Creation of a Practical Framework for Congestion Charging Systems in the Maltese Islands
Analysis of the Valletta CVA System

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January 2015
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Abstract:

Congestion is a phenomenon that is becoming an increasing problem on road networks in and around many urban areas. As congestion causes a number of environmental, economic and social problems, policy and decision makers have started to consider a number of measures to tackle it. A number of cities have therefore implemented congestion charging systems, with one of the most recent being Valletta, Malta, in May 2007. Despite being part of a number of initiatives in attempting to curb Malta’s considerable congestion problems, there are indicators that the Valletta Controlled Vehicular Access system has not been as successful as originally envisaged in reaching its objectives. This thesis therefore analyses the Valletta CVA system, and other proposed and implemented congestion charging systems around Europe, to discern the common factors of successful and unsuccessful congestion charging systems and their implications for transport policy. This therefore enables the construction of a practical framework for the implementation and operation of a successful congestion charging system in the Maltese context.

**Key Words:** Urban Planning; Transport Policy; Congestion Charging; Road Pricing; Intelligent Transport Systems; Policy Frameworks.

The research work disclosed in this publication is partially funded by the Strategic Educational Pathways Scholarship Scheme (Malta). The scholarship is part-financed by the European Union – European Social Fund.

Acknowledgments

I would like to express my sincere gratitude to my supervisor Peter Schmitt for his patience, guidance and assistance in carrying out this work.

Most of all, I wish to express my gratitude and love for my friends and family for providing me with support when I have needed it most.
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Introduction

The Republic of Malta is an island country in the Mediterranean and, since 2004, also a member of the European Union. Malta is the smallest country in the EU with an area of 316 km² and a population of 425,384 (NSO, 2014: 3). These figures show that Malta is not only one of the smallest countries in the world but, with an average population density of 1,346 people/km² (NSO, 2014a: 3), it is also one of the most densely populated. Malta, also called the Maltese Islands, comprises of an archipelago of a number of islands and islets. The term ‘Malta’ is generally used to denote the whole country, and this thesis shall use this definition when referring to Malta unless otherwise specified. The three largest islands of the archipelago are Malta, Gozo and Comino and are the only ones that are inhabited. The population of Malta is 386,057 and Gozo and Comino have a combined population of around 31,000 (NSO, 2014: iii). Almost 50% of Malta’s population lives in the Northern and Southern Harbour Districts (NSO, 2014b: 3) (see Fig. 1).

Figure 1: The Maltese Islands and its districts
Source: NSO (2014a)
In addition to its high population density, Malta also has one of the highest levels of motorisation. The number of licensed vehicles per 1000 in habitants stood at 759.2 in 2013, a figure which has been increasing steadily over the years (NSO, 2014c: 109). In fact, according to the National Household Survey published in 2010, over 74.6% of trips conducted by an average household used the private car as a form of transport—up from 54.7% in 1998 (Transport Malta, 2010: 20). Due to the combination of high density and high motorisation, Malta also experiences high levels of congestion and its associated problems (Attard and Ison, 2010: 14).

Until relatively recently, the main method of tackling congestion has been to improve the capacity and efficiency of the road network (Attard and Ison, 2010: 14). However, despite being somewhat effective in areas where this has been feasible (Transport Malta, 2013: 2), few can agree that this is a sustainable solution. While Malta’s road network encompasses 2,350km of roads, Malta’s main strategic road network is merely 260km of this (see Fig. 2) (Transport Malta, 2013: 2). A number of capacity problems and bottlenecks therefore exist, and they have started to spill over from the peak morning and evening commuting times to other parts of the day (Transport Malta, 2013: 2).

Figure 2: Malta’s Road Network
Source: Attard and Ison (2014)
The turn of the millennium saw a shift in Malta’s transport policy, stimulated at least in part from Malta’s accession to the EU (Attard and Ison, 2010: 16). Serious effort was therefore made to counter Malta’s transport problems. This involved a shift from a predict-and-provide framework for transport infrastructure, to a more sustainable one based on increased modal share, improved mobility and reduced congestion, amongst others (Attard and Ison, 2010: 14, 16). In 2007, the Controlled Vehicular Access (CVA) system was implemented in the capital, Valletta. The system was implemented as part of a transport package of initiatives to curtail transport problems and improve the quality of life of the residents of Valletta (Attard and Enoch, 2011: 547).

The CVA is congestion charging system, levying a fee on road users entering and remaining in the city at certain times of the day. The CVA made Valletta one of the few cities in Europe to successfully implement a congestion charging scheme (Attard and Ison, 2010:14). The implementation of the CVA system has been a positive step towards the creation of a sustainable transportation system for the Maltese Islands. The aim of the CVA system was to increase access to Valletta and increase modal share of trips to the city. However, figures show that the CVA system has only been moderately effective in its completing its objectives (Attard, 2014: 6). The system has also incurred substantial financial losses since its introduction. Joseph Muscat, Malta’s current prime minister has publicly voiced his discontent of the system, indicating that it must be reformed or scrapped (“Valletta CVA System,”2013).

The purpose of this thesis is therefore to analyse the CVA system and determine if it has been a success. As the CVA system is a relatively new policy, there has been relatively little research regarding its effects and whether it has completed its objectives. The most recent has been by Attard and Ison (2014) who analysed the effects of the system in terms parking policy and management. However, the publication does not directly address the shortcomings of the system and how it can be improved. The second aim of this thesis is therefore to construct a practical framework for the implementation of a successful congestion charging system in the Maltese Islands. In doing so, the framework enables policy makers to build upon the lessons learnt from the CVA system if they wish to implement additional congestion charging systems in other localities. Although this thesis does not directly provide recommendations how the Valletta system can be improved, one can nonetheless compare the existing system to the practical framework and therefore draw conclusions for this purpose.
Methodology

The research framework of this thesis is based upon qualitative methodology, ultimately utilising deductive reasoning to conduct an in-depth case study of the Valletta CVA system. Following this, a theoretical framework was developed to serve as an aid for the possible future implementation of other congestion charging systems in the Maltese Islands.

The research objectives of this thesis were developed using the inductive method. The Valletta CVA system is relatively new, having only been implemented in 2007. Therefore, by conducting an analysis of secondary sources, potential research objectives were formulated. These objectives, and the methods for completing them, are defined below.

Research Objectives

1) (a) The determination of the success of the CVA system and  
   (b) The lessons that can be learned from its implementation and operation
2) The creation of a practical framework for the implementation of congestion charging systems in the Maltese context

Research Objective 1

To complete the first research objective, the definition of success first had to be defined. Here, success (i.e. what makes a system successful or unsuccessful) was determined following the fulfilment of three success criteria that were developed following an extensive analysis of secondary sources. Thus, one could say that inductive research was performed to formulate these criteria, thus developing a conceptual framework for determining the success of a system. This enabled the completion of the first component of the first objective.

To determine the actual reason for this success or lack of, a set of success factors was then developed for this purpose. It is important to not confuse the concepts of success criteria and success factors. The former can be described as determining if a system is successful; whilst the latter determine why a system is successful.

The success factors were developed following the analysis of five separate and strategically chosen case studies of other congestion charging systems, which have either been implemented or non-implemented. The presence of both types of systems was rational and intentional, as fundamental lessons can be learned from both (Vonk Noordegraaf et al., 2014: 173). Firstly, the success of each
The system was analysed utilising the deductive approach according to the aforementioned success criteria. Following this, the success factors were realised following the identification of common aspects both influencing success and failure in the case studies. One can therefore say that the success factors serve as a theoretical framework for the analysis of the CVA system.

The systems analysed were based in the cities of London, Stockholm, Milan, Edinburgh and Manchester. In regards to the choice of the systems analysed, one must realise that there are relatively few examples of existing congestion charging systems in Europe, and in fact the world. Furthermore, research was influenced by the presence of appropriate scientific literature investigating the case studies. The most appropriate literature sought was scientific articles consisting of case-study analysis of singular or multiple systems. Articles determining the lessons learned from the systems in terms of planning policy were the most valuable and appropriate. Singular case studies were more numerous than multiple ones, though literature concerning the actual policy of congestion charging is not extensive. Much literature revolved around acceptance of congestion charging systems. Some of this was useful, but much of it was psychological analysis which was not as relevant in constructing planning policy.

Effort was made to choose case studies that were relevant to the research. In regards to London and Stockholm, one could say that they were pioneers of large-scale congestion charging systems and, in fact, a large amount of academic literature exists regarding these two systems. The British systems in general are very relevant because of the similar “ideologies, attitude and institutional set-up” (Attard and Enoch, 2011: 550) as Malta was a former British possession. Lastly, one could draw parallels with the Italian city because of the similar levels of (high) motorisation and the presence of a congestion epidemic that had to be resolved. Further reason for the choice of systems is considered below.

<table>
<thead>
<tr>
<th>System</th>
<th>Implementation</th>
<th>Reason for Choice</th>
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| London | Yes            | • Pioneer of congestion charging in a major European city  
|        |                | • Large amount of literature  
|        |                | • Similar institutional set-up to Malta |
| Stockholm | Yes | • Pioneer of congestion charging in a major European city.  
|          |     | • Implemented a politically and publicly sensitive referendum which was successful  
|          |     | • Large amount of literature |
| Milan  | Yes            | • Relatively little research of the system, thus generating interest (but sufficient to get a research process). This thesis is one of a mere handful of publications including Milan in an analysis of other systems  
|        |                | • Presence of a |
Table 1: Choice of Case Studies

<table>
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<tr>
<th>City</th>
<th>Vote</th>
<th>Success Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edinburgh</td>
<td>No</td>
<td>Overwhelming ‘no’ vote in referendum, similar institutional set-up, considerable literature</td>
</tr>
<tr>
<td>Manchester</td>
<td>No</td>
<td>Overwhelming ‘no’ vote in referendum, similar institutional set-up, relatively little literature, thus generating interest (though sufficient for the research process)</td>
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The analysis of these case studies led to the development of the success factors that were used to analyse the Valletta system. Therefore, to complete first research objective, its first component was completed using the success criteria; following this, the success factors were used to complete the second component. Both of these utilised the deductive method of research.

Following the establishment for whether the Valletta CVA system was a success or not (as per the first component of the first objective), the reasons for this were then analysed in terms of the success factors. For the second component of the first objective, the presence and/or adherence to these success factors was therefore analysed in the Maltese context. To do this, a number of primary and secondary data sources were utilised. Secondary sources included academic papers, newspaper articles and official statistics, amongst others. Primary sources consisted of a series of strategically chosen interviews to get a more in-depth knowledge regarding the main CVA case study.

The interviews were semi-structured in nature, based on a pre-defined set of questions that was prepared before each interview. While the question guides were broadly similar, they differed slightly from interviewee to interviewee depending upon the role of the person and the reasons for interviewing them. The interviews were digitally recorded for convenience of analysis.

The interviewees and the reasons they were chosen are listed below:

<table>
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<tr>
<th>Name</th>
<th>Role</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hon. Anthony Bezzina MP</td>
<td>Opposition Minister for Transport</td>
<td>• Insight in the political and sociocultural situation in Malta towards transport policy</td>
</tr>
<tr>
<td>David Sutton</td>
<td>Transport Malta Head of Strategy</td>
<td>• Insight in past, present and future transport policy, especially in regards to the CVA.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Insight in the planning process and operation of planning institutions</td>
</tr>
<tr>
<td>Anthony Mamo</td>
<td>CEO of CVA Technology Company Ltd.</td>
<td>• Insight in the methods of</td>
</tr>
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</table>
implementation and operation of the CVA system.
- Thoughts regarding further implementation of road pricing systems
- Views on the current state of the CVA scheme and its implications for its future.
- Insight in the power relations between local and national government

Table 2: Choice of Interviewees

Prof. Alexei Dingli  
Mayor of Valletta

In addition to these interviews, there was also e-mail correspondence with Dr. Maria Attard, a prominent academic on Maltese transport policy and member of the panel of experts for the design of the CVA system. In addition to correspondence, her research was invaluable as a secondary source of information.

Research Objective 2

To complete the second research objective, the lessons learned from the analysis of the CVA were utilised to construct the practical framework. Here, the process of deductive reasoning of this secondary data enabled the realisation of the method to achieve the successful implementation and operation of congestion charging systems in the Maltese Islands.

The construction of the framework was aided by the fact that the prior analysis was done in light of the Maltese context. It is important to keep in mind that congestion charging systems are generally implemented in urban areas with high congestion levels. Therefore, aspects of this framework are applicable to many urban areas worldwide. However, the focus of this research objective was to make this framework as applicable as possible to the Maltese context.

In terms of structure, the framework is split into two phases: pre-implementation and post-implementation. The reason for this is that implementation and operation of a system fall into the former and later phases respectively. The rationale for this choice is that although there are similar components in each phase, they are unique enough to warrant this split in the structure.

As stated the purpose of this thesis is not to directly recommend improvements to the CVA system, but to construct a framework for the implementation and operation of potential new systems. Therefore, the framework is designed with this in mind. The main reason for this is that making adjustments to a system that has been in operation for some time has other challenges compared with the implementation of a new system. That said, whilst reading this study, it is still possible to
observe the lessons learned from the CVA system, and the framework itself, and draw conclusions on how it can be improved.

**Rationale for Utilised Methodology**

The methodology utilised for the completion of the research objectives has been a combination of the inductive and deductive approaches. The success criteria and success factors were both developed via the inductive approach, in which an analysis of secondary sources was utilised to develop a patterns and theories from the data. Indeed, the rationale for this is the fact that congestion charging is a relatively new field of research and theory for best-practice implementation and operation is not abundant (though not inexistent). While both the success factors and success criteria are subjective, the extensive utilisation of existing secondary data, and of multiple case studies, has strengthened their validity in the research process. The deductive method was utilised in establishing if the case studies were considered a success and also the analysis of the CVA system according to the success factors.

Case studies were also extensively utilised during the research process. The development of the success factors utilised the analysis of multiple case studies, whereas the framework itself was developed by observing a single one. There are both rational choices and practical restrictions for the use of both modes in the research process.

From the analysis of secondary sources, it was observed that research in the field generally consists of the analysis of case studies. Therefore it was not only rational to utilise case study research but the process was, in effect, restricted to this method. Despite this restriction, case studies are a powerful tool in unexplored research fields. Describing the importance of case-study research to the social sciences, Flyvbjerg (2006: 226) in fact states:

“**Predictive theories and universals cannot be found in the study of human affairs. Concrete, context-dependent knowledge is therefore more valuable than the vain search for predictive theories and universals.**”

The research methodology utilises six case studies, one of which (the CVA case-study) is central in completing the research objectives. That said, the secondary case studies are also important for the inductive method, as they provide a basis for the analysis of the primary case studies. As Santos and Eisenhardt (2004: par.2) state, multiple case studies enable the confirmation of emerging constructs
and complementary aspects of the same phenomenon. As the authors continue (2004: par.2), this is useful for inductive research and theory construction because they lead to "more robust, generalizable, and developed theory" compared to single-case study research.

The question therefore arises if the primary case-study of the CVA system is sufficient for developing the practical framework. However, Flyvbjerg (2006: 228) states that single case studies are sufficient to create generalisations in social science, provided that the case study is chosen strategically. In this case, given the size of Malta, it is safe to assume that these generalisations are very valid for the Maltese context.

