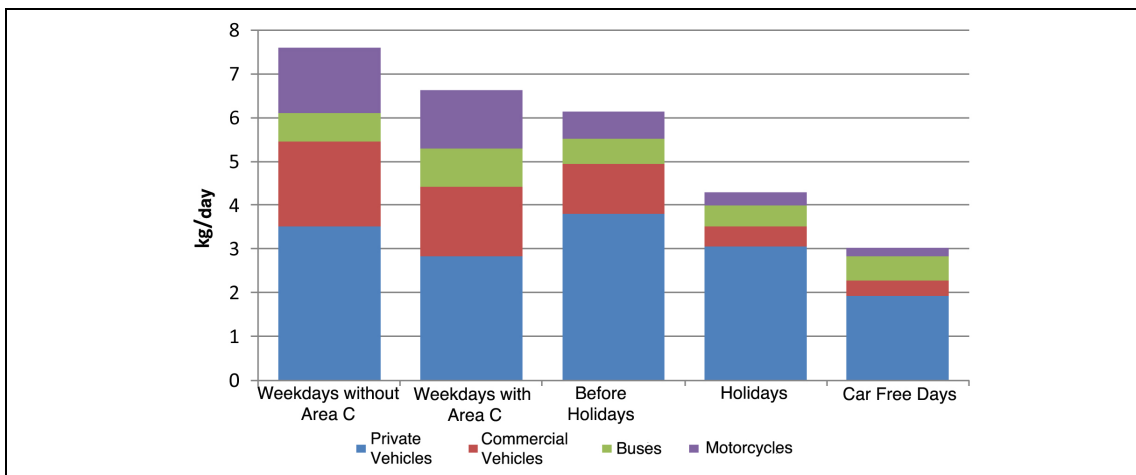


Figure 65. Daily average emission of PM10 exhaust during the whole day (00:00 - 24:00) in the period from January to April (Source: AMAT, 2012c, p.8)

Finally, comparing the time series of daily averages of PM10 emissions exhaust in the period from January to April, limited to the charging zone and charging hours, it can be seen that the trend of decline is continuing at a much accelerated rate: with 'Area C' PM10 exhaust emissions have reduced by 19% compared to those of 2011 (during which, however, there were additional active measures to limit compared to previous years such as: Revoke the exemption of payment for access, existing with Ecopass, for vehicles Euro 4 diesel systems without reduction of the particulate mass, the new discipline of ZTL regulation for vehicles to be used transportation of goods,-emergency measures to contain emissions Particulate air pollution) and were reduced by 61% compared to 2008. (AMAT, 2012c)

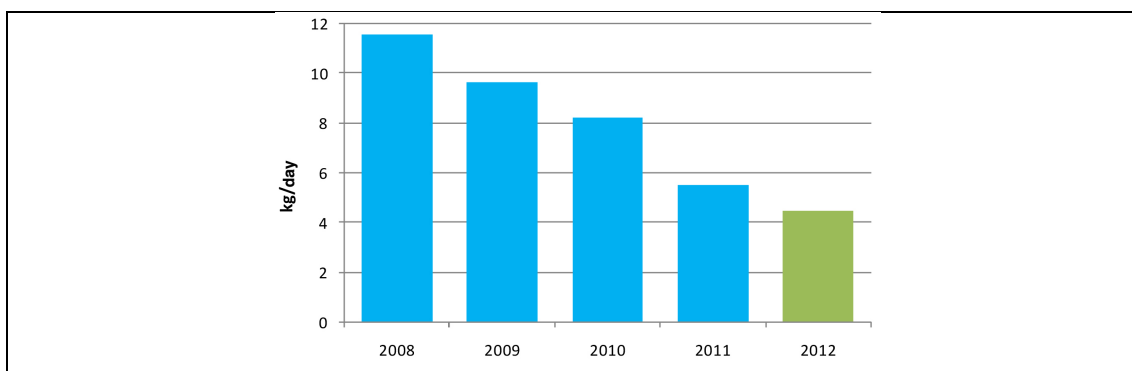


Figure 66. Comparison of daily averages of PM10 emissions exhaust in the period from January to April in respect to the years (Source: AMAT, 2012c, p.9)

### 5.2.3.2. SOCIAL IMPACTS OF THE SCHEME

Since it is an ongoing trial period, there is no information about the social impacts. However, considering the early results, Milanese people started to change their travel habits. The number of cars under payment entering the charging zone decreased significantly on the other hand the number for the eco friendly vehicles increased as well. Therefore like in the Ecopass case people who have eco friendly vehicles and those who can afford to change their cars with eco friendly vehicles until 2013 will be winners.

Data	Authorized Vehicles		Eco-friendly Vehicles		Vehicles under payment			
	Veicoli Commerciali, bus e veicoli speciali	Autovetture trasporto persone	Veicoli Commerciali, bus e veicoli speciali	Autovetture trasporto persone	Veicoli di servizio	Veicoli intestati a residenti	Altri veicoli Commerciali, bus e veicoli speciali	Altre autovetture trasporto persone
Media settimana pre Area C	2.121	16.767	2.532	6.391	6.820	14.283	6.595	66.547
	18.888		8.923		94.246			
Suddivisione %	1,7%	13,7%	2,1%	5,2%	5,6%	11,7%	5,4%	54,5%
	15,5%		7,3%		77,2%			
Totale Area C 16/1-30/4/2012	2.555	22.516	2.818	7.731	5.941	10.501	5.089	31.248
	25.071		10.549		52.779			
Suddivisione %	2,9%	25,5%	3,2%	8,7%	6,7%	11,9%	5,8%	35,3%
	28,4%		11,9%		59,7%			
Variazione %	20%	34%	11%	21%	-13%	-26%	-23%	-53%
Variazione media N. ingressigiorno	434	5.749	286	1.340	- 879	- 3.782	- 1.506	- 35.299

Table 33. The number and percentage of the vehicle categories entering the charging zone compared with the pre Area C (Source: AMAT, 2012d, p.12)

According to AMAT (2012d), in the first 71 days of application of Area C, approximately 538,000 different vehicles entered to the charging zone, of which approximately 30,000 residents' vehicles. The frequency distribution has a significant variability depending on the category of the vehicles, with a greater presence of systematic entrances among authorized vehicles. However, the vehicles under payment systematic entrances (36 or

more days of entrances in the first 71 days) are only 2%.

	Number of Entrance	vehicles	%
	0	4.648	13,8%
	1	1.464	4,4%
	2	2.494	7,4%
	3	1.531	4,6%
	4	1.809	5,4%
	5	1.350	4,0%
	6	1.517	4,5%
	7	1.150	3,4%
	8	1.235	3,7%
	9	1.016	3,0%
	10	893	2,7%
	11	809	2,4%
	12	784	2,3%
	13	680	2,0%

Table 34. Number of entrances and vehicles in the first 71 days (Source: AMAT, 2012d, p.19)

Considering only residents' vehicles in the first 71 days of the application 63,6% of residents entered the charging zone 13 times during the charging hours. Therefore, if this trend continues like this during the year, 63,6% of residents will enter not more than 39 times, since first 40 entrances are exempted, they will not be subjected to the charge. Only 36,4% residents instead will be subjected to the charge and depending on the number of entrance the charge will vary between 3 to 279 euro. This shows that the residents are not affected as much as their oppositions.

#### 5.2.4. LESSONS LEARNED

Thanks to Area C, Milan is one of the two cities after Stockholm that implemented a congestion charging scheme with the public approval by referendum. These cases show that having acceptance by referendum isn't impossible.

On the other hand, these cases differ in terms of knowledge of the voters. As it is mentioned before, the strategy of Stockholm in order to have acceptance was 'trial+referendum'. The citizens have been "prepared" to vote in favor of the scheme. However in Area C case the citizens had to vote before the trial therefore they didn't have chance to see the actual impacts of the scheme, which is a modification of the previous one.