**Limitations and Delimitations of the Study**

While it is the opinion of the author that the methodology of this study provides a solid foundation to reach its conclusions, there are certain limitations and delimitations that one must consider. As already mentioned, the lack of research in policy for congestion charging is not extensive. While this is a positive factor for the relevance of this study, this nonetheless might have an effect on the conclusions. This is particularly so as the success criteria and success factors were constructed following inductive research into secondary sources.

It is the opinion of the author that the range of interviewees was sufficient for the analysis of the CVA system. However, although an interview was conducted with the Opposition Minister for Transport, it would also have been useful to conduct an interview with the current Minister for Transport. In doing so, the study would benefit from a second opinion, indeed from the other side of the political spectrum, in an area that is highly politicised. However, it could also be said that the interview with the Transport Malta Director of Strategy provided a more neutral viewpoint. The Director was seen to give a viewpoint that was objective and was understandably reluctant to comment on issues that were seen as too politically sensitive. Therefore, future transport policy was only briefly touched upon as this was sensitive information.

According to Flyvbjerg (2006: 236-7) a common critique of case-study research is that it might have a subjective bias. Indeed, this critique is most applicable to the analysis of the Valletta case study. The author himself is a Maltese citizen (though admittedly no longer a resident) and admittedly does not own a driver license. This naturally might have inadvertently had an effect on the construction of questions for the interviewees. Understandably, the author also conducted inductive preliminary
research prior to constructing the interview questions. It can be commented that there is the risk that interview questions might have been constructed to reaffirm the researcher’s preconceived notions regarding the case study. While this critique is understandable for case study research, as Flyvbjerg (2006: 237) states, it is ultimately arbitrary as further analysis of the case study might falsify preconceived notions.
Background

Overview of Maltese Transport Policy: 1990- Present

At the start of the 1990s, Malta had one of the lowest amounts of cars per capita in Europe (Sutton, 2014). In light of this, transport policy at the time encouraged car use, as the car was seen as a sign of development and modernisation (Sutton, 2014). During this period, Malta experienced a GDP growth of an average of 4% per annum, which enabled higher levels of car ownership (Attard, 2005: 24). In fact, between 1985 and 2000, the amount of registered vehicles in Malta saw an increase of 116% (Attard, 2005: 24). During the 1990s, transport policy did not include advanced congestion reduction measures, and a predict-and-provide strategy of increasing capacity of the transport network was utilised. In addition, on-street parking at the time was virtually free and unregulated (Sutton, 2014) with few private car parks.

![Figure 3: Private Car Ownership in Malta 1985-2011](source: Attard (2014))

Although public transport was quite popular prior to the 1990s, the higher rates of car ownership led to a decrease in public transport patronage (Attard, 2012: 983). The poor level of quality and efficiency of the public transport network was also a major contributor to this shift (Attard, 2012: 983).
Land Transport in Malta was administered by the central government and not a dedicated public authority, with the operation of public transport in Malta entrusted to the Bus Owners Association (BOA). The BOA was a collective of driver-owners who had had exclusive rights to run Malta’s bus service for which the state ensured no competition (Attard and Hall, 2003: 18). In return for this, the government requested proper operation and maintenance of the bus network (Attard and Hall, 2003: 17). However, the lack of a proper contract of service with stipulated service guidelines ensured poor quality of the public transport network (Attard, 2012: 983), leaving the BOA free to operate the service to the standards they deemed fit (Attard, 2005: 26). In 1995, the Guaranteed Earning Scheme was introduced which heavily subsidised the service and income to operators/owners irrespective of the quality of service (Attard, 2005: 26). This naturally cemented the poor level of service of public transport in the Maltese Islands.

In 1990, the government set up the ATP (Public Transport Authority). The BOA was absorbed by the ATP and was empowered to regulate the public transport system, improve the quality of service and ensure that public transport conformed to the government’s economic and environmental planning strategy (Attard and Hall, 2003: 18). However, although set up by the government, the ATP was still in essence a private association operated by the owner-drivers (Attard, 2012: 983). Nonetheless, they were given a greater degree of legitimacy and a clearer framework for operating public transport. Furthermore, the ATP suffered a number of operational and administrative inefficiencies. As Attard and Hall (2003: 18) state:

“\textit{In nine years of operation, the organisation has been responsible to five different ministers, as well as having six chairmen, seven groups of directors and three general managers. This has created inconsistency and uncertainty in the policies adopted and agendas provided by each management group involved.”}\n
It can be said that the poor quality of the public transport service and the increasing rate of motorisation created a feedback loop between the two. In fact, by the early 2000s bus patronage was at an all-time low (Fig. 4). It was therefore realised that land transport policy had to evolve from a predict-and-provide framework to a more sustainable one (Attard, 2005: 28). At the time, land transport was not planned and administered by a single public authority, but rather a patchwork of ministries and organisations with little cooperation or institutional framework between them. This hindered the implementation of a holistic and integrated transport policy. These efficiencies were evident and highlighted as early as the Structure Plan in 1992 (Attard, 2005: 28).
Concrete action for the development of an integrated transport strategy was proposed in 2001 and the 2002 saw the publication of the Transport Topic Paper. It highlighted the need for an integrated national transport strategy which would align the actions of the different ministries by providing policy objectives and the institutional framework to implement them (Attard, 2005: 28). However, by 2004 this national transport strategy had not been developed, mostly due to the organisational changes in setting up a dedicated transport authority, the Malta Transport Authority (ADT) (Attard, 2005: 29).

The ADT was assigned the relevant responsibilities and authority to administer land transport in the Maltese islands including the relevant regulatory frameworks for doing so (Attard, 2005: 27). The Malta Transport Authority was a branch of the Ministry of Transport and Communication and contained five separate directorates:

- Transport Strategy Directorate
- Corporate Services Directorate
- Licensing and Testing Directorate
- Public Transport Directorate
- Roads Directorate
- Traffic Management Directorate (Attard, 2005: 27)
Importantly, the creation of the ADT allowed more effective planning and implementation of not only Maltese transport policy, but also that of the EU prior to and following Malta’s accession. In fact, the alignment of national transport policy to that of the EU has been a major component of Maltese transport policy from the 90s (Attard, 2005: 29). In 2001, the EU published the *White Paper European Transport Policy for 2010: A time to decide* (Attard, 2005: 27), which highlighted transport problems within the EU and proposed solutions for them. Naturally, the white paper greatly influenced EU transport policy over the next decade. By 2004, Malta made much progress in adapting to EU regulations, specifically in the harmonisation on the movement of goods; operators licensing for passenger and goods drivers; driver training and testing; vehicle and environmental standards and road safety (Attard and Hall, 2004: 22; Attard, 2005: 29). In addition, a number of timed parking schemes were introduced in the Maltese Islands in the early 2000s and could be said to have acted as pilot studies for the Controlled Vehicular Access system in Valletta (Sutton, 2014).

Malta has benefited from EU accession not only in the alignment of its policy, but also in funds used for the development of transport infrastructure. In 2002, the EU carried out an analysis of Malta as part of its TINA (Transport Infrastructure Needs Assessment) project. The aim of the TINA project was to initiate development of multi-model Trans-European Transport Network (TEN-T) in the EU candidate countries (TINA, 2002: 6). From 2004-2013, Malta received a total of €918m in funds as part of the EU’s Cohesion Policy, over €500m of which had been earmarked for transport and its infrastructure (Ministry of European Affairs, 2015a; Ministry of European Affairs, 2015b).

In 2004, the Cabinet Committee for National Projects was formed which aimed to specifically tackle Malta’s land transport problems. The Cabinet’s first initiative was to propose a number of measures to increase accessibility to and from Valletta and its surrounding areas (mainly its suburb, Floriana). These were published in a 2005 public consultation document entitled *Valletta and Floriana: a strategy to improve access* (Attard, 2010: 16; Sutton, 2014). These included:

- The creation of a Park and Ride service in Floriana
- More pedestrian areas in Valletta
- An electronic access and parking scheme in Valletta and Floriana, later known as the Controlled Vehicular Access (CVA) system, which was effectively a form of congestion charging.
- The introduction of electric mini cabs
- Efforts at shifting land transport onto the sea by offering ferry services to and from Valletta (Attard, 2010; Sutton, 2014)

The schemes saw a whole year of public consultation, especially in regards to the CVA system (Attard, 2010: 26; Sutton, 2014). Previously, a fixed-price area licensing scheme was used to control...
access to Valletta, however this was deemed inefficient and easily abused. Following the public consultations, the final decisions on the CVA system were announced. These included the abolishment of the previous area licensing scheme; exemptions to a number of vehicles including residents, emergency vehicles and residents, amongst others. Furthermore, the times of operation were also specified and it was importantly decided that the charging zone would exclude Floriana (Attard, 2010: 26).

As mentioned previously, Malta’s public transport system had some serious deficiencies. The poor state of the public transport system was the catalyst for a transport reform in 2011 in which the ATP was dissolved (Attard, 2010: 984). Flaws in the public transport system had been apparent for many years, but it was the introduction of Regulation No 1370/2007 of the European Parliament and of the Council in 2007 that set the basis for the reform. The regulation supported privatisation and removal of state monopolies on transport and set the basis for competitive tendering in the EU (Attard, 2012: 986). This regulation and thereby gave institutional legitimacy to the reform. The announcement of a transport reform led to a general transport strike in July 2008 which further increased public and political support for the reform (Attard, 2012: 983).

Attard (2012: 983-4) identifies the following indicators of the poor quality of the public transport network which existed up until the reform:

- Poor timetable adherence and punctuality with passengers having to wait long periods at bus stops
- Unreliable information given to current and potential passengers regarding routes and schedules
- Unsustainable amount of supervisors and inspectors who do not maintain proper level of service
- Variable quality and standards of the bus fleet in regards to maintenance, cleanliness and customer care
- Poor value of multi-trip tickets
- Inefficient hub-and-spoke route pattern emanating from Valletta

The government then published a policy document entitled Public Transport in Malta. A vision for Public Transport which fulfils public interest in the context of environmental sustainability (Attard, 2012: 984). Following a year of public consultation, an Expression of Interest was published in 2009 which highlighted the needs of the system. These included:

- A new transport network breaking away from the previous hub-and-spoke based system
- The introduction of a more environmentally friendly and accessible fleet, with differing bus sizes depending on the needs of a particular route.
- The introduction of a minimum level of service
- An improvement in the working conditions for drivers
• A clear distinction between scheduled bus services and irregular services
• The use of ITS measures to increase passenger information about the operation of the service (Attard, 2012: 987)

A public tender was issued and, in 2010, Arriva Malta was announced as the winner and a contract signed.

The year 2010 also saw the creation of Transport Malta. Transport Malta was set up as a corporate entity, merging ADT, the Malta Maritime Authority and the Civil Aviation department. The creation of the organisation was another step forward for Malta in achieving integrated transport policy. Its aim is therefore to create synergy between air, land and sea transport and create cross fertilisation of technical competencies between themselves (Transport Malta, 2010b: 3). The formation of Transport Malta came at an ideal time. In 2011, EU published the White paper entitled Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system which highlighted the need for a holistic European transport network and set a number of targets to increase mobility and efficiency of road, air, sea and rail transport in an environmentally sustainable manner (European Commission, 2011: 3-4).

Since 2011, Malta has also been gradually reforming its taxi service. These include improving the quality of service by introducing measures such as providing better training to drivers; installing peripheral devices such as panic buttons, taximeters and tracking devices; changes to tariffs and other minor improvements (Transport Malta, 2012: 53). Following this, 2012 saw the publication of the National Strategy for Electromobility in the Maltese Islands by the Ministry for Resources and Rural Affairs. The strategy set a target of 5,000 electric vehicles on the road by 2020. Given that Malta will be connected to the European electrical grid by this date, the strategy will help Malta achieve the Climate Change and Energy Packet Targets (the so-called 20-20-20 targets) set by the European Union (MRRA, 2012: 12).

The publishing of the National ITS Action Plan for Malta was the next development in Maltese transport policy. The document indicates how Transport Malta will implement a number of ITS policies and systems spanning 2013-2017, which are referred to as ‘Phase 1’ measures. Phase 2, to be implemented from 2018 to 2012, are not specified in the document. Naturally, as congestion charging is an ITS, this document is of great relevance to this thesis. The following measures will be implemented in Phase 1:
• A network of CCTV cameras for traffic monitoring and incident monitoring, which also facilitate the operation and deployment of emergency services.
• Dynamic real-time messaging system providing road users information such as road conditions, congestion levels, speed levels and lane changing information amongst others.
• An electronic parking guidance systems in Malta’s Park and Ride facilities
• An Urban Traffic Management System with intelligent and demand-responsive traffic signals
• A road flooding alert system (Transport Malta, 2013: i).

Importantly, the document does not directly specify that it will implement road user charging in the near future, but will consider it on a “case-by-case basis” (Transport Malta, 2013: 29).

The Maltese General election in 2013 saw a change in government from the Nationalist party to the Labour Party, the former having been in power for 15 years. While in the past two years there does not appear to be significant changes in transport policy compared to the previous administration, there have been some developments.

The first of these developments was the termination of Arriva Malta as a public transport operator and its departure from the Maltese Islands. Following commencement of operations in 2011, Arriva encountered a number of immediate problems and setbacks affecting the smooth operation of its services from which it never fully recovered (Sutton, 2014). This therefore signified a failure in the Transport Reform of 2011. The main reason for this failure is that the reform occurred virtually overnight, when in hindsight perhaps it should have been rolled out over a longer period of time (Sutton, 2014). Media at the time was highly critical and sensational journalism further increased public dissatisfaction to the new system (Sutton, 2014). However, as can be seen in fig 5, the real situation wasn’t as dire as the media made it out to be. However, its decision was understandable. It was revealed that by 2013 the company incurred losses of €50m during its operations in Malta (“Arriva Racked up Debt”, 2013).
The CVA system in Valletta has also been adjusted following an electoral promise made before the change in government. The hours of operation of the CVA system have been reduced, with further justification being that the system does not break even financially (CVA Changes to Valletta, 2014). In addition, while the CVA system was initially effective, the number of exemptions to the scheme has risen considerably (Camilleri, 2013). These changes have understandably been unpopular with residents and the Valletta Local Council. Prime Minister Dr. Joseph Muscat has also suggested the possibility of eliminating the system altogether (“Valletta CVA System”, 2013). However, the mayor of Valletta, Alexei Dingli, has stressed that the system need not necessarily be scrapped but reformed.

Malta’s transport policy has radically changed over the past 24 years. From a predict-and-provide transport framework, policy has developed into a more integrated one. Malta’s policy has also aligned more closely to that of the EU, and it seems that the country is generally conforming to the EU transport policy recommendations. While there have been advancements, there have also been setbacks. The transport reform of 2011 can be said to have been a failure, while the current CVA system is also going through some changes. However, a replacement public transport operator has been chosen. Autobuses de Leon will commence operation of the public transport service in early 2015 (“Autobuses de León Awarded the Contract”,2014). Nonetheless, Transport Malta is currently developing a National Transport Strategy (NTS) and Transport Master Plan (TMP) which will be
published in late 2014 to replace the obsolete Structure Plan of 1992 (Sutton, 2014). These two documents will dictate transport policy in Malta until 2040.
The Costs of Road Transport

The usage of the car as a form of transport has many advantages to the individual. Indeed, the car provides mobility and access to locations that would otherwise be difficult to reach. As Wee (2014: 69) states, the car provides individual freedom of movement and also enables door-to-door access to locations. In addition, the symbolic value of owning a car may also be considerable. In fact, the status concerns of not using a car are usually included as a barrier to utilising other modes of transport (Gatersleben, 2014: 88).