It is true that in terms of area selection the scheme is Milan oriented like Ecopass. Municipalities around City of Milan complain about the lack of transportation facilities to the Milan center. The reason is that ATM is owned by Milan Municipality and they responsible for public transportation in Milan (only the territory inside the borders). Therefore there is a gap between the City of Milan and other cities although the impacts of the scheme are much wider since the charging zone is the center of the metropolitan region.

The lessons that should be taken into account from Area C case are:

- The system had clear and measurable objectives and the system was designed according to these objectives.
- The information campaign was successful. The public was informed by flyers, letters, signs, and advertisements on radio, television, website and public meetings.

Before the trial everyone already knows about how and where to pay the charge thanks to Ecopass they were already experienced.

- Since drivers especially commercial vehicles' arranged their journey according to charging hours of previous scheme Ecopass. Therefore not to be confusing the charging hours remain the same with Ecopass. Similarly payment methods And also clear and easy payment methods are the same with the Ecopass.
- The scheme features had been defined in the light if the Ecopass results. Therefore, there is an attempt to learn from the previous scheme and not to repeat the same mistakes.
- Thanks to the unique charge for all, the scheme hasn't been criticized as much as Ecopass for being social discriminative. However the residents of the charging zone claimed that Area C discriminating scheme in terms of Article 3 (the principle of equality), Article 16 (freedom of movement) and Article 42 (property right). But it should be considered that according to the measured results the large majority of residents are not affected as much as their reactions thanks to the free 40 entrances. Also the commercial vehicles have special discounts and they are not so affected as well. The large majority of central city users already used public transport, so the number of presences in the centre is probably declined of few percentage points only.
- According to periodic AMAT reports, the improvements in travel times, reductions on the number of the cars show that the scheme is on the right way for the achievement of the objectives. Therefore, the potency of road pricing had been overwhelmingly proved.
- From the beginning the media explained and evaluated what was happening according to the interviews of the politicians and AMAT reports. Before the starting date for those who didn't participate the meeting with the councilors and after the application for those who haven't interested in reading the reports of AMAT from the website, these news was able to inform the citizens.
- Thanks to the AMAT reports, the public was kept up to date about the results of the trial. The problem of limited transparency doesn't exist anymore.
- The scheme is updated version of the Ecopass even the main objectives are different. Thanks to the new features of the Area C like the unique charge for all, the results are more positive than Ecopass even on reducing air pollution.
- The scheme is not a stand-alone policy in fact, together with the developments for sustainable mobility it is a part of the 'Sustainable Urban Mobility (Urbano della Mobilità Sostenibile - PUMS) which has initiated by the Administration.

On the other hand, since the scheme seems successful, the criticisms continue. According to Goggi (2011), London in which escaping from penalties is impossible even in 1970's, has waited eight years before starting the congestion charge in order to regulate the system of traffic and parking system and extend the parking spaces in all the districts to make them under charge for the residents. The introduction of this measure in a city like Milan, where everything is permitted, where the penalty for illegal stops reaches about 10% and where layover in the second row are widespread, have deleterious effects. Therefore, Milan should have waited in order to deal with these

problems. Also before introducing the scheme, extension of the public transportation should have finished to encourage citizens to use it. On the contrary, when the scheme has started on January, ATM started to test their fleet's timing in order to improve the frequency till March. Consequently, the underground was over-crowded.

## **6. CONCLUSION**

### **6.1. INTRODUCTION**

In the last few decades, sustainability became one of the most important issues for policymakers and planners in both developed and developing countries. In order to achieve the goal of sustainable mobility, one of the most challenging obstacles stands out as traffic, especially for the large cities. Since traffic causes severe environmental and economical problems, policymakers seek a solution urgently.

Since it is known that Traffic Demand Management strategies such as traffic calming, road pricing are successful on changing people's travel behaviors and reducing congestion in urban areas, they have consequently become very popular policies around the world. However, these strategies are not so easy to implement since the citizens do not want to change their habits. Therefore, the one of the most important and the most challenging factor for the successful implementation of road pricing schemes is the public and political acceptability.

In this research, the most important examples of the road pricing measures, namely London, Stockholm and Milan have been analyzed in terms of their features, problems and results with particular focus on the issues determining their acceptability. This chapter will demonstrate the technical comparison between these cases; consequently the interpretations and observations regarding each case's acceptability will be made prior to conclusion.

### **6.2. COMPARISON**

Since all the cases of London, Stockholm and Milan are from European context, every city is unique hence every case has some particularities. On the other hand, there are also some replicable features, which can be transferred to other cases. That is these factors can be lessons that should have been taken into account by other cities which want to implement a congestion charging scheme or has already a scheme and want to increase the acceptability.

The aim of the congestion charging schemes can differ and the features of the scheme depending on the aims reflect differences as it is shown in the Table 1.

	London	Stockholm	Milano	
			Ecopass	Area C
<b>Implementation</b>	2003/ Western Extension in 2007/ Removal of Extension 2011	2006	2008	2012
<b>Charging Type</b>	Cordon (Camera & ANPR)	Cordon (Camera & ANPR)	Cordon (Camera & ANPR)	Cordon (Camera & ANPR)
<b>Covered Size</b>	22 sq. km (land percentage 1.3%) / 40 sq. km	35 sq. Km (land percentage 9.2% - 36% of all the residents)	8.2sq. Km (land percentage 4.5%)	8.2sq. Km (land percentage 4.5%)
<b>Hours Charged</b>	7:00a.m. – 6:30 p.m. (weekdays) / 7:00a.m. – 6:00 p.m. (weekdays)	06:30 a.m.– 06:30 p.m. weekdays	7:30 a.m. - 7:30 p.m. weekdays	7:30 a.m. - 7:30 p.m. weekdays
<b>Main Objective</b>	Reduce Congestion	Reduce Congestion and emissions, increase accessibility	Reduce Pollution, reduce congestion as a secondary aim	Reduce Congestion and emissions
<b>Price</b>	£5 / £8 / £10 (12 €) daily	10 - 20 SEK (11- 22 €) every crossing	2 - 10 € daily	€5 daily
<b>Toll</b>	Non-varying fee	Time-varying	Vehicle-varying fee	Non-varying fee
<b>Discounts and Exemptions</b>	City center neighbors (90%) and specific vehicles: light vehicles, military vehicles, emergency services, disabled persons, buses, coaches, minibuses, certain health service workers	Traffic from Lidingo and Essingeleden and specific vehicles: emergency vehicles, motorcycles, diplomatic vehicles, taxis, vehicles registered abroad, environment friendly vehicles, disability and social services	Specific vehicles: emergency vehicles, motorcycles, environment friendly vehicles, disabled, annual discount for residents	Residents inside the area have 40 free accesses per year and a discounted fare of €2, specific vehicles: emergency vehicles, motorcycles, environment friendly vehicles, disabled
<b>Annual revenue</b>	£268m. (revenue)- £131 m. (costs) NET £137 million (2007/8)	SEK 850m. -SEK 320m. NET: SEK 530 million (2008)	9,6m. € (2009) 26,m. € total (2008-2010)	25m. € (without operation costs) – 5,9m. € (other costs) NET 19,1 million
<b>Revenue Use</b>	Public transport, walking facilities, road works, and road safety improvements	Public transport under Social Democratic government, road projects connecting outer districts under Conservative government	Improvement of public transportation and new transportation services.	Extension of public transportation services and green mobility
<b>Prior Public Transportation Investments</b>	11.000 new seats available in public bus transportation before implementation, 300 new vehicles, investments in Tube's quality	197 new buses, 16 new bus lines, 200 new bus parking spaces, 9 new workshop places, 3 new washing halls and 3 new fuelling installations, 17 depots and 1400 new spaces for park-and-ride facilities over 23 parking lots in 13 municipalities, 615 bicycle parking spaces over 10 parking lots in 6 municipalities	10000 new seats available in public transportation, completion of the new metro line.	Introduction of night buses, extending bike and car sharing service, new parking spaces for bicycles