Due to income increases over the last century, Western society has seen a marked increase in the ownership of cars, with the majority of countries having vehicles ownership rates of over 450 vehicles per 1000 inhabitants (Wee, 2014: 69). Therefore, for many people, usage of the automobile is part of everyday life. However, although useful to the individual, the automobile has many detrimental effects both to the individual and externalities to wider society. Examples of effects on the individual level include road safety concerns, health concerns due to lack of exercise and exposure to pollutants (Wee, 2014: 74-5). On the societal level examples include air pollution and global warming (Wee, 2014: 71). It is also possible to monetise these problems. As Litman (2009a: 5) states, these are then termed as costs:

“What most people call problems, economists call costs. For example, if somebody says, ‘Traffic congestion is a terrible problem,’ an economist might say, ‘Traffic congestion is a significant cost.’”

One of the most important concepts integral to road pricing is that of internal and external costs. Internal costs are those that are borne by the user and external ones are the ones that are imposed to others. Social costs are the costs borne by society as a whole and are therefore a combination of the two. In its simplest form, the purpose of road user charging is to charge the user for external costs imposed on society (Litman, 2009: 7). Since the road user has a tendency only considers internal costs to transport, external costs often do not impact the decision-making process (Ecola and Light, 2009: 2).

In an extremely comprehensive analysis of the costs of transport, Litman (2009, 2) identifies 23 different types of transport costs.

<table>
<thead>
<tr>
<th>Cost</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Ownership</td>
<td>Fixed costs of owning a vehicle</td>
</tr>
<tr>
<td>Vehicle Operation</td>
<td>Variable vehicle costs, including fuel, oil, tires, tolls and</td>
</tr>
</tbody>
</table>
In his analysis of the 23 different types of transport costs, Litman (2009: 6) concludes that social costs amount to approximately 0.39 euros in rural areas and 0.68 euros per km in urban areas. Of course, this is a merely an estimation as there are variations in any specific trip, such as by transport mode and vehicle type. However, it can clearly be seen that there are various costs to transport that affect the individual and, perhaps more importantly, wider society.

### Congestion and its Costs

Despite much research on the phenomenon, there is no universally accepted definition of congestion (ECMT, 2007: 10). The reason for this is that congestion is both a physical and relative phenomenon. It is a physical phenomenon in the sense that vehicles impede each other and inhibit the smooth flow of traffic. However, the presence of congestion is relative in the sense that it is also influenced by subjective user experience. Similarly, vehicle behaviour can be influenced by both physical constraints (i.e. how the vehicles react to each other) and also by how road users view the
congestion relatively (ECMT, 2007: 10). In fact, research has shown that congestion is non-linear, and even a small reduction in vehicles can lead to great reductions in congestion (Walker, 2011: 9).

Definitions can be expressed in both quantitative and qualitative ways. For example, two definitions given by Grant-Muller and Laird (2006: 20) are:

“Traffic is congested if there are so many vehicles that each one travels slower than it would do if the other vehicles weren’t there”

and

“Traffic is congested if there are so many vehicles that they are brought to a standstill or can only crawl along”

As the authors state, the definitions are interesting because the first one describes congestion in terms of external costs, whilst the second has more of a ‘traffic engineering’ perspective.

Similarly, quantitative definitions can be given. For example, congestion can be expressed as a volume to capacity ratio (V/C). A road with a V/C of less than 0.85 is considered under-capacity, while one with a V/C of over 1.0 is over capacity, or congested (Litman, 2009: 3).

Whatever the definition used, congestion itself also imposes costs to society. Aside from the normal costs associated with road usage, congestion also has a number of intrinsic costs. According to a study by the HDR Corporation on behalf of the Greater Toronto Transport Authority, these are the following:

1. Reduced economic output and job loss for society due to delays
2. The cost of travel delays for road users and uncertainty of trip duration
3. Increased vehicle operating costs due to higher traffic volumes
4. Additional environmental costs and effects due to increased emissions
5. Economic costs due to greater collision and crash risk (HDR 2008, 2)

The above costs are substantial. In 2011, it was estimated that the costs of congestion in the US amounted to $121 billion (Schrank, Eisele and Lomax, 2012:5). In the EU, this amounted to €111.3 billion which is approximately 1% of total EU GDP (Christidis and Ibáñez Rivas, 2012: 16) as illustrated in the table below.

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost of Congestion (€ Billion)</th>
<th>Percentage of GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Belgium</td>
<td>3.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Germany</td>
<td>24.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Spain</td>
<td>5.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Country</td>
<td>Cost 1</td>
<td>Cost 2</td>
</tr>
<tr>
<td>----------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Finland</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td>France</td>
<td>16.5</td>
<td>0.9</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>24.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Italy</td>
<td>14.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Poland</td>
<td>4.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Portugal</td>
<td>1.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Total EU (Available Countries)</td>
<td>111.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 4: Costs of Congestion in EU
Source: Christidis and Ibáñez Rivas (2012)

The costs of congestion are interesting because they are internal to motorists as a group and external to non-motorists. However, according to Litman (2009b: 7), the internal costs should be seen as external ones. This is because each road user incrementally increases the congestion costs borne by other motorists. Because of these substantial multi-user costs, congestion is therefore a serious problem affecting mobility and economic mobility and should be tackled at all policy levels.

**Overview and Taxonomy of Road Pricing**

Road Pricing is a complicated area of study and its terminology often differs on who uses it, its context and its objectives. Indeed, terminology is sometimes used interchangeably which can cause some confusion between planners, policy makers and researchers. This study therefore utilises a definition similar to that proposed by Eliasson and Lundberg (2002: 6). This study therefore considers road pricing to be an umbrella term for any charge imposed on the road user for the costs (externalities) they impose on other members of society. The term road pricing is also sometimes extended to include measures such as parking fees, vehicle registration fees, fuel taxes and others. However, while an interesting forms of revenue generation these measures are not included in the definition used in this study. In its broadest sense, road pricing has two general objectives: congestion management and revenue generation (VTPI, 2014). However, a road pricing system may be tailored to focus on either one of these or other additional objectives such as improvement of the environment and accessibility (Eliasson and Lundberg, 2002: 8).
Tolls:

Tolls are a charge levied on a road user for using a particular road, bridge or tunnel, or in the case of cordon tolls for passing into a particular area. They are not considered to be particularly effective at congestion management because rates are static and do not vary according to the time of day, or levels of congestion (Ecola and Light, 2009: 3). The goal of tolls therefore is revenue generation, especially for transport infrastructure and they are usually quite effective at this. The success of a toll road is often measured in terms of project cost recovery (VTPI, 2014). Tolls can either be collected manually at booths or using a variety of electronic means.

Area-License schemes:

An area-license scheme is one in which a user purchases a specific license for the right to enter and/or park in a specific area. These areas are typically city centres or places with important historic or cultural value. While area-license schemes might somewhat reduce congestion, they are not considered to be particularly effective as the owner of the license can make unlimited trips into an area (Ecola and Light, 2009: 3). Furthermore, effective enforcement may also be an issue. It can also be the case that one does not even have to live within the zone, but own a residence there (Attard and Ison, 2010: 18). Similar sentiments are held by Walker (2011, 126) who states, that while useful they are only a “blunt” instrument to reduce travel demand, as they often do not sufficiently incentivise a reduction of car use.

HOT Lanes:

HOT (High Occupancy Toll) Lanes are considered a form of managed lane strategies. HOT lanes allow single-occupancy vehicles the usage of HOV (High Occupancy Vehicle) lanes for the payment of a charge (VTPI, 2014). The price of the charge may also vary with demand. HOV lanes are normally reserved for vehicles with a driver and one or more passengers such as PT and carpool vehicles.

Environmental Pricing:

Environmental pricing revolves around charging road users based upon the environmental characteristics of their vehicle. However, a sub-goal is usually also congestion reduction (Eliasson and Lundberg, 2002: 7). Many road pricing schemes are often marketed as environmental pricing even if they are not primarily designed for environmental management. The reason for this is generally for public acceptability.
**Congestion Pricing:**

Congestion Pricing systems are those which are primarily designed to reduce congestion. Charges can be variable according to a fixed schedule or dynamic, which vary based on traffic levels (VTPI, 2014). Congestion Pricing schemes are sometimes called value pricing schemes (particularly in the US) because of the assumption that that road user behaviour will change and low-value trips will be reduced or moved to different times of the day (FHWA 2009, p. 1; VTPI 2014).

**Road Space Rationing**

The purpose of road space rationing is to ration road usage introduce a revenue-neutral credit-based system (VTPI, 2014). For example, a citizen could be given credits for 100 peak time trips or 20 euros worth of congestion fees. Users can then either use the credits themselves or trade them to other road users (VTPI, 2014).

**The Implementation of Road Pricing**

According to the Victoria Transport Policy Institute (2014), road pricing systems are implemented and managed by public or private road agencies or local authorities. Their purpose is for infrastructure funding packages, for transportation demand management or privatisation of highway operations. Their implementation may also require approval by national or federal governments.

Road users may be charged in a variety of ways. For example, with point charging, users are charged when passing a particular point in the road such as the start of a road or tunnel (VTPI, 2014). This charging method is frequently used for standard road tolling. These schemes are not to be confused with cordon tolling, which uses a series of points (forming a ring, or cordon, around an area) rather than just single points (Ecola and Light 2009, p. 3).

Charges may also be also be also be used along a road section, road corridor or upon multiple roads (perhaps on certain levels of roads) in a specific region (VTPI, 2014). This can result in traffic being diverted which can result in positive outcomes such reduced congestion upon the charged road; or conversely as auxiliary roads might become congested themselves (VTPI 2014; De Palma and Lindsey 2009, p. 12). Area and cordon charging schemes are therefore a solution to this and may apply charges for travelling into or within a specific zone. Careful consideration and traffic modelling must therefore be performed prior to implementing a system.
The design and implementation of road pricing systems are also influenced by their pricing method. For example, road user charges may either be:

- Static charges
- Semi-variable depending on time of day, type of car, etc.
- Based on distance travelled (distance charging)
- Based spent travelling or within a zone (time charging)
- Dynamic based on levels of congestion and other factors (VTPI, 2014)

However, it is important to realise that the technology used is a key characteristic of the system. Simply put, some types of technology are much more applicable than others for certain charging types and pricing schemes and vice versa.

### Road Pricing Technology

Road pricing comes in a variety of forms and applications and understandably utilises a number of different types of technology. However, ultimately the technology used in a road pricing system largely depends on what criteria the user is to be charged. Some of the more widely used technologies are described below.

#### DSRC and RFID

Dedicated Short Range Communication (DSRC) and Radio-Frequency Identifying applications (RFID) use tag and beacon technology as a forms of detection. Here, vehicles are equipped with a battery-powered on-board unit (OBU) which communicates with a road-side beacon that detects the presence of the vehicle passing through it. The communication methods used are either radio-based, microwave-based or infrared based (Zabic, 2011: 39). Tag and beacon technology is highly reliable, commercially available, and has been in use for well over two decades. The reliability of RFID and DSRC applications often reach near 100% rates (Walker, 2011: 132). Notable disadvantages are the financial costs for street infrastructure (such as toll gantries) and the OBUs; however these are usually lower than other technologies. In addition, though DSRC is used for detection, applications frequently must use ANPR at least in some way for enforcement due to legal reasons. Furthermore, the public may be initially less accepting of such a system because of the perceived hassle of having to purchase and mount an OBU in their car. Tag and beacon technology can be used for point,
cordon, and time-based applications, but can only be used crudely for distance-based applications. This is due to the fact that an operator can discern when a vehicle has passed a detector, but not the specific amount of distance travelled between one detector and another (Walker, 2011: 133).

**ANPR**

Automatic Number Plate Recognition (ANPR) is a reliable and effective technology that is used fully or partially in a number of road pricing systems. ANPR applications involve cameras taking a picture of each vehicle passing a certain point. Following this, Optical Character Recognition (OCR) technology then analyses the picture to discern the number plate in question. Many ANPR systems are based on the utilization of two types of cameras: an infra-red camera that captures multiple images of the number plate and a normal colour camera to take a picture of the number plate and/or vehicle in contact. (Zabic, 2011: 43).

ANPR technology is typically more expensive than DSRC due to the differences in price between a camera and a simple radio or infrared transmitter/reader. However, when you consider the fact that tag and beacon technology requires more infrastructure and the distribution and maintenance of OBUs, this balances out (Walker, 2011: 65). However, one must also not forget costs for storage of data and the communication network, which would be higher.

**GNSS**

Global Navigation Satellite Service, also referred to as “GNSS” is the generic term for a satellite navigation system which uses provide three-dimensional positioning with global coverage. Current global coverage GNSS systems include the Russian GLONASS and the American GPS, whereas the European Galileo and Chinese Compass systems are also under development (Zabic, 2011: 39).

GNSS provide positioning by receiving line-of-sight signals from respective GNSS satellites. The satellites are used as a reference point for the location of the vehicle, and the receivers use time-of-arrival information from the radio signals to determine the location of the vehicle. Accuracy is relatively high as GNSS systems are able to calculate time and location of a vehicle to within a few meters (Zabic, 2011: 39).
The Best System

Following the taxonomy and overview of road pricing presented, the composition of a road pricing system can therefore be said to be split into three:

1) The basis of charging (e.g. congestion, environment)

2) The morphology of the system (e.g. point-based, cordon-based)

3) The method of charging (e.g. static, schedule, dynamic)

4) The technology used for detection (e.g. ANPR, GNSS)

Determining which is the best system is futile, as the characteristics of a distance-based truck tolling system would be much different than, for example, a dynamically priced, cordon-based congestion charging system. The question one must ask is what composition would best achieve the objectives of policy makers.
Theory

The purpose of this chapter is to present case studies of successful and unsuccessful congestion charging systems. These case studies will be further investigated in the next chapter, where a list of components of a successful system has been developed.

However, before the case studies are presented, one must first define what is meant by a successful system. In this thesis a successful system has been evaluated based on three success criteria which are:

1) The system must have been implemented
2) The system must have completed its objectives
3) The system must have achieved public and political acceptance ex post implementation

In the examined literature, there was a trend where a number of systems are called or alluded to as being ‘successful’ without an explicit definition of what is meant by the term. It is therefore important to state that these criteria are the extrapolation of the author following an extensive analysis of secondary data. Of course, while the criteria of a successful system can be defined, one must also keep in mind that the fulfilment of each of these criteria is also subjective. For example, if the goal of a system is to primarily reduce congestion, and the reduction has only been marginal, it is therefore debatable if the system has achieved the aforementioned criterion. However, towards the end of each case study, a qualitative analysis is given why the author considers the system a ‘success.’ Naturally, the systems that were not implemented are considered failures. The gauge of success of each system shall be the basis of the next chapter which defines the components of a successful system.