<b>Impact on Congestion</b>	15% - 20% decline in two weeks, 30% in long run	19% reduction in congestion	16.2% reduction in congestion	The overall decrease of incoming traffic to the charging zone compared to the same period of 2011 (with Ecopass) amounted to 34.3% (first 15 weeks)
<b>Impact on Pollution</b>	16% decline in carbon dioxide emissions	8% - 14% reduction in pollutant emissions	15% reduction of emission of PM10, 30% reduction of PM10 exhaust	PM10 exhaust emissions have reduced by 19% compared to those of 2011
<b>Impact on Road Safety</b>	2% - 5% reduction personal injury accidents, 70 fewer accidents	5% - 10% decrease in victims	21.3% reduction in accident rates	Within Area C accidents fell by 51.75% and by 44% out of the charging zone.
<b>Body Responsible for the Implementation</b>	Implemented and operated by Transport of London, a local government body under control of the Mayor of London.	The three principal participants in the Stockholm Trial were the City of Stockholm, the Swedish Road Administration and Stockholm Transport (SL).	Thanks to the previous application of 'limited traffic zone', infrastructure of the scheme were already implemented (Cameras)	The municipality is the main actor. AMAT give technical support by monitoring and evaluating the results.
<b>Political Levels Involved</b>	Municipal/ metropolitan (Greater London Authority)	National and municipal government	Municipal, Regional and National Government	Municipal Government
<b>Political Support</b>	Government support (Labor), opposition against (Conservatives)	National and municipal government support (Social Democratic), opposition against (Conservatives)	Opposition in Government and also some parties in the City Council	Left-ring parties support, after the referendum Right-wing parties against.
<b>Public Opinion</b>	Generally accepted, due to its success acceptability increased.	Support in the city of Stockholm, rejection in surrounding cities	Citizens didn't accept it but they got used to it.	Support or at least acceptance
<b>Strategy of Communication</b>	Two public consultations held before the implementation; thorough campaign of information	Meetings, discussion, Media, Trial	No strategy - limited transparency	First referendum then meetings, discussions, information campaign
<b>Way of Acceptability</b>	Public Consultation Process	Referendum (51.3% supported in the city center, 60% against in periphery)	Media	Referendum (79,12% supported)
<b>Boundaries of the Referendum</b>	No Referendum	City of Stockholm and surrounding municipalities	No Referendum	Only city of Milan

Table 35. Summary of the Congestion Charging Schemes: London, Stockholm, Milan (Ecopass and Area C) (Source: Self elaboration with data from Albalade and Bel, 2009)

According to Silva (2007) the aim of road pricing schemes is linked to extension of the charging area. For instance, considering the other cases from the world, it is seen that when the main objectives is to reduce congestion then the charge is higher and the

charging zone is smaller like in London, Stockholm and Milan. However if the main objective is to generate revenue then the charging zone is larger and the fee is lower like in Norwegian cities. Also, according to Jones (1998) when the aim is primarily to control traffic congestion, the charging zone may be smaller than where the wider environmental objectives lie behind the scheme. However in Milan when the charge was changed from pollution charge to congestion charge, the area remain the same.

The aim of the scheme is linked to the level of charge. (Silva, 2007) For example, when the main aim is to reduce congestion, the level of charge can differentiate according to peak hours like in Stockholm, however in London and Milan (Area C) the charge is not time-variable. Like in Ecopass case, when the reduction of air pollution is the main aim, the level charge change depending on the vehicles' emission standard.

The existing schemes are all cordon-based congestion charging. However only in Stockholm drivers have to pay every time they cross the cordon. In Milan and London it's daily charge so drivers can cross the cordon as many times as they want with only one charge. Although Stockholm's 'every pass is subject to a fee' rule is more effective on reducing congestion, it is less acceptable. Milan's annual revenue is relatively lower than the other cases because few vehicles subjected to the charge (due to exemption of the green vehicles), the smaller geographical extension of the charging zone and the low level of charge.

The technology of the schemes is electronic in all the cases in order to be reliable. They use Automatic Number Plate Recognition (ANPR), which is a special form of Optical Character Recognition. Thanks to the digital cameras at each control points, entrances, the system automatically reads the license number of vehicles and compares to a list of registered users and also recognizes the non-registered unpaid vehicles.

In general all the cases were successful on reducing traffic and air pollution and gradually create safer roads by reducing accident rates. However after the implementation, drivers get used to the system and intend to use their private cars again in other words the effects of the charging scheme tend to diminish on the long-run. Therefore, policymakers have to upgrade the charges or extend the scheme in order to have successful results. In London, the charges have increased from £5 to £8 and £10 respectively. The charging zone has been extended however in 2011 they decided to remove the extended area because of ineffectiveness. In Milan, the main aim of the scheme has changed. Firstly it was a polluter pays system (Ecopass, pollution charge, whose effectiveness declines with the natural substitution of older vehicles). Then after the referendum it became a congestion charging scheme.

In order to be acceptable and to tackle the problem of equity, every case has different discounts and exemptions. These features are particular because they depend on the geography or structure of the cities. For instance, since Stockholm is built on 14 islands, the island of Lidingo has only one access to the center and also Essingeleden motorway is the only main route by-passing central Stockholm therefore they are exempted. In London and Milan there are some discounts for the residents of the charging zone and for service vehicles. Environment friendly vehicles, disabled vehicles, military vehicles, emergency services and public transportation are exempted.

In order to increase acceptability, the revenues are invested for improving public transportation vehicles like in the cases. However in Stockholm, the conservative government announced that the revenues would be used to finance new road infrastructure to connect outer districts.

In Stockholm since local government bodies can only collect taxes from their own citizens, the tax had to be made a state tax. Therefore, the charges classified as a tax rather than a fee and the National Road Administration is responsible for collecting the charges and administering the system. However In London and Milan case the charges are collected and reinvested by the municipality.

Considering the examination by issues determining acceptability explained in the literature review (Chapter 3), it is seen that the level of acceptability of the cases differs.

Factors Determining Acceptability	London	Stockholm	Milan	
			Ecopass	Area C
Problem Perception	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Important aims to reach	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Mobility related Social Norms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Knowledge about the Action	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Perceived Effectiveness and efficiency	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Attribution of Responsibility	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Socio-economic Factors	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Revenue Allocation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Table 36. Examination of the cases in terms of factors determining acceptability (Source: Self elaboration)

As it is seen in the Table 35, among the other cases examined in the thesis, Stockholm is the most acceptable case in terms of all factors that literature recognizes as determining acceptability.

In every case public is aware of the problem and knows that something should be done (problem perception ) and also the schemes have main objectives and relevant strategies (important aims to reach ). However the most problematic issues are socio economic factors and equity () both for London and Milan.

Regarding both Ecopass and Area C, Milan is the less acceptable case especially in terms of social norms, equity and socio-economic factors. On the other hand, it can be said that Milan is improving itself. Compared to the previous scheme Ecopass, Area C is more transparent therefore the knowledge of the citizens is higher than before. In addition the issue of 'perceived effectiveness and efficiency' () is more positive thanks to the effective results however there are still some doubts about the effectiveness among some stakeholders. Moreover, both in Ecopass and Area C it is announced that the revenues will be reinvested for improvement of public transportation. However in Ecopass case it is never explained how the revenues were reinvested. In Area C the situation is more positive than Ecopass as new mayor Pisapia give more importance to the transparency. On the newspaper it is possible to find information about how the revenues are reinvesting. Also it is announced that a full report on costs, revenues and reinvestments will be published soon. In Stockholm and London, in every report how the revenues have being spent is explained.

Considering social norms, it is internationally known that in Scandinavian countries people are more concerned about the environmental issues. According to Kelly et al.'s study (2004) level of environmental concerns in Britain is close to the European average higher than Southern European countries. Finally in Milan where car ownership rates are very high, people's attitude about private car is well known. No one intends to change his/her mode of travel. There is however a sort of "polarization" among citizens, with environmental concern increasing in some classes. And also "soft" mobility practices are improving among some citizens.