The implemented systems analysed in this chapter are:

- London
- Stockholm
- Milan

Whilst the non-implemented are:

- Edinburgh
- Manchester
**Case Study 1: London**

The case of London is of particular importance to analyse. The city was amongst the first in Europe to implement a congestion charging system, and certainly the first major city (Durham was actually the first in the UK). Implemented in 2003, the system itself covers an area around 21km$^2$ and charges a flat rate of £11.50 (originally £5 in 2003) to users entering the chargeable zone from 07:00 to 18:00. However, discounts and exemptions exist for residents, disabled persons, public transport vehicles, road recovery vehicles, low emission vehicles, and vehicles with over 9 seats, amongst others (TfL, n.d.a; TfL, n.d.b). The system is ANPR-based and identifies users entering, exiting and operating within the zones via a network of cameras.

As one of Europe’s largest cities, London has had an urban congestion problem for decades and the prospect of a congestion charging system was considered as early as the 1980s (Martin, 2005: 50). The London Congestion Charge Research Programme (LCCRP) was therefore commissioned by the Department of Transport in 1991 and conducted a £3.5 million, three-year study which recommended the introduction of a congestion charge that would provide economic, environmental and congestion-reduction benefits (Martin, 2005: 52). Following this, the national government issued a White Paper in 1998 which highlighted a need for a shift in national transport policy. One of the measures suggested was the introduction of a road-user charging (Martin, 2005: 83). This naturally had implications for the possible introduction of congestion charging in the capital.

In 1999, the Greater London Authority Act was implemented which really paved the way for the introduction of a charge. As Martin (2005: 85) states, the Act had a number of provisions such as: the introduction of the position of Mayor of London, who was given executive authority over London; the setting up of Transport for London (TfL), the executive agency to administer transport in London; and importantly, created legislation enabling the introduction of congestion charging. Following this, the Road Charging Options For London (ROCOL) Working Group was established which started to prepared a draft report underlining the characteristics and effects of such a scheme (Sorensen at al., 2014:42).

In May 2000, Ken Livingstone was elected as Mayor of London. Improving public transport was a central factor of Livingstone’s electoral campaign, and in 2001 Livingstone presented his Transport Strategy which included the congestion charging scheme to be implemented in 2003 (Sorensen at al., 2013: 42). The Transport Strategy also included extensive public consultation both before and after its publication which saw some important changes and exemptions such as a 90% reduced
charge for residents inside the charging zone (Sorensen at al. 2013: 43). However, the residents of Westminster and Kennington strongly disapproved of the charges and mounted a legal challenge against its implementation which was dismissed by the High Court in 2002 (Martin, 2005: 112). Following this legal barrier, the scheme was cleared for implementation. The scheme was introduced in 2003, alongside a £100 million public transport investment and numerous other congestion management measures (Sorensen at al., 2013: 43). Furthermore, the revenues generated from the scheme were to be invested in public transport (Sorensen at al., 2013: 43).

The introduction of the Congestion Charge had immediate effects. The number of private cars, trucks and vans entering London decreased by 33% and average speeds inside the zone saw an increase of around 17% (Leape, 2006: 165, 166). Bus patronage was also affected, with an increase of 38% of during the morning peak period (Leape 2006, 168).

Following re-election in 2004 and the success of the first year of operation of the LCC, Ken Livingstone proposed the Western Extension of the scheme. Introduced in 2007, The Extension effectively doubled the chargeable area, covering much of the affluent Chelsea and Kensington neighbourhoods. The extension was seen as controversial, and received strong opposition from residents. Following the election of Boris Johnson as mayor in 2008, public consultation regarding the Western Extension showed that 62% of residents were against the charge (Wilson, 2011). This led to the decision to abolish the Extension. The Western Extension zone was eventually dissolved in 2011 and therefore the charging zone reverted back to the 2003 limits.

Although the LCC was initially very successful, current observations are less clear-cut. While at face value the figures look positive, further analysis puts them to question. Between 2001 and 2011, car trips in London dropped by 13%, whilst both population and total trips also increased by 13%. Cycle trips have increased by 67%, bus trips by 60% and rail by 42%. In total, overall traffic in Central and Outer London has been reduced by 21% and 8% respectively since 2000 (Wilson, 2013). As Wilson (2013) continues to explain, it could also be seen that this overall traffic reduction was a general trend in the UK. Between 2007 and 2001, total vehicle km driven in the UK dropped by 3%, with a 7% drop in Greater London and 13% drop in Central London. This suggests that the congestion charge supported this trend, but only marginally reduced the situation outside Central London (Wilson, 2013). However, whilst traffic levels have been reduced, congestion levels are actually higher than pre-charge levels (see Fig.6). However, this has been attributed to reduced road capacity because of road works and allocation of lanes and infrastructure to other modes of transport (Wilson, 2013; Givoni, 2011: 1098-9).
In terms of air quality, studies have shown that improvements have been negligible to modest (Wilson, 2013). Furthermore, whilst the scheme does make a profit, it is not extremely profitable, contributing a little over 5% to TfL’s budget (Wilson, 2013).

So, these findings therefore beg the question: Has the LCC been a success? The fact that the scheme was implemented is a success in itself as public acceptance is a significant barrier to the implementation of congestion charging (Sorensen et al., 2013: 50; Attard and Ison, 2010: 17; Ison and Rye, 2006: 452). Furthermore, with the exception of Durham, congestion charging was generally a ‘new’ type of transport policy in the UK and therefore its successful implementation is further remarkable. This therefore has implications for the possible implementation of congestion charging in other cities (Litman, 2005: 10).

The next question is if the scheme has been accepted both publicly and politically. As Wilson (2013) states, the scheme has become a “political non-issue” with little doubt that it is rational and needed. As Wilson (2013) also states, the LCC was a controversial issue in previous elections but no issue at all in the 2012 election. It seems that this is a reflection of public acceptance on the scheme. As the author continues to state, the scheme has been widely accepted but a significant reason for this is most residents of London excessively use public transport.

One must also consider the long term effects of the system i.e. if the scheme has fulfilled its objectives. Certain authors such as Givoni (2011: 10-12) and Wilson (2013) are more critical in this respect. In its present form, the scheme is marginally profitable, with the 2012 annual report stating that net revenues were £136.8 million (Wilson, 2013). As Givoni and Wilson state, modal share and number of trips by private car have certainly decreased, but congestion seems to have increased. However, this increase might not necessarily be due to the scheme itself but due to construction works. Therefore, it can be concluded that whilst the scheme certainly has room for improvement, it can be defined reasonable success.

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Source: TFL Travel in London Reports 1 (2009) and 5 (2012)
Case Study 2: Stockholm

The possibility for a congestion charge system in Stockholm was first realised in 1990s as part of the “Dennis Agreement.” The agreement was an infrastructure package in which road tolls were proposed as a partial financing measure. Negotiations about the Dennis agreement eventually faltered, but the preliminary assessment and stakeholder consultation set the foundation for the future Stockholm congestion charging system (Eliasson, 2014a: 3).

In 2002, the Social Democratic national government was considering implementing a new infrastructure package for Stockholm. Toll-roads were envisioned to provide part of the funds but, following much opposition, the social democrat mayor in Stockholm announced that a road pricing system would not be implemented. The Social Democrats eventually won both national and local elections in Stockholm; however a majority was achieved because of a coalition agreement with the Green party. However, in return for pledging their support, the Green party demanded a full-scale congestion charging trial, which the Social Democrats were forced to agree to (Eliasson, 2014a: 4).

Naturally, this decision proved to be very controversial. Media analysis showed that the proportion of newspaper articles with a that were negative to the charges were 48%, whilst with positive 3% of articles were positive(Winslott-Hiselius et al., 2009: 278). The opposition demanded that a referendum be held to decide about the charges. The Social Democrats considered this an opportunity to regain some of the lost support from the electorate and therefore agreed(Eliasson, 2014a: 4). However, it was decided that the referendum was to be held after the trial period, which occurred from January to July 2006.

The effects of the congestion charge were immediate and significant. After a few weeks, there was a 22% decrease in traffic volumes and a 30-50% decrease in congestion (Eliasson 2014b: 5). Unsurprisingly, this caused public support for the scheme to increase from 30% of pre-trial levels to over 50% post-charge (Eliasson and Jonsson, 2011: 638). All political parties vowed to respect the result of the following referendum after elections in 2006 (Eliasson, 2014a: 4). Eventually, the elections resulted in a liberal-conservative majority both nationally and locally, and the trial was held as planned.

The charge was implemented in August 2007 and its rapid turnaround in public acceptance can be seen as integral to its implementation. However, while political acceptance is largely motivated by
public acceptance, there were some other political factors to iron out to ensure its implementation. From a legal point of view, the charges are considered a tax and not a charge. Since it is not legal for a municipality to levy a tax on its residents, the administration and levying of the charges is the responsibility of the national government (Börjesson at al., 2012: 10). This led to a dilemma as local Stockholm politicians were still wary of implementing the charges as they felt that they would receive less government funding due to this new revenue source (Börjesson at al., 2012: 10). The answer to this was the Chederschiöld Agreement, which was a large transport infrastructure package negotiated with the central government. Here, the central government made a substantial funding contribution and the revenues from the congestion charge system were earmarked for road investments (Börjesson at al., 2012: 11).

The charge itself consists of a toll cordon with 18 charging points around the city. Vehicles are registered automatically as they pass through the cordon using ANPR technology. Road users are charged approx. 1-2€ euros if they pass a charging point depending on the time of day, with a maximum daily total of approx. 6€. Exemptions (mostly buses, foreign cars and residents of the island of Lidingö) cover 15% of all passages. Originally, there were exemptions for alternative fuel cars, but these were removed in 2012 (Eliasson, 2014b: 7).

It is hard to argue that the Stockholm congestion charge is not a success. Firstly, it overcame political and legal barriers and also negative public acceptance. This alone is quite a feat. In addition, while public acceptance levels prior to implementation were low, they considerably increased following implementation and currently remain high (Eliasson, 2014b: 2). In addition, the charges have been accepted by all parties as a success. The reasons for this include their profitability, congestion reduction effects and increasing levels of public acceptance (Eliasson, 2014b: 6).

The system completed its objectives in reducing congestion and improving air quality. 2011 figures show that traffic volumes passing through the charged area are currently 20.5% lower than pre-charging levels (Eliasson, 2014b:9). Furthermore, average travelling speeds fell by one third and one half in the morning and evening peak periods respectively (Eliasson, 2014b, 11). Air quality was also improved, with emissions from traffic falling by 10-15% in the inner city depending on the pollutant (Eliasson, 2014b: 14). Carbon Dioxide emissions in the whole county also fell by 2-3% (Eliasson, 2014b: 15). Due to these successes, it is therefore understandable that the system has received considerable international attention both academically and from policy makers.
Case Study 3: Milan

Milan is an interesting case of public acceptability towards the implementation of congestion charging schemes. Following a referendum, 79% of respondents voted in favour the Area C scheme—a noteworthy figure compared with other referendums on congestion charging (Mattioli et al., 2012: 7). The Area C scheme was implemented in 2012 and was an evolution of the previous Ecopass environmental pricing scheme to one which was more orientated to tackling congestion. A number of factors contributed to this success, such the implementation of EU legislation; political developments; and the presence of an air quality “emergency” that had to be solved (Mattioli et al., 2012: 7).

The catalyst for the implementation of the scheme was EU Directive 1999/30/EC which specified limits of the carcinogenic contaminant, PM10, in urban areas within the EU by 2005 (Mattioli et al. 2012: 5). PM10 is generated in a number of ways such as combustion within car engines and industry. Levels of motorisation in Milan and Italy as a whole are high, and the Po Valley is also highly industrialised. Coupled with the fact that the valley is surrounded by mountains, levels of PM10 in Milan can be critical (Mattioli et al. 2012: 5). In fact, Milan has the second largest car ownership rates among European cities, and the third highest concentration of PM10 (Percoco, 2014: 56).

The previous Ecopass system was implemented in 2008 and charged vehicles for entering the Limited Traffic Zone (ZTL), which was an 8km² wide area around the city centre. The Ecopass scheme was implemented due to aforementioned EU and national regulations (Rotarisi et al., 2010: 360) and was initially well-accepted by the public due to the very apparent air pollution in Milan (Mattioli et al., 2012: 9). The scheme charged users entering the ZTL depending on the emission standards of vehicles. Low polluting vehicles and motorcycles were exempt of the charge and an annual pass was available to residents.

While the scheme was initially effective, both in terms of pollution and congestion reduction, by 2010 the share of exempted vehicles passing through the scheme was 90% (Mattioli et al., 2012: 7). In 2010, an expert panel concluded that while there was reduction of PM10 inside the zone, the overall reductions was negligible at city and regional level (Mattioli et al., 2012: 7). It was therefore clear that the scheme had to be reformed. As investigated by Percoco (2014: 56), part of the reason for this was an exemption given for motorbikes, which saw modal share of these vehicles greatly increase.
In June 2011, voters overwhelmingly approved of the new Area C scheme with 79% of voters being in favour. The scheme was implemented in January 2011, but saw a temporary suspension due to a lawsuit by parking operators. By September, however, the scheme was reinstated (Gibson and Carnovale, 2013: 5). The current Area C scheme is an ANPR-based system which operates on Monday, Tuesday, Wednesday and Friday from 07.30 to 19.30, and Thursday from 07.30 to 18.00 (Commune di Milano, n.d.a). The main difference between the Area C and the Ecopass is the number of exemptions. Previously, only the most polluting cars were chargeable, with charges ranging from €2 to €10 depending on the environmental characteristics of the vehicle. Currently, almost all vehicles have to pay a €5 fee. However, exemptions exist for Hybrid/Bio-fuel vehicles, electric vehicles and scooters. Residents pay a discounted fee discount of €2 and have 40 free accesses per year. Compared to the Ecopass scheme, the number of chargeable vehicles passing into the zone was raised from 12% to 92% (Mattioli et al, 2012: 11).

The Area C scheme seems to have completed its objectives, albeit improvements can certainly be made. After analysing the effects of the suspension of the charge in 2012, Gibson and Carnovale (2014:10, 15) concluded that the scheme reduces traffic by approximately 6% and emissions by 5 to 13%. Modest effects are reinforced by a similar study by Percoco (2014: 58-9). There was also a marked shift in traffic composition, with the proportion of exempted vehicles increasing considerably (Gibson and Carnovale, 2014: 11; Percoco, 2014: 59). In terms of revenues, the scheme is profitable with net revenues of €13 million in 2012 (Commune di Milano, n.d.b). This figure does not include externalities, in which implied welfare gain from pollution reductions alone was estimated to be €20 million inside the charged zone (Gibson and Carnovale, 2014: 15).

Therefore, the scheme is a modest success but improvements can be made. Possible improvements could be to reduce the exemptions, particularly to scooters, which seem dampen the effects of the system). In addition, compared to other congestion charging schemes, the price is rather low. According to Gibson and Carnovale (2014: 14), an increase in €1 would reduce vehicles entering the charged are by 3%. What is interesting is that routes with good public transport coverage saw large changes in traffic, whilst those with poor coverage saw little to no change (Gibson and Carnovale, 2014: 18). This has implication to policy makers, as this signifies that proper alternatives must be in place for congestion charging to be effective.

Although no dedicated surveys or analysis of public acceptance appear to have been conducted ex post the implementation of the system, Hamilton (2012: xxiii) states that the public of Milan seem to have accepted the congestion charging system. On the other hand, political acceptability for the charges seems to be a little more divided. In general, parties aligned with the political ‘right’ have
been more critical of the scheme (Ozer, 2012: 97). Proponents and opponents to the charge have also used different methods of measuring emissions to evaluate the effectiveness of the charge (Mattioli et al. 2012: 14). That said, even some opponents of the scheme seem to be in favour of some sort of car use restriction in the city centre (Mattioli et al., 2012: 10). Compared to the other two successful congestion charging systems, the Milan scheme is younger. Therefore, it is the opinion of the author of this thesis that this might negatively affect the political acceptability of the scheme despite its modest success.

**Case Study 4: Edinburgh**

Following implementation of the London Congestion Charge and its perceived positive effects, a number of cities in the UK considered the implementation of a scheme of their own. Due to issues with public acceptability, political indecision and legislative barriers (Gaunt et al., 2007: 100; Rye et al., 2008: 659-61) implementation of the Edinburgh system failed. This failure came following a referendum vote in 2005, and plans for the system were put on hold.

Consideration about the possible implementation of congestion charging started in the 1990s, but due to legislation issues congestion charging was difficult to implement prior to the Transport (Scotland) Act of 2001. Prior to 2001, local transport authorities could not implement congestion charging themselves because there was no legal framework to do so (Rye et al., 2008: 646). Local authorities therefore had to rely on the national government to design and implement such systems (Rye et al., 2008: 646). Although the Transport Act changed this, a large degree of control by the government still remained. While the local transport authority for the City of Edinburgh could design and propose a system, implementation first had to be approved by both the Scottish Parliament (called the Scottish Executive) and then final approval by the Scottish minister (Rye et al., 2008: 646). In addition to this, there is also another level in the form of the UK parliament which has some degree of influence over matters in Scotland (Rye at al., 2008: 657).

The system was to be based on two cordons, an inner and outer. Inbound road users would be charged to pass through one or both cordons with a fixed rate of £2 per vehicle, per day. If a user would cross one cordon or both cordons multiple times a day, they would still be charged the same amount (McLeod and Healy, 2006: 7). Exemptions included those for disabled badge holders, emergency vehicles and public transport vehicles. A further exemption included residents living outside the outer cordon being charged for passing through the outer cordon (McLeod and Healy,
The revenues for the scheme were to be used for public transport. However, many of the investments depended on the scheme being implemented (Rye et al., 2008: 650).

The Scottish Executive requested that the Edinburgh Local Council hold a referendum before approval of the system was granted. The result of the referendum was overwhelmingly negative for the implementation of the congestion charge: 74% of respondents voted ‘no’ out of a 64% voter turnout (Rye et al., 2008: 645). This was unsurprising, public communication was rather poor and political leadership was lacking (Gaunt et al., 2007: 100; Rye et al., 2008: 658-9). The advertising campaign also lacked direction. As a result of this, relations with the media were also strained, with the majority of articles being negative in the run-up to the referendum (Rye et al., 2008: 660).

**Case Study 5: Manchester**

The Manchester Congestion Charge was another proposal that failed the implementation process. The congestion charge system was proposed as part of a Greater Manchester Transportation Innovation Fun (TIF), a transport package that was to be funded by the central government. The package itself included improvements to cycle, rail and tram infrastructure in which the congestion charging system was to be an integral part (Sorensen et al., 2013: 50).

The funding for the TIF proposal was £1.5 billion in direct funding, and an additional £1.2 billion in the form of a loan. The implementation of the congestion charge system was integral repay the loan, and also one of the prerequisites for receiving the funding in the first place (Vigar et al., 2010: 471). As a result, the public saw the scheme as a so-called ‘money grabber’ (Vigar et al., 2010: 478) and the benefits of the scheme were lost in translation (Sorensen et al., 2013: 50).

The scheme itself was to be a double-cordon scheme, similar to the Edinburgh proposal, with users charged during rush hours (7:30 am to 9:30 am and 4:00 pm to 6:30 pm) (Park et al., 2014: 408). The charge was proposed in 2007, with implementation to commence in 2013, after 80% of the other components of the package were to be implemented (Vigar et al., 2010: 471). The charged area of the system was comparatively large, with the two cordons covering an area of around 210km² (Sherriff, 2014: 10).

Following a referendum on the matter in 2008, 78.8% of respondents were against the TIF package and integral congestion charging system. This lack of acceptability can be the result of many things. Examples include: poor public communication (Sorensen et al., 2013: 50); poor public consultation.
(Park et al., 2014: 408); poor relations with the media, in which the benefits of the scheme were not explained properly (Vigar et al., 2010: 478); and a lack of political leadership from parties and councillors in favour of the charge (Park et al., 2014: 409; Sherriff, 2014: 16). Furthermore, the Community Action Party, who was against the charge, won the local elections directly preceding the referendum (Park et al., 2014: 409).

Characteristics of a Successful System

The purpose of this chapter is to define the characteristics of a successful system (hereby called ‘success factors’). These success factors have been developed following an analysis of secondary data and also the extrapolation of the author of this thesis. The success factors defined in this chapter are of fundamental importance to this thesis, as they will serve as a basis for the analysis of Valletta’s congestion charging system in the next chapter.

There needs to be need for action to reduce congestion and/or other detrimental effects on society

This is, understandably, quite a rational prerequisite for a successful system. Ultimately, it is futile to try and find an answer to a problem that does not exist. As Eliasson (2010: 3) states, congestion charging systems are often mistakenly considered as a quick way to generate revenues. As the author continues to state, there are more cost-efficient measures for such systems, especially considering congestion charging systems are rather expensive. Similarly, in a list of twelve principals for introducing congestion charging compiled in Jones (2003, as cited in Ozer 2012: 25) also lists the need for a problem to be in existence to tackle congestion charging.

Of course, whether a congestion charging system should be the preferred measure to tackle congestion is open to debate. Schade and Schlag (2002: 49) in fact argue that congestion charging is not as effective as other methods to tackle congestion, but it is more financially efficient. However congestion charging ideally should be implemented in tandem with other transport improvements and this has been done, or at least proposed, in all analysed systems

In the three implemented systems analysed, there was certainly a need for action to be taken. In the London case, the situation was dire enough that transport was the top priority for Ken Livingstone’s electoral mandate (Richards, 2005: 1). Furthermore, research conducted prior its implementation highlighted the need for a congestion charging scheme. Prior to the system in Stockholm, constricting topology (such as water bodies and green wedges) coupled with a steady rise in motorisation caused increasing road infrastructure saturation and greater trip durations and
therefore a scheme was needed (Eliasson, 2014b: 4). In the Milan case, the city had one of the highest levels of motorisation in Europe leading to serious congestion problems and an "environmental emergency" that had to be tackled (Mattioli et al., 2012: 7). The Area C system was indeed an evolution of the Ecopass system that was more tailored to tackle congestion, as the latter was not as effective as envisaged.

In regards to the two failed systems, it seems there was indeed some need for a congestion reduction mechanism. In Edinburgh, congestion issues had been forecasted to worsen (Rye et al., 2008: 643). In Manchester, statistics show that the North West of the UK saw a slightly higher increase of motorisation from 1998 to 2008 compared to other regions (Young and Sly 2010: 43). Of course whether this increase was 'critical' enough for a congestion charging system to be implemented is open to debate. It can also be seen that the decision for the implementation of a CC system in both cases was influenced of the London system. This is especially so in the case of Manchester, in which national funding depended solely on the introduction of a system (Sherriff, 2014: 5).

**Public Consultation, Communication and Negotiation are integral to Acceptance**

An overwhelmingly common observation from research regarding acceptance towards road pricing and congestion charging, is that these two factors are integral to and for public acceptance and the implementation of a system. In an analysis of 106 publications concerning public acceptance for the implementation of six different road pricing systems, Vonk Nordgraaf et al. (2014: 183) state that neglecting communication, marketing and negotiations may hamper implementation. Sorensen et al. (2014: 48-9) identify that applying communication strategically and flexibility in negotiations are of great importance. In a list of recommendations for the implementation Jones (2003, as cited in Ozer 2012: 25) similarly states that close collaboration with stakeholder groups will ease implementation. Vigar et al (2011: 478) also come to similar conclusions, and also state that proper communication with the media, and therefore how a system is presented to the public is important for acceptance. Eliasson (2010: 10) states that ‘branding’ is also of importance, and public acceptance is more likely if the system is marketed with environmental concerns along with those of congestion concerns as they are more popular with the public. Owen et al. (2008 as quoted in Walker 2011: 30) also draw similar conclusions, and also elaborate that trust in the authority that delivers a scheme is also an issue. Furthermore, with reference to the previous characteristic of a successful system, Owen at al. (2008 as quoted in Walker 2011: 30) also state that the public need to know that there is a problem, and that it can be solved by congestion charging. Another point regarding acceptance and the success of the system is that the public must not only understand the
benefits of the system, but how it operates (e.g. pricing structures, payment structures, etc.) (Eliasson, 2014b: 40).

In terms of the case studies analysed, it was seen that these factors were present in all the successful systems, yet lacking in the non-successful ones. In the London and Stockholm cases, Sorensen et al. (2014: 48-9) state that the ability to identify the concerns of the public; use of public consultation; flexibility in negotiations and ability to adapt the scheme to the concerns of the public were integral to implementation. Great effort was also made to conduct information campaigns that would inform the public of the characteristics and aims of the system (Ison and Rye, 2006: 457; Eliasson, 2014b: 40). When implementing the Area C scheme, local authorities learned lessons from the implementation of the Ecopass system and engaged in greater public consultation (Ozer, 2012: 94). Furthermore, as with the Stockholm and London cases, a successful information campaign was also integral towards public acceptance in the Area C scheme (Ozer 2012: 104).

In the non-successful systems, there seems to have been major problems in public communication. As Gaunt et al. (2007: 100) describe, the Edinburgh case was seen as overcomplicated and miscommunicated with both the benefits and characteristics of the system ill understood. Rye at al. (2008: 658) state that although there was sufficient communication, promotion of the scheme and its benefits were lacking. Compounding the matter was distrust of the council and their motives, with the scheme being seen as a revenue generating mechanism (Gaunt et al., 2007: 98). While the addition of a double-cordon made the system more effective and profitable, it also complicated matters. A large proportion of the public did not understand the payment structure and believed the daily charge would be applied more frequently. Furthermore, as Attard and Enoch (2011: 550) state, implementation was hampered by a largely negative media campaign.

In terms of the Manchester proposal, acceptance was hampered incorrect communication to the public that diluted the aim of the system. The public perceived the system as merely a way to generate funds for the rest of the package (Vigar et al., 2010: 478). Therefore, the focus was not on the benefits of the system itself, but rather its negative aspects. In addition, the fact that the system was part of a wider package led to complications in marketing the system which were not adequately resolved (Sørensen et al., 2014: 50).This was also represented in the media which could be said to have shaped and reinforced public opinion on the matter. Here, the TIF bid was under explained, and articles (even the ones showing the scheme in a positive light) centred on the system did not give much attention to the other transport investments (Vigar et al., 2010: 478).Public Consultation was also poor. Following the consultation process, in which 81,000 responses were collected, 25,813 were negative and 14,675 were positive. However, the negative ones were not
given adequate attention as it was thought that those who responded to the public consultation in the first place were more likely to have a strong negative disposition (Park et al., 2014: 408).

Environmental Values and Car Use

As Eliasson and Jonsson state (2011: 646) acceptability of congestion charges correlates with environmental awareness and environmental concerns. For example, in a survey regarding environmental attitudes towards the Stockholm Congestion charge, only 7% of respondents stated that they are completely uninterested or rather uninterested in the environment (Eliasson and Jonsson, 2011: 644). Similarly, in a survey regarding social attitudes towards the London Congestion Charge, 57% of respondents stated that less polluting road users should pay less (Taylor, 2012: 120). As Mattioli et al. (2012: 4) suggests, the critical environmental situation at the time also resulted in the unexpectedly high ‘yes vote’ in the referendum for the Milan system.

Furthermore, the level of motorisation might also have an influence regarding acceptance. As Wilson (2013) states, only London’s success has benefited from the fact that only 60% of households own a car and only 7% of commuter trips use this form of transport. Approximately 35% of commuting trips in London are by the car, which is far lower than approximately 60% in Manchester (TfGM 2011: 30) and 41% in Edinburgh (Macnab, 2014). In a survey gauging the acceptability of 4900 individuals towards the Stockholm system, less than 60% have a car and less than 30% utilise the car for commuting (Eliasson and Jonsson, 2011: 646). Understandably, surveys showed that the less car dependant an individual is, the more positive is their disposition towards the charges. Conversely, the level of car ownership in Milan is actually amongst the highest in Europe (Mattioli et al., 2012: 3). However, it could be said that the critical situation might have been sufficient to overcome this barrier.

The publishing of data and reports about the results of the system

Also relating to previous factors regarding communication is the proper dissemination of information regarding the effects of the system. Of course, as Eliasson (2010: 10) states, the system has to first deliver benefits. As he continues to describe, the ability of the public to appreciate these effects through the availability of hard scientific facts increases acceptance of a system. Of course, it can be said that this is not only the case of public acceptance, but also political acceptance.

For the Stockholm system, Eliasson (2014b: 40) states that after the initial "shock" of the unexpected results wore away, the presence of extensive scientific evaluation led to the positive effects of the system being impossible to be ignored. In the London case, TfL also publishes annual reports about
the effectiveness of the charge. Similarly, for the Milan case, AMAT (Agency for the Mobility and Environment of Milan) also publishes regular reports detailing the effectiveness of the system.

**Trials and Referendums**

Trials and Referendums can be decisive tools towards the implementation of congestion charging. Naturally, a referendum empowers the public and is thus a democratic decision which enhances the political legitimacy of a system. However, there are risks with the decision to hold a referendum. As Hensher and Li (2013: 194) explain, a referendum plays substantial informational demands on citizens. As the authors continue, the inability of voters to make rational decisions may harm the implementation process. The high resistance towards the Edinburgh and Manchester schemes may, in part, be explained by the aforementioned poor information campaigns.

A way to counteract this could be the implementation of a trial. By ‘forcing’ voters to experience the scheme, they might then be in a better place to make more informed decision about it. As Isaksson and Richardson (2009: 255) explain regarding the Stockholm system:

“The overall strategy to create legitimacy was thus that of an experiment where the politicians decided on the main approach, which citizens were then forced to try, and in return the power over the final decision was handed over to the public.”

The authors therefore state that trials have great potential towards the implementation of controversial policies. Hensher and Li (2013: 195) also advocate a two-step approach prior to the implementation of a referendum which consists of an accurate information campaign and a trial. The authors also state that the Ecopass scheme may have acted as a trial for the Area C. However, as has been explained previously, the reasons for the overwhelming ‘yes’ vote may be due to a multitude of reasons.

**The Use of Carrots and Sticks**

The strategic use of revenues has implications for both public and political acceptability. The so-called use of carrots and sticks is an oft-mentioned characteristic of a successful congestion charge system. For example, Owen at al. (2008, as cited in Walker 2011: 30) states that a successful system must be implemented as part of an integrated transport plan with components such as green travel plans, park and ride facilities and improvements to public transport. Sorensen at al. (2014: 47) state that in the London and Stockholm cases, policy acceptance and implementation greatly benefited from the redistributive combination of sticks and carrots. In London, this was done with improvements to bus services, the underground and other transport management measures.
(Sorensen et al., 2014: 43). In Stockholm, this included improvements to bus, rail and metro services and also investments in road infrastructure (Eliasson, 2014b: 17). Jones (2003, as cited in Ozer 2012: 25) concurs with this and states that acceptance towards a system would benefit from the fact that improvements are in place before implementation. In Milan the system was also implemented as part of a wider ‘Sustainable Urban Mobility (PUMS)’ package (Ozer, 2012: 105). This included improvement to bus, metro and taxi services and bicycle and bus lanes (Mattioli et al., 2012: 4).