Referring to the attribution of responsibility in Italy, although in every case there are some institutional actors with some social associations who were committed with pricing schemes, people's attitude to the environmental concerns is lower than other countries and there is unwillingness to pay in order to protect the environment. Unlike Italy, in Britain and Stockholm people have responsibility of solving the environmental problems and they believe that they can make a difference regarding a sense of environmental efficacy and a belief that their pro-environmental actions.

### **6.3. INTERPRETATIONS AND OBSERVATIONS ABOUT THE CASES**

In the thesis four different road-pricing examples are shown for examining the acceptability of road pricing measures. In the chapter 4 and 5 the different strategies of these cases in order to be acceptable have been shown. In this section, the strategies of the cases will be concluded and interpretations will be done.

First of all, London had the Mayor Livingstone 'Hero' whose election manifesto includes congestion charging scheme was in powerful position. He had faced strong resistance therefore he spent his time and energy on consultation process. The information campaign such as meetings with the public was the key for acceptance. There was a tradition of publishing of paper, receiving complaints and answering the letters. However at the end nothing really had changed with respect to first version, as there were no major problems like in Milan case. By doing this, the public had impression that the policymakers monitor whether there is a problem and if so, they would change it. According to Banister (2003) the case of London is the only example, of which was introduced without being significantly weakened. However, the acceptability hasn't been approved by referendum. It is not clear that whether a referendum has been held, the majority of citizens would have accepted the scheme.

In London the media were against the scheme like in other cases. According to Wetzel (n.d.), the reason is that the media is based in London and the most of the journalists are the private car drivers. Therefore, the news on the newspapers are not totally objective.

According to the social impact analysis, people who live in Inner and Outer London have personally gained as a result of the scheme or the scheme didn't make any personal difference. In the congestion charging zone, people come from high-income households without cars and those in the 35-54-age bracket are the people who personally gain most however those from lower income households and those aged 25-34 are who have personally lost. Therefore inside the charging zone there is the problem of equity in terms of socio-economic factors.

Secondly, Stockholm has succeeded on having acceptability without a powerful mayor. According to Isaksson and Richardson (2009) Stockholm's success is the result of a number of different actors working together practically in a climate of uncertainty, managing and adjusting to difficulties in a more incremental manner. Also the party (SDP together with their left-wing allies) helped in approving the proposal of the local

government holding a majority in local government was also leading the national government. Therefore, it was a great opportunity for Stockholm. Together with the information campaigns, in Stockholm there was a trial period before the referendum. So the citizens had chance to see the effects of the trial and they realized that the effects are not as negative as they have estimated. Thanks to the referendum the citizens had the power of decision and were ready to vote slightly in favor of congestion charging.

According to social impact analysis of Transek (2006) for the Stockholm case considering only direct road users the congestion taxes negatively affect the inner city and Lidingo more than other areas, high-income individuals more than low-income individuals, employed people more than others, households with two adults with children more than other types of households and men more than women. It is announced that *'one is thus "hardest hit" by the congestion tax if one is an affluent, employed male living in a household with two adults and children in the inner city or Lidingo.'* However it should be considered that the research had done only at the direct road-user. It is clear that who use private car is affected negatively. Therefore, making interpretation about the other groups who use public transportation or ride a cycle is impossible.

In addition in the light of the interviews Henriksson et al. (2011) claims that the public transportation users became more positive about the scheme thanks to better environment and air in Stockholm and fewer delays on buses and sufficient amount of people. As a result of the scheme low and middle-income group has gained from the scheme.

Both in Stockholm and London the reason why even low and middle-income group has gained from the scheme is the improvement of public transportation. Before the application of the scheme, these cities has extended their public transportation lines, added new buses and seats. Therefore public transportation users haven't been subjected to over-crowded and delayed buses/trams.