The Edinburgh and Manchester schemes also planned on implementing a number of measures in a transport package alongside the respective systems. However, public appreciation for these measures was not achieved due to lack of proper communication. In the Manchester case, as previously stated, the system was seen merely as a way to generate funds for the other measures. In the Edinburgh system, due to miscommunication and insufficient promotion, the benefits of the system were not realised.

A successful system would also benefit from the fact that improvements to the public transport system are in place at the time of implementation (or that public transportation is of a high standard in the first place). An efficient public transportation system was in fact integral to the success of the London and Stockholm systems (Eliasson, 2014b: 40; Wilson, 2013).

**The design of the system must be as effective and rational as possible**

As Eliasson (2010: 5) states, transport systems are incredibly complex and therefore designing a congestion charging system is a “job for experts”. However, complications arise when the issue of public and political acceptability factors into the design of the system. The equity and justice of a system (perceived or real) are seen major factors towards its acceptability. As Ison and Rye (2006: 457) state, keeping inequity to a minimum is a key factor for a system’s access and exemptions are one way to reduce inequity. Another method is the redistribution of costs as “carrots” mentioned previously.

However, as Schade and Schlag (2003: 48) state, perceived justice may be different than objective distribution of costs and benefits. Complications therefore arise when policymakers attempt to appease the public by modifying the design of the system in light of perceived equity. Eliasson (2010: 10) mentions that while it is the role of the policy makers to define the goals of a system, it is the job of the experts to actually design it as too much interference could lead to a sub-optimal system. Too much interference by policy makers can have drastic consequences:

> “An ill-designed system may not only be “sub-optimal” – it may likely cause more problems than before.” (Eliasson, 2010: 6)
For example, when describing the Milan case study, it has already been described how some of the exemptions have hindered the efficiency of the system. Similarly, in the Stockholm case, while an exemption for the residents of the island of Lidingö could be seen as fair (residents would be forced to cross the toll-cordon twice), this caused implications to the costs of the system (Pridmore and Miola, 2011: 13). Similarly, in the Stockholm scheme, an exemption for alternative-fuelled cars was also controversial and removed in 2012 (Eliasson, 2014b: 7). Litman (2014: 4) provides an effective summary to the relationship between equity, exemptions and effectiveness by stating that transportation planning is a trade-off between equity and policy objectives.

Another component of a well-designed system is that it is simple enough to be easily understood, but not too simple that it is economically inefficient. For example, both Gaunt et al. (2007: 96) and Sherriff (2014: 8) state that the double-cordon design of the Edinburgh and Manchester schemes hindered the public from correctly understanding how the systems operated (though naturally this was also due to poor public communication). Conversely, however, Eliasson (2010: 6-7), states that it is also all-too common for policymakers to underestimate the public’s ability to understand the scheme. The author elaborates that forcing the system to be “too simple too early” may lead to inflexibility of design, inefficiency of operation, poor results and therefore poor acceptance and success.

**Politics and Power**

Political Leadership is an oft-mentioned factor for the implementation of congestion charging. In the analysis of 3 different congestion charging systems, Attard and Ison (2010: 21) state:

“The political champion also seems to remain a fundamental critical factor. The perseverance and support of a person or group of persons who are ready to undertake the necessary change and face the problems that these changes might create is crucial. “

In their comprehensive analysis of six different road pricing systems, Vonk Nordgraaf et al. (2014: 183) also state that political leadership is of crucial importance to implementation. Iertonchou et al. (2006: 9) concur with this assumption, stating that a charismatic individual or group of individuals may “spearhead “a project to success. Sorense et al. (2014: 42) also illustrate this in an analysis of a number of different road pricing schemes, and acknowledge the presence of this factor towards a successful system.
In terms of the three successful case studies analysed, there seems to have been political will and leadership to drive all projects forward. In the London system, the bravery and conviction of Ken Livingstone was one of the main driving forces behind its implementation (Sorensen et al., 2014: 44). Vonk Nordgraaf at al. (2014: 180) even go so far as describing his role as “exceptional. “Livingstone was willing to take political risks for a solution that he saw as being beneficial in the long run. Furthermore, Livingstone took decisive and speedy action to ensure that the system would be in place during his first term in office. A more relaxed approach might ultimately have failed (Martin, 2005:221, 223). The political risk that Livingstone took eventually paid off, as it led to his re-election in 2004. Admittedly, however, implementation was greatly helped by the institutional set up of London’s administration, in which the mayor is given considerable executive power (et al., 2014: 181).

For the Stockholm system, the coalition between the Social Democrats, Green Party and Left party was the driving force behind the scheme and all three parties developed a mutual trust that aided in implementation (Sorensen et al., 2014: 45). However, it could also be said that it was the power play between the Green Party and Social democrats that instigated the introduction of the system (as described in the case study).

In the Milan case, the Association Milano Si Muove was also a factor for the success of the system. The association comprised of politicians, members of the civil society and academics, amongst others and campaigned for the improvement of public transport and an extension of the congestion charge (Ozer, 2012: 91; Mattioli, 2012: 9). The founder of the association, Prof. Eduardo Croci, was actually Local Councillor of Transport during the Moretti administration but was forced to step down due to controversies caused by the effectiveness of the Ecopass system (Mattioli, 2012: 10). The association managed to obtain enough signatures for the referendum for the upgrading of the Ecopass system to the Area C to take place (Mattioli, 2012: 10).

In the Edinburgh case on the other hand, there was no political champion for proponents to rally behind and drive the forward implementation of the project (Sørensen et al., 2014: 50). Furthermore, as Attard and Enoch (2011: 550) states the local Labour Politicians in Edinburgh (who were advocates of the charge) received no support from the Scottish or British Labour party. This hampered the other political parties’ confidence in the system (Attard and Enoch 2011, 550). Even the Scottish Executive member for transport, Andrew Burns, was ambivalent and undecided on the matter (Gaunt et al., 2007: 100).
A Similar champion was also missing in the Manchester case. Councillor Roger Jones, who was the public figure most associated with the GTIF lost his seat in the 2008 local elections, which caused the politicians to be cautious towards support for the scheme (Sherriff, 2014: 16). The ten local authorities in the AGMA comprised of Labour, Liberal Democrat and Conservative administration, and therefore this fragmented political situation hampered the implementation (Sherriff, 2014: 14-15). Furthermore, the Association of Greater Manchester Authorities (AGMA) was formed in 2010 it was decided that all decisions would require a majority vote to be enacted, with the exception of road pricing (Sherriff 2014: 14).

**Institutional and Legal Factors**

The institutional barriers may also be a factor that may hinder the success of a system. In this case, what is implied is that the proper set-up of actors, organisations and authorities responsible for implementation and administration is more likely to enable their success.

For the London case, the GLA Act gave the Mayor executive authority over London, which certainly helped speed up the process (Martin 2005: 225). Other authorities in the UK might have considerable difficulty implementing congestion charging scheme and would not be able to have the same level of independence. Furthermore, it is important to also add that virtually all transport administration in London, including that of the congestion charging system and all accompanying measures in the transport package, are administered by TfL. The London boroughs are responsible for the local road network, but they receive funds to do so directly from the transport authority. Therefore this not only streamlined the implementation process but meant that the authority exerted a certain influence over the boroughs (Martin, 2005: 225).

For the Stockholm system, the Congestion Charging Secretariat (CCS) was formed, which operated directly under the mayor and therefore had a clear interpretation of her electoral mandate. Although not as large as TfL, the setting up of a dedicated authority to plan and realise the system clearly had its advantages (Sorensen et al., 2014: 49).

Institutional factors also contributed to the failure of the Edinburgh system. The presence of the 3 levels of government complicated matters. Furthermore, although a private company was established to oversee development of the system and its proposal, final decisions had to be approved by the Edinburgh Council(Rye et al., 2008: 657). Though the private company had its own board, it relied on funds by both the Council and the Scottish Executive, thus restricting its efficiency somewhat. In addition, the Edinburgh Council was surrounded by other local councils, many of which opposed the scheme (Rye et al., 2008: 657).
In the Manchester scheme, one must also consider that the AGMA was a new institution and as Sherriff (2014: 15) states, the “GMTIF was born into a fragmented governance setting.” One could also consider the structure of the GMTIF itself as rather problematic. Congestion charging was a prerequisite of the scheme, and therefore it could be said that the central government was reluctant to push Congestion Charging directly due to political ramifications (Sherriff 2014: 5).

Conclusion

Following the analysis of both the successful and unsuccessful systems, a number of characteristics of successful systems have been defined. These can be summarised as the following:

- There must be a need for action to be taken to reduce congestion and/or other detrimental effects to society caused by transport
- There must be a proper and efficient institutional set up to ease implementation and administration
- There must be political leadership and will to drive the implementation and administration forward
- There must be proper public consultation and flexibility in negotiations to increase public acceptance of the system
- There must be proper communication with the public including the distribution of information and a good media relationship. The marketing of the goals of the system as being in tune with concepts that the public are supportive of (such as environmental protection) is recommended.
- The use of revenues is integral to both public and political acceptability (ideally the system must be profitable). Investments must be made to transport infrastructure (i.e. carrots and sticks). Furthermore, public transportation should be of a good standard at the time of implementation.
- There must be data and reports to reinforce public and political acceptance of the system
- The design of the system must be as effective as possible. Public consultation must not hamper the effectiveness of the system. Efficiency also includes carefully choosing the exemptions given to certain demographics/categories of road users.

Of course, these success factors can be considered somewhat generic in their application. In other words, they are generally applicable to all congestion charging systems. However, there are
situational factors that are unique to every case, and these can play a major part in policy development. Adhering to these success factors may be integral for policy transfer. As Attard and Enoch (2010, 548) state:

“Learning or lessons drawing from other schemes, particularly if they are relatively rare and politically sensitive becomes necessary to ensure that success factors are adopted and potential difficulties are avoided.”

For example, the lack of proper policy transfer was also seen in the Manchester case. Park et al. (2014: 409) state that while policy transfer was attempted from the London system, the reasons for the failure of the Edinburgh system were not analysed sufficiently. The lessons learned from this failure could have resulted in at least successful implementation.

These success factors will therefore be used in the following chapter, which is an analysis of the CVA system in Valletta. Of course, before this occurs, the Valletta system must first be deemed successful or unsuccessful.
Analysis of the Valletta CVA system

In fulfilling the goals of this thesis, it is necessary to analyse the success or failure of the CVA system. Firstly, the success of the CVA shall be gauged according to the fulfilment of the previously established criteria. Following this, the fulfilment of these criteria shall be analysed according to the presence of previously defined success factors. This information will then be utilised in the next chapter, which is a discussion regarding the creation of a framework for congestion charging in Malta.

The CVA System

Valletta is the capital Malta and the first and only locality in the country to have a road pricing system. Therefore, an analysis of the so-called Controlled Vehicular Access (CVA) system is extremely relevant for the purpose of this study. Valletta is a fortified UNESCO heritage site and also the Central Business District (CBD) of Malta. 90% of Malta’s 400,000 inhabitants are considered urban and live in the agglomeration surrounding Valletta (Attard and Ison 2014: 2). The city has a day-time population of 55,000, however this drops to a night-time resident population of 7000 (Attard and Ison 2010: 14). Due to the city’s small area of around 1km², and Malta’s extremely high level of motorisation, this large variability in population places stresses on the city’s transport infrastructure.

Prior to the CVA system, a fixed-price area licensing scheme (known as the V-license) was used to control access in Valletta. Introduced in the 1960s, the V-License scheme was inefficient and easily abused. For example, citizens who would have liked to park in Valletta in the uncongested evenings were unable to do so without paying the yearly fee. Furthermore the fixed price did not change according to how long one parked in Valletta, meaning that a commuter could park in the city for hours at a time to the detriment of visitors and residents. Valletta has approximately 3000 legal parking spaces and prior to the implementation of the CVA; surveys estimated that 5000 cars were parked in the city by 11:00 am (Attard and Ison 2014: 4).
Following the formation of the Malta Transport Authority in 2002, the first White Paper of Sustainable Land Transport was approved and published by the newly elected Nationalist government in 2004 (Attard and Ison 2010: 16). This white paper was a starting point of investigation into the restriction in the Maltese Islands and Valletta and proposed a number of measures to do so.

In 2004, the Cabinet Committee for National Projects was formed which aimed to specifically tackle the implementation of national projects which had not been implemented due to coordination issues between different ministries and government agencies (Attard and Enoch, 2011: 546). One of the projects that had not been implemented was a park and ride facility outside Valletta. However, following doubts about its effectiveness, it was decided that the project should be implemented as part of a holistic policy to increase accessibility to and from Valletta and its surrounding areas (mainly its closest neighbouring town, Floriana) (Attard and Enoch, 2011: 546). To do this, a local committee of consultants and experts was formed to investigate the matter. The proposals were published in a 2005 public consultation document entitled *Valletta and Floriana: a strategy to improve access* (Attard and Enoch, 2011: 547; Sutton, 2014). The introduction of an electronic
parking and access scheme for Valletta and Floriana was a major component of the document. Other measures included:

- The creation of a Park and Ride service in Floriana
- More pedestrian areas in Valletta
- An electronic access and parking scheme in Valletta and Floriana which was effectively a form of congestion charging. This system would later be known as the CVA system
- The introduction of electric mini cabs
- Efforts at shifting land transport onto the sea by offering ferry services to and from Valletta (Attard and Ison, 2010: 16; Sutton, 2014)

The schemes saw a whole year of public consultation, especially in regards to the CVA system (Attard and Enoch, 2011: 547; Sutton 2014). Following cabinet approval, works began in 2006. The final scheme was introduced in May 2007, with a number of changes were made from the initial proposal. Most notably, while previously supportive of the scheme, the Floriana mayor had a change of heart and decided that the locality was to be excluded from the scheme (Attard and Ison, 2010: 16). The exact reasons for this are unknown, but likely to be due to public acceptance (Attard, 2014).

There are 11 entrance/exits points into the charged area, with vehicles being charged a fee for remaining inside the zone. At the time of writing, the CVA scheme is in operation from 08:00 to 18:00. Vehicles were charged 0.82c per hour in the zone, of which the first 30 minutes were free. Saturdays, Sundays and Public Holidays are also free and, as of December 2013, a vehicle entering the charged area after 14:00 will not be charged (CVA, 2014). Exemptions included residents, emergency vehicles, garage (off-street parking) owners and electric vehicles, amongst others (Attard and Ison, 2010).

**Analysis of Success**

The CVA has been effective in reducing congestion levels in Valletta. Surveys taken prior and post introduction show that on a typical weekday, 9.5% less vehicles park in the capital compared to pre-charge levels. In addition, the average time per vehicle spent in Valletta went down from 3.9 to 3.5 hours (Attard and Ison, 2014: 5). In terms of the amount of vehicles entering the zone, the effects
are not as clear-cut. After one year of operation, the number of vehicles entering the zone actually increased by 3.4% from pre-2007 levels. After a following year, this increase dropped to 0.3% and by 2010, there was a drop of 2%. From 2010 to 2012, there was a decline of 7.4% from pre-charge levels but perhaps this has been aided by infrastructural works in Valletta (Attard and Ison, 2014: 6).

Data in the National Household Travel Survey published in 2010 shows that the CVA system had an effect on modal share. According to the survey individuals visiting Valletta as a car driver or a car passenger dropped by 39.5% to 30.9% and 11.4% to 9.8% from 1998 levels respectively. During the same period, individual trips using the bus increased from 44.6% to 53% (Transport Malta, 2010: 16). Given that the modal share changes experienced in Valletta are in contrast with national transport trends of increased motorisation during the same period, it is likely that these changes were in part due to the CVA system (Attard and Ison, 2014: 6).

Therefore, while the CVA system has been somewhat effective, the system has gone through considerable changes since it was first proposed and also introduced. This may have had some effects on its results, with the largest change being the decision to exclude Floriana.

The public acceptability for the system is hard to assess. Following an interview with the Director of Strategy of the national transport authority, public acceptance of the system was said to be relatively high, with the last study being conducted in 2010 (Sutton, 2014). However, this study is no longer available and its methodology and conclusions cannot be analysed. In addition, no available studies appear have been conducted since. According to Mayor Dingli (2014), however, the public seems to at least have gotten used to the scheme.
During June 2014, an online poll was conducted by the newspaper Maltatoday asking respondents the best way to reduce traffic congestion in the Maltese Islands. Only 4% of the 2,603 (see fig. 9) respondents stated that congestion charging was the best solution. While this is not a direct assessment of the public acceptance towards the CVA, it might at least be an indicator of its perceived effectiveness and general opinions towards the prospect of congestion charging. Currently however, various stakeholder groups are placing pressure on the current government to remove various residential on-street parking schemes around Malta for equity reasons (i.e. they are seen as ‘undemocratic’ by non-residents) (Attard and Ison 2014: 6). This does not bode well for the CVA as it is, at least in part, an access and parking management scheme.

The current government’s political acceptance towards the system seems to be low. In March 2013, a new Labour Government was elected and pledged to implement the electoral promises that were made running up to the previous election. In June, Prime Minister Joseph Muscat announced that the scheme must be reformed or scrapped (“Valletta CVA System to Be Reviewed or Scrapped”, 2013). A fundamental reason for this is the financial losses incurred by the system. In its 7 years of operation, the system has cost €11.7 million to operate but only recouped €5.8 million (Xuereb, 2013). In December 2013, the operating hours of the CVA were reduced to 14.00pm to stimulate commercial activity in the capital (Attard, 2014). It is quite possible that this change has had some effect on the congestion reduction effects of the system. That said, the changes were not
carried out in a haphazard manner, and great effort was made to ensure that the financial losses incurred with the change were minimal (Mamo, 2014).

It is therefore hard to estimate whether the scheme has been a success or not. Although the scheme seems to have been somewhat effective in completing its objectives (particularly in 2011-2012), these have only been moderate. The general public acceptance towards the scheme is difficult to properly assess, but there has been much pressure by influential stakeholders on the government to scrap and/or reform the system. These have been somewhat effective, as can be seen by the recent changes to the system. Further compounding political acceptance of the scheme are the financial losses of the system. The reasons for the system’s only partial success shall therefore be investigated in the next section. Therefore, the scheme can be described as a partial success that has room for improvement and refinement.

Analysis of Success Factor Presence

The CVA system has only been a partial success. In this respect, the prevalence of the success factors identified in the previous chapter shall therefore be examined. In this way, it will then be possible to see the faults of the system and where improvements can be made.

Success factor 1:

*There must be a need for action to be taken to reduce congestion and/or other detrimental effects to society caused by transport*

There is no doubt that, at the time of implementation of the CVA system, there was (and still is) serious congestion problems in the Maltese Islands. As has been explained in detail in previous chapters, Malta’s motorisation has been continuously growing and along with it, congestion problems. As mentioned, the CVA system was part of a shift in transportation policy from a predict-and-provide framework to a more sustainable one. All interviewees confirmed Malta’s congestion problems. Furthermore, confirmation is also present in academic literature and policy publications by Transport Malta. It is important to note, that the congestion problems were also apparent to the public. Furthermore, Attard and Enoch (2011: 550) state that this was not only apparent in research, but also to the general public and stakeholders in Valletta.
Success Factor 2:  

There must be a proper and efficient institutional set up to ease implementation and administration

The institutional set up was solid for implementation and is currently solid for administration. Firstly, the Malta Transport Authority (ADT) was formed in 2002 and therefore established an institutional context to administer transportation holistically and sustainably.

The establishment of both the Cabinet Committee for National Projects and local committee was also instrumental as it saw the creation of an administrative hierarchy and division of responsibilities. The local committee reported to the committee for national projects who in turn reported to the cabinet of ministers (Attard and Enoch, 2011: 549). In addition, two members of the local committee were also Deputy CEO and Manager of Transport Strategy of the Malta Transport Authority. This no doubt smoothed the implementation of the system and improved cooperation between the two bodies (Attard and Enoch, 2011: 549).

The role of the local committee was to design the scheme and develop the aforementioned public consultation document: Valletta and Floriana: a strategy to improve access. In doing so they also conducted official visits to London, Edinburgh and Durham to learn from the successful or failed experiences there (Attard and Enoch, 2011: 549).

![Hierarchy of CVA Implementation](Image)
It is interesting to note that Malta’s British heritage also eased policy transfer. As Attard and Enoch (2011: 550) state:

“The relative similarity in ideologies, attitude and institutional set-up helped policy transfer between Malta and the UK”

The role of the Cabinet Committee was mainly in political support, public communication and public consultation. They were instrumental in interacting with different stakeholder groups and the public to develop the initial green paper and the public consultation thereafter (Attard and Ison, 2010: 21).

Another thing that eased the implementation process was the fact that transport planning in Malta is, in general, a centralised affair. Local councils are often consulted with regards to policy, but in general they do not have much power when compared to the transport authority, Transport Malta (Dingli, 2014). Furthermore, local councils receive the vast majority of their funds from the central government and are not large enough to have dedicated urban and/or transport planning departments (Sutton, 2014). One can therefore draw some comparisons to the London case, which did not have any institutional barriers between different levels of governments or administrative bodies compared to other cases.

**Success Factor 3**

*There must be political leadership and will to drive the implementation and administration forward*

This success factor is apparent in the Malta case. The decision to form a Cabinet Committee created a dedicated political entity to drive the project forward. While there was no single champion in the Valletta case, it could be argued that the Cabinet Committee held this role. The Cabinet Committee provided support and leadership throughout the consultation and implementation period, and thus could be said to be integral to its introduction (Attard and Ison, 2010: 21).

However, current political support for the CVA, or at least the concept of congestion charging, seems to be mixed. One of the main aims of the CVA is modal shift via access and parking management of Valletta. As Attard and Ison (2014: 4) illustrate the general attitude towards the concept of the CVA and other parking management system can be discerned from the electoral manifestos of Malta’s three main political parties:

| Nationalist Party (PN): | • Wished to create additional parking |
Table 5: Electoral manifestos for 2013 general election

<table>
<thead>
<tr>
<th>Party</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Party (MLP)</td>
<td>• Maintain status quo of free public parking areas.</td>
</tr>
<tr>
<td></td>
<td>• Wished to construct additional public parking facilities in areas at full capacity</td>
</tr>
<tr>
<td></td>
<td>• Reduction of operating hours of the CVA system</td>
</tr>
<tr>
<td>Alternattiva Demokratika (AD)</td>
<td>• Most extensive measures for modal shift. Little mention of parking management except via modal shift</td>
</tr>
</tbody>
</table>

In terms of the current Labour government, acceptance of the system is low. Prime Minister Joseph Muscat has highlighted the need for the removal or reformation of the system and the reduction of the CVA’s operating hours is a reflection of this.

In an interview with Toni Bezzina, the Opposition Minister for Transport, it was stated that the Nationalist Party are open to investigation of the possibility of other congestion charging/road pricing systems. However, it was discerned that other measures such as the improvement of public transport, bicycle infrastructure and other congestion reduction measures are more of a priority (Bezzina, 2014).

In terms of current policy documentation, the possibility of future congestion charging systems is not, however, excluded. As documented in the National ITS Action Plan for Malta 2013-2017:

“Malta’s position on road charging is taken on a case-by-case basis and upon consultation with its stakeholders. (Transport Malta, 2013: 29)"

The Valletta Local Council was very supportive towards the concept of the CVA. In an interview with the Mayor Alexei Dingli, the importance of the system and its potential for congestion reduction was stressed. However, the Mayor seemed to be rather disappointed at the government’s lack of support. Mayor Dingli even went so far as saying that the scheme has been “ruined” due to the large amount of exemptions; the decrease in operating hours; and the general changes from the original proposed design (Dingli, 2014). Mayor Dingli continued to explain that this was the result of too much appeasement of stakeholders which in turn diluted the effects of the system.

As Attard (2005: 30) points out, a barrier towards the implementation of transport policy is the political situation in Malta. In Maltese electoral history, there has only ever been two political parties
(the Nationalist and Labour Parties) that have won a general election. As the author states, recent history has seen a small number of votes affect election outcomes. This leads to the situation that a number of stakeholders might create pressure groups to exert considerable influence on political decisions (Attard, 2005: 30). This factor, coupled with extremely high voter turnout levels, causes politicians to be reluctant to suggest or implement controversial policy for fear of loss of votes. As Attard (2005: 30), also states, Malta’s politics are also more centralised compared to other countries, with most projects needing approval by Cabinet. This entails that politicians often suppress measures to protect their seat in parliament.

Another somewhat related factor is the mistrust between political parties. During his interview, Toni Bezzina also stated that in Malta there is not enough consultation and cooperation between parties when developing transport policy. Examples were given where the Government would organise conferences or consultation exercises and the opposition were not notified and/or invited (Bezzina, 2014).

Therefore, to conclude, the implementation of the CVA system saw strong political leadership from the cabinet committee to drive the project forward. Current support of the CVA system, or at least the concept of congestion charging, is mixed between the political parties. The Labour Party does not seem to be in favour; the Nationalist Party is ambivalent towards the concept yet prefer other measures; whereas Alternattiva Demokratika seem to be the most supportive of the concept. In addition, Malta’s political situation seems to have caused too many compromises in the system, which seems to have had effects on its effectiveness.

**Success Factor 4**

*There must be proper public consultation and flexibility in negotiations to increase public acceptance of the system*

It is quite clear that there was a large public consultation effort when designing the system. The cabinet committee was instrumental in the public consultation exercise. This was done in two ways:

1) Whilst developing the Green Paper, the Cabinet Committee sought to bring aboard and gain insight from stakeholders about the traffic situation in Valletta at the time. This was mainly done via the use of questionnaires (Attard and Ison, 2010: 16). This was useful as, upon publication, the Green Paper generally aligned with the views of the stakeholders concerning the improvement of the state of affairs in Valletta.
2) Following the publication of the consultation document, a whole year of public consultation
a number of changes were made to the original plans. Amongst these:

- The charging zone was to exclude Floriana
- The ring-road around Valletta was not to be charged
- The inclusion of reserved parking areas for residents
- The setting of the hours of operation of the system, including the 30 minute grace period
  (Attard and Ison, 2010; Sutton 2014)

The extensive public consultation was certainly integral to the successful implementation of the
system. The decision for the local committee to engage in policy transfer with different institutions
in cities where congestion charging system has been implemented was also useful. Valuable lessons
were learned in this regard (Attard and Enoch, 2011: 552).

**Success Factor 5**

*There must be proper communication with the public including the distribution of information and
good media relationship. The marketing of the goals of the system as being in tune with concepts
that the public are supportive of (such as environmental protection) is recommended.*

It is also clear that there is a great effort to establish good public relations and communication. As
Attard states, the aforementioned policy transfer also aided in designing the advertising campaign
(Attard and Enoch, 2011: 550). The advertising campaign was conducted by the operator of the CVA
system with collaboration from the Malta Transport Authority (Mamo: 2014). The campaign was
conducted both before and after implementation on all forms of media. Aside from ‘standard’ forms
of media (i.e. newspapers, billboards, leaflets, etc.) other forms of media were television
programmes and radio talk shows (Attard and Ison, 2010: 20). There was a particular focus on
education on the reasons for implementation (i.e. improving the environment, reducing congestion,
more parking) and the system operated (Mamo, 2014). However, it must also be said that while the
public may be broadly supportive of the goals of the system, the individual’s self-interest might have
an effect on acceptability (Eliasson, 2014a: 13). This can certainly be the case in the Maltese context,
due to the extremely high level of motorisation.

According to Attard and Ison (2010, 20) few organisations were against the strategy as it focused on
improving access (which was accepted to be a problem). A team was also employed for the public to
ask any queries regarding the system, both over the phone and in person (Mamo, 2014). In addition,
the public are also informed about any changes to the CVA system on all forms of media (Mamo,
2014). Attard and Ison (2010: 20) also state that a good relationship with the media was established and the newspapers in particular were very supportive of the objectives of the scheme.

**Success Factor 6**

There must be data and reports to reinforce public and political acceptance of the system

Unfortunately, there seems to be a lack of information available to the public regarding the effects of the scheme. No dedicated reports or publications have seemingly been issued regarding the effects of the scheme. However, some effects have been mentioned in passing in some publications or reports such as the aforementioned 3rd National Household Transport Survey conducted in 2010. This is not to say that analysis has not been conducted, but this observation has been established following a comprehensive search of the author on the Transport Malta webpage and other channels. Academic literature concerning the effects of the scheme also seems to be lacking, with the most recent and possibly only analysis being Attard and Ison (2014). Here, it seems that the author derived the data from the private operator of the system and not Transport Malta. A comprehensive search of online media was conducted by the author of this thesis regarding the effects of the scheme. While some newspaper articles were found, they mainly revolved around financial losses and the possibility of the system being scrapped.

**Success Factor 7**

The use of revenues is integral to both public and political acceptability (ideally the system must be profitable). Investments must be made to transport infrastructure (i.e. carrots and sticks). Furthermore, public transportation should be of a good standard at the time of implementation.

The CVA system was implemented as part of a range of measures to reduce congestion in Valletta. In addition, some of these, such as the Park and Ride service, were implemented before the CVA system was in operation. The Public Transport reform occurred in 2011, and as previous figures and data show (fig. 5; fig. 9) 2011 saw the largest reduction in cars entering the charging zone yet and also an increase in bus passengers. Of course, further research needs to be conducted if there is any meaning to this correlation. However, it must also be said that the reform also saw the privatisation of the park and ride service, which resulted in higher prices. Following this privatisation, it was actually cheaper to park in the CVA charged area than the Park and Ride facility (Mamo, 2014). Naturally, this may have had repercussions on the effectiveness of the CVA system.

Unfortunately, the system does not currently break even, a factor which has hampered political acceptability. The media have also contributed to a lack of public acceptability. In the opinion of the
author of this thesis that recent newspaper articles regarding the scheme have been somewhat sensationalist. Many of them have been focusing on the financial losses of the scheme and the political ramifications of this factor.