Lastly in Milan where the car ownership rate is higher than London and Stockholm, the cases of Ecopass and Area C differ in terms of not only the structure of the scheme but also the level of acceptance. In Ecopass case the mayor Moratti faced strong criticisms and political resistance. She had to defense the scheme stubbornly over the politicians and city council. However, while she was trying to convince the city council, she didn't give any importance to the public knowledge. The only source was the media. However like in London case there was a question of objectivity. As soon as the mayor Moratti got approval of city council, the scheme was introduced. But lack of information caused high number of fines, complains, court trials and dissatisfaction of citizens. In addition, the reports of AMAT about the air pollution results were in detail only. However, how the revenues were reinvested was a totally mystery. Moreover thanks to the media's criticism about the increasing ineffectiveness of the Ecopass, the seeking for a new solution has started.

According to the results, considering the residents vehicles' number of the entrances to the charging zone, the percentage of the residents who affected by Ecopass was very low and most of the residents enjoyed the safer and quieter roads, faster public transportation, and so on. Also commercial vehicles weren't affected as much as their expectations. However since the level of charge depended on the vehicles' emission standard, who can afford to change the vehicle with an environmentally friendly vehicle didn't pay the charge and who has an old car and couldn't change the vehicle had to pay the highest charge or not use it. Therefore, the scheme had affected the low-income group more than medium-high-income. In other words, the scheme was socially

discriminative.

In Area C case, the new mayor Pisapia like London's hero Livingstone has been elected despite the presence of the congestion-charging scheme in his election manifesto. Since the referendum date had been decided before, the new mayor didn't have time to make any campaign about it. However after the positive results, he started work on that. Maybe for the first time, everything was transparent. The report of AMAT about the results of the Ecopass and the aims of new scheme has been published. Then information campaign has started. As a result of the meetings with citizens, the discounts have become definite. However like London case, the first version hasn't been changed majorly.

Like in the Ecopass case, according to early results more than half of the residents were subject to charge less than 5 days in the first 71 days of application (till the end of April). Since they don't have to pay for the first 40 entrances, it is clear that the residents are not affected as much as their oppositions.

Like in the all cases, in London not only success played a role but also at the end the majority of people simply unaffected or affected very marginally. Therefore by time passing oppositions softens and people experience that the scheme is not as bad as was feared like Goodwin's cycle claims.

#### **6.4. CONCLUSION**

To conclude, policymakers of Milan should take into account some lessons –replicable– from London and Stockholm cases and try to put into force these features in order to be more acceptable.

First, in a climate of limited transparency there would not be trust to the information, which can cause unacceptability. Therefore, they should give more importance to the knowledge of the citizens. Both in London and Stockholm public had been consulted by meetings, advanced information techniques like websites, call center. In Milan – Ecopass- case there was no transparency and limited consultations. But Milan has learned from its mistake and in Area C there was an attempt to give information to the public by meetings.

Second, the improvements of the public transportation before the application of the scheme were the key of successes of London and Stockholm. On the contrary in Milan the improvements of public transportation (especially ATM's tests of their fleet's timing) has started with the application of the scheme therefore public transportation users had to subject to over-crowded and delayed underground. On the other hand, the most important problem of the Milan is the inadequate and low quality connected lines between surrounding municipalities and the city center. Since half of the movements in Milan is coming from the surrounding municipalities, the improvement of connected lines have to be done for people who can not afford to use private cars anymore and change their travel habits. Otherwise, the scheme will continue to criticize for being social discriminative.

Third, the revenue should be spent for some projects which all the citizens in particular low-income group can benefit in order to tackle with the equity problems. (Banister, 2003) In general when the revenues reinvested for improvement of public transportation, the scheme become more acceptable. However in Milan (Ecopass) how the revenues reinvested was not transparent. Because of that people who think that congestion charging scheme is just another form of tax has increased in Ecopass case. Up

to now, there isn't clear information about the revenues of Area C as well. However, a full report on costs, revenues and reinvestment is expected.

Therefore, to answer the question posed in beginning of the thesis the most important issues determining acceptability of congestion charging schemes are explained, and then London and Stockholm cases, which are the well-known successful schemes, are examined. Moreover, Milan's Ecopass and Area C cases are analyzed in the light of other cases.

Finally, this thesis have underlined that public and political acceptability is one of the most major barrier for the implementation of the congestion charging scheme. Also in Milan there is a need for strategies that can be learned from other successful cases in order to have public's acceptance.

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