**Success Factor 8**

*The design of the system must be as effective as possible. Public consultation must not hamper the effectiveness of the system. Effectiveness also includes carefully choosing the exemptions given to certain demographics/categories of road users.*

Following analysis of the data obtained from primary and secondary it sources, it would appear that the design of the system is not as effective as originally envisaged. A number of changes have been made from the original design of the system both during public consultation prior to implementation and political decisions following this. In this respect, possible factors influencing the effectiveness of the system shall be stated below.

**The Size of Charged Area:**

The CVA system was supposed to include both Floriana and Valletta. However, while originally the Floriana local council seemed to approve of the concept of the scheme, they later changed their mind during public consultation.

As Mamo (2014: 20:27) states:

“...as you can see there's a whole set-up behind the CVA system. But I think the issue with the CVA system is that it changed from its original design. [For example,] the charging area was supposed to be much larger, but that didn’t happen.”

Similarly Sutton (2014: 42:24) also agrees with this notion.

“...originally when we designed it, [the CVA] was for Valletta and Floriana. The system would have taken three cameras; you would enter the peninsula... and pay a different amount for Floriana compared to Valletta. Valletta accepted, during the public consultation, the principle of having a CVA and Floriana didn’t. And this instantly created problems ...obviously we had to re-dimension the scheme.” (Sutton, 2014: 42:24).

Another reduction of the charged area occurred with the decision to not charge the ring-road surrounding Valletta, which had around 200 extra parking spaces (Sutton, 2014).
Another change was the decision for resident’s parking spaces. However, this might only slightly have affected the system. However, as Sutton (2014) states, residents were a major stakeholder and it is quite normal to have reserved residents parking spaces in a parking scheme.

**Pricing Structure**

The pricing structure of the CVA also points to its lack of effectiveness. According to Mamo (2014), the CVA tariffs have never been revised in 7 years of operation; with the current price of €0.82 perhaps being too cheap.

Another component that may be revised is the 30 minute grace period.

“The first half an hour was free, which is a bit unusual. It’s quite a lengthy period for people to access an area and for it to be free. But that was done purely as a political measure because of feedback received during public consultation...” (Sutton, 2014: 43:04)

The system can be improved by also having a more flexible charging structure. As Mamo states, the charge rate can increase after three hours in the zone. Mamo (2014: 22:02) explains that the system can break even with “just a bit of tweaking.”

Similarly, the recent reduction of the operating hours has also had an effect on the effectiveness. As the mayor of Valletta states (Dingli, 2014: 11:16)


Mayor Dingli also states that the payment method may need revision as this effects public acceptance. As it stands, road users receive a bill at the end of the month. Paying a month’s charges at once may give the perception of the fee being quite a burden, where they might not consider using other payment structures.

**Exemptions:**

The CVA system also has a rather large number of exemptions. As Mamo (2014) says, these might need revision to increase the effectiveness of the system. The following vehicles are exempt from being charged:

- Emergency and official vehicles
- Vehicles of Members of Parliament
- Electric vehicles
- Public Transport Vehicles
- Motorcycles
- Vehicles capable of carrying over 10 people
- Resident’s vehicles
- Resident’s relative’s vehicles
- Vehicles whose owners have with private garages and parking spaces in Valletta
- Vehicles owned by people with special needs
- Monti (Open-air market) hawkers
- Regular Deliveries
- Urgent works vehicles
- Emergency vehicles used by services in the electricity, water, drainage and communication sectors
- Doctors
- Public school teachers (CVA, n.d.); Camilleri, 2013)

As the mayor Valletta states (Dingli, 2014: 10:59) a number of these have been due to political decisions:

“Recently they gave exemptions to all the teachers. I mean, why? If I’m a salesperson or a shop owner, should I have an exemption? If I’m a plumber should I have an exemption? So why give it to all the teachers? I think they’re [the Government] just messing up the whole system.”

**Conclusion**

The CVA is the first system of its kind in the Maltese Islands. However, while its implementation is a success in itself, the system seems to have a number of issues which have reduced its ability to complete its objectives and be politically and publicly accepted.

The decision to implement a congestion charging system in Valletta was politically brave. A great deal of effort was conducted in designing and implementing the system to be effective, yet also be publicly and politically accepted. Lessons were learned from other cases abroad and policy transfer was conducted. One of these was the extensive public consultation process. While the great effort of public consultation is admirable, there seems to have been too much effort to please stakeholder groups. This seems to therefore have had negative consequences on the system.

It is the opinion of the author that the system should not be scrapped, but reformed. It has been established by the analysis of the system that minor changes to the system can have significant effects on its objectives and profitability.
Whatever the fate of the CVA may be, a number of lessons can be learned from its implementation and administration. In the next section, these shall be formed into a framework for the implementation and administration of congestion charging in the Maltese Islands.
The Creation of a Congestion Charging Framework

The purpose of this thesis is ultimately to develop a framework for the successful implementation and administration of congestion charging in the Maltese Islands. This framework is built upon the analysis of two sets of data. The first is the success factors which have been extrapolated from the international case studies. The second is the analysis of the presence of these success factors in the extended case study of the CVA system. Of course, since part of the data is derived from the best practice observations of different case studies, it is safe to say that many components of this framework are applicable to any system and any context. However, the presence of each component of this framework shall be explained in the Maltese context where possible.

The Framework

In designing this framework, one must therefore return to the criteria of a successful system which are:

1) The system must have been implemented
2) The system must have completed its objectives
3) The system must have achieved public and political acceptance ex post implementation

A complication therefore arises because the fulfilment of these criteria occurs over different phases of the system’s life cycle. Therefore, this framework has been divided into to:

- Pre-Implementation
- Post-Implementation

Pre-Implementation

There must be improved education and environmental values

The intrinsic values of the Maltese populace towards environmental issues are of key importance. From the analysis conducted it would seem that in general, the Maltese populace do not directly link congestion problems with environmental issues. Furthermore, it seems that there is a general
thought that congestion issues may be solved by provision of more transport infrastructure. Changing this cannot be done overnight, but all interviewees would seem to agree that there needs to be greater education and awareness on the impact of congestion on society and the environment, especially at a young age. Of course, changes would occur over the long-term. However, one cannot disregard the importance of educating future generations about the positive effects of bicycle use, walking, public transport utilisation and car-pooling, amongst others.

*There must be political leadership*

In the analysed case studies we have seen the importance of political leadership or the presence of a political champion, and this was no different in the CVA case study. Here, the cabinet committee served the role well and therefore this framework would suggest a similar approach in the implementation of future schemes for the Maltese context. Of course, the political situation in Malta certainly complicates matters. However, the CVA case study has shown that this can be overcome, if at least partially so. The political champion should show sufficient bravery to not be pressured by stakeholder groups to modify the system to ineffectiveness. As we have also seen, cooperation between political parties is lacking in Malta. In this respect, consultation and agreement between parties towards the implementation of a system is recommended.

*There must be public consultation*

The methods employed in public consultation for the CVA system were effective for acceptance, even though the results had an impact on the effectiveness of the scheme. This framework would advocate the same general method of the public consultation exercise. That is, it should be employed at an early stage (if possible before or during the preliminary design of the system) with further consultation occurring thereafter. However, as mentioned previously, consultation should not entail completely modifying the system to the whims of powerful stakeholder groups. The question therefore arises if the needs of certain stakeholder groups should be given more consideration. For example, some groups such as residents or business owners may be particularly sensitive to the effects of the congestion charge system. It is ultimately up to the policy maker to decide if this should be done, however, this must be done cautiously. Some modification of the original design is inevitable, however.

*There must be proper public communication*

Public communication is also a fundamental factor. Early on, the objectives of the scheme and the rationality of the policy must be explicitly defined. An advertising scheme concerning the system should be conducted on various forms of media, intensifying in the months leading up to
implementation. In addition, as was done for the CVA system, there should be a task force in place to answer any questions or address misconceptions regarding the future operation of the system.

**There must be a proper institutional arrangement**

Malta benefits from the fact that all transport is planned and administered by a single authority, Transport Malta. Decisions in regard to transport policy are centralised, with Local Councils not having the power or resources to plan, operate and administer public transport within their locality. This is naturally beneficial towards the implementation of a congestion charging system. However, Local Councils do provide an important link towards the residents of their jurisdictions which cannot be ignored for the public consultation process.

The planning and implementation of a congestion charging system is no trivial matter. The provision of a system requires the creation of task forces and roles that are responsible for some aspect of the project or another. In general, politicians should be left out of the actual design of the system except perhaps to define its goals. Politicians do have a very important potential role in the form of public consultation with residents and stakeholders, however.

**There must be strategic use of trials and referendums**

Some sort of trial would ease implementation of the system. As was seen, the implementation of the CVA system benefitted from the fact that a road pricing scheme (The V-License) was already in place. However, no other road pricing schemes exist in the Maltese Islands. There are, however, a few localities with resident parking schemes in place and these could therefore be seen as possible candidates for the introduction of a system similar to the CVA. However, to gain the public’s acceptance of a new congestion charging scheme, it is the opinion of the author that the CVA system must be reformed.

A referendum, however, would most likely hamper the implementation of a system due to the current environmental values of the Maltese populace. This framework would therefore not recommend a referendum at least for the near future.

**There must be usage of carrots and sticks**

A potential system should be implemented as a transport package along with other transport measurers and incentives. Of particular importance in the Maltese context is having an efficient public transportation system. The public transport system in Malta has generally been found to be
lacking in efficiency, and the reform that occurred prior to the writing of this thesis failed. However, a new operator, Autobuses de Leon, has already won the tender to become the new public transport operator which is positive news.

Ultimately, the transport package and how it is implemented and operated should be in line with the goals of a potential system. However, if the goal of the system is parking management (as with the CVA system) the provision of parking facilities (such as park and ride) is heavily recommended. Therefore, it is important the many of these are in place before the congestion charging system is implemented. The reasons for this are that the implementation of too many measures and components at the same time might complicate the process; and also so that the public are used to the new measures by the time the system is implemented. It must also be said that the transportation measures must synergise with the system. In the case of the CVA system, for example, it was more expensive to park inside the Park and Ride facilities rather than the CVA zone following its privatisation which was counterproductive.

**Timing and Windows of Opportunity**

Taking advantage of timing and windows of opportunity is necessary in any context and the Maltese one is no exception. Currently, there is a general consensus (publicly, politically and otherwise) that there is a massive congestion problem in the Maltese Islands. Taking advantage of this would be a positive move, but the issues with the CVA system must be rectified first to achieve public acceptance. Of course, reforming the CVA system cannot occur overnight, but fortunately neither can the resolution of Malta’s congestion problems.

**Post-Implementation**

The post-implementation phase involves the consolidation of successes achieved in the pre-implementation phase. At face value, it would seem that this phase is simpler than the previous one. While this assumption is somewhat justified, this phase nonetheless has new and important challengers that did not occur previously. Of course, it is important to realise that any deviations to the framework that occurred in the previous phase might have repercussions in this phase.

**Political Leadership**
The start of the post-implementation phase might be a turbulent period with low public acceptance levels. Indeed, the public may take some time in adjusting to the effects of the scheme and appreciating its benefits (provided it was designed properly). This period therefore requires political leadership to withstand negative public sentiment and the political repercussions that go along with it. Indeed, the presence of only two political parties holding seats in parliament will likely result in much pedantry and criticism from the Opposition at the time.

Public Communication

In this phase, public communication takes a different stance than in the previous one. Here, public communication involves the reinforcement of the effects of the congestion charge system. Naturally, this assumes that the design of the system was effective at reaching its goals and that the framework was followed through in the previous phase.

Streamlining of the System

It is likely that the post-implementation phase might require some further changes to the original design of the system. These may either be positive, due to the fact that the transport model used in the design of the system may have had some inaccuracies; or negative ones due to feedback received from the public. In the latter case it is essential that these do not detriment the system too much. In the Maltese context we have seen the power of stakeholder groups in the political context. Very often if political parties do not support one stakeholder group the other will attempt to gain their support with electoral promises.
Conclusion

This thesis has presented a framework for a successful congestion charging system in the Maltese Islands. Following the definition of criteria for a successful system, the framework was established with the analysis of multiple successful and unsuccessful systems, including the Valletta CVA system. The Maltese context shares similarities with other contexts and other systems analysed. However, the Maltese context is also unique in a number of ways, which has implications for the implementation and operation of congestion charging systems.

The Maltese context is somewhat unique in the fact that it has the highest cars per capita in the EU; and one of the highest in the world. The connotations of this figure are further amplified by its small size. In fact, its urban characteristics are arguably more comparable to that of a city, rather than a country. When using this comparison, Malta’s level of motorisation is actually far higher than that of cities in the EU. Malta’s high level of motorisation coupled with its urban characteristics has led to high levels of congestion, which have been acknowledged both publicly and politically. In turn, this motorisation has repercussions on the public acceptability for road pricing. It could also be argued that Maltese environmental values are not very supportive of the concepts of modal share and the concept of road pricing, which therefore has repercussions on the success of a system.

The political situation in Malta is also problematic for the implementation of a system. The existence of representatives from only two political parties in parliament is of concern. The strength of stakeholder groups in Malta and the tendency for elections to be won and lost by small margins may also cause a lack of bravery in Maltese politicians.

Currently, Malta’s public transport system is also in transition. The previous public transport operator recently ceased operations in the Maltese Islands. However, public tendering has already found a replacement that will commence operations in early 2015. Despite the problems in Malta’s public transport infrastructure, there seems to be great willingness from the current government to solve Malta’s congestion problems, which is a positive indicator for the success of a system.

There are, however, more positive factors towards the implementation of a system. Malta’s transport authority, Transport Malta, is a relatively new organisation that has streamlined the administration of land, sea and air transport in the Maltese Islands. The centralisation of transport administration and weak strength of local councils is positive factor for the success of a system. In
in this respect, national directives and projects have a greater chance of being implemented without much pressure from the local government.

The existence of the CVA system can also be said to be a positive factor for further implementation of road pricing systems. Although it is debatable whether the system was a success or not, the CVA was the first of its kind in the Maltese Islands. Therefore, further utilisation of electronic road pricing might not seem so alien. That said, there are strong arguments that CVA system must be improved before an additional system is introduced.

In terms of the characteristics of the framework itself, this has been described in detail in previous chapters both in the pre- and post-implementation phases. Nonetheless, it is safe to say that the main foundations of the system consist of proper design of the system and accompanying measures; proper communication with the public; and political bravery.

Furthermore, there are recommendations for future research. As stated, the determination of public attitudes towards the CVA system and the potential for other congestion charging systems is rather pressing. This research could either be carried out on a local or national scale. Following the completion of the National Transport Model, feasibility studies towards the effects of congestion charging systems in different localities could also be performed.

While this thesis recommends a framework for the success of a system, it is difficult to assess the likelihood that a system will be implemented in the near future. On one hand there is great rationality because of the congestion problems in the Maltese Islands. On the other, it can also be said that the current government may be unwilling to take political risks due the fact that this is currently their first term in power. On a positive note, however, the National ITS Roadmap states that the feasibility of congestion pricing systems may be analysed on a case by case basis. The upcoming National Transport Model developed by Transport Malta will certainly be of use to this. Nonetheless, if the possibility for a system is to be explored, policy makers and planners will likely find this thesis of use for the implementation and operation of a successful system.
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