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LOCAL DECISIONS REGARDING PUBLIC TRANSPORT ALTERNATIVES:

-Their Relevance to and Impact Upon Volvo Buses and other Bus Manufacturers

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Abstract

This thesis looks at the decision-making processes associated with choosing public transport alternatives in major cities. The choice is made either when routes are to be replaced or when new routes are to be implemented. The thesis is a case study where two bus cases and two light-rail cases were selected. These cases (cities) have the ability to choose and utilize a hybrid of alternatives.

Contrary to initial beliefs, the researchers found that the alternative was not selected subsequent to rigorous evaluations, such as cost-benefit analyses, between several alternatives. Instead, it was chosen on the basis that the alternative was believed to be able to best solve the problem defined by the applicable authority and achieve the desired goals. The lowest cost possible was not found to be an important criterion. In neither case, two or more alternatives were evaluated, which contradicts the theory of rationality. Moreover, field trips proved to be a major determinant for choosing an alternative.

Further, the interests of stakeholders were not established to affect the choices, and political will was established to be the single most important factor. The state subsidies of light rail were found to be crucial to its selection whereas they were not for buses. These state subsidies are believed to give light rail an unfair comparative advantage.

Key words: public transport, light rail, bus, decision-making processes, political will, cost-benefit analysis, state subsidies.

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Gothenburg, January 2003

Martin Johansson & Claes Westlin

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1. Introduction

The first chapter will introduce the reader to the background of the thesis, the cases that will be analysed, the problem discussion, the purpose of the thesis, the limitations, the case company (Volvo Buses), the contribution of the study and the definition of commonly used terms.

1.1 Background

Public transport is currently a debatable issue in society as there are tremendous costs associated with it. Large amounts of public funds are used to finance new investments and the maintenance of existing public transport infrastructure. These investments and maintenance costs related to public transport affect all citizens. This is partly because the financing is made with public funds through taxation, but also due to the large amount of people who are dependent upon public transport. In Sweden, for example, it is estimated that about 30% of the population is dependent upon different means of public transport or the bicycle[1].

In major Swedish cities such as Stockholm and Gothenburg, and in English cities such as Leeds and London, there are different public transport alternatives and solutions. Rail dependent systems, both under and above ground, and buses compete for increased market share as means of public transport. The manufacturers of vehicles to the public transport system, regardless whether they are manufacturers of trams or buses, are companies that seek to maximize profits. A city's choice of a particular public transport alternative is therefore very important to the manufacturers of public transport vehicles. The choice of means of public transport is up to local government politicians and traffic planners. In Sweden, for example, they are instructed by the government to choose an alternative that is, among other things, long-term economically efficient from a societal perspective[2].

The final choice of one public transport alternative over another on the local level is an entirely political decision, which in itself poses some interesting questions. Are these decisions based upon "hard" factors such as passenger prognoses, capacity of vehicles and economic fundamentals such as corporate and societal cost-benefit analyses? Or, are they based upon "soft" factors such

[1] Kollektivtrafikutredningen UTR (1994)
[2] Kollektivtrafik – effektkatalog och handledning (2001)

as political will of the party in power and upon cultural aspects such as institutional thinking? These two schools of thoughts often collide in reality. Researchers[3] argue that these public transport decisions are often based upon both "hard" and "soft" factors. Moreover, they argue that even if the underlying economics in the form of a cost-benefit analysis do not support a decision, or even favours a different one, the decision is taken anyway. This problem can be exemplified by the following example:

> *"An important political question divided a Swedish political municipality into two opposing sides. After a heated debate, the group decided to take a break. During the break a representative of the majority block approached a person of the minority block and said: "You may be right, but we are the party with the majority".*[4]

This "political will" can have a large impact upon decisions. A decision can be thought to be irrational in the sense that nothing directly speaks for one alternative, but it is decided upon anyway. Politicians can take a particular decision without the support of media, industry and the population as long as the financing of the decision is solved[5].

Researchers also argue that politicians do not want to introduce the concept of rigorous cost-benefit analyses in the decision-making processes. Hereafter, the decision-making process will be referred to as "DMP" and cost-benefit analysis will be referred to as "CBA". Politicians want to take decisions that are in their own self-interests without anybody else being able to control whether the decisions were beneficial or not to the citizens or society as a whole. The CBAs "threaten" politicians to take decisions that are rational from a societal perspective, and not necessarily rational from their own personal perspective. The extensive use of rigorous CBAs would also greatly reduce the importance of politicians.[6]

One of the stakeholders in the DMP, and whose interests are affected by the outcome of these decisions, is Volvo Buses (a strategic business unit of the

[3] Ljungberg (2001) & Falkemark (1999)
[4] Falkemark (1999) (Own translation)
[5] Fridh (1996)
[6] Ahlstrand (1983)

Volvo Group). Volvo Buses experiences fierce competition within the transit bus[7] industry and global competition from other bus manufacturers such as Mercedes/Setra, Irisbus, MAN and Scania makes it a tough market to operate and compete in. Margins are razor thin and many of the manufacturers of coaches and buses are reporting negative profits.

Volvo Buses is quite concerned with the DMPs that local politicians and public transport planners go through when facing decisions about choices of one public transport alternative over another, when expanding or building a public transport route network. Volvo Buses wants to gain a better understanding of these DMPs of choosing one public transport alternative over another. Why? If Volvo Buses has a fundamental understanding of the DMP, it is better positioned to respond to it, or even try to influence it. The DMP and the choice of a public transport alternative affects Volvo Buses since it is the largest supplier of transit buses to public transport operators in Sweden[8]. The choice of trams and light rail over buses as means of public transport alternatives is believed to unfavourably affect bus manufacturers, including Volvo Buses.

The fundamental core of this thesis is to look at the public transport DMP in a few large cities in Sweden and England and to see what the decisions are based upon. Some cities choose the bus whereas some cities choose tram/light rail as the core of the public transport system. Nevertheless, most larger cities choose a complementary solution. It is quite interesting to compare and analyse the cities' DMPs that lead up to these choices since there are great differences in the cities' use of alternatives. When cities build new public transport routes due to an increased demand, as a result of people and businesses moving into a new area, or replace old routes with new routes, there is often a decision to be made with regards to what public transport alternative to use. These decisions are what are at heart in this thesis.

1.2 Cases

The cases of choice in Sweden are "Stombusslinjer" in Gothenburg and "Tvärbanan" in Stockholm. The cases in England are "Croydon Tramlink" in Croydon, London and "Leeds Superbus" in Leeds. All of these projects meant that new public transport routes had to be constructed since the existing ones could not fully satisfy the needs and wants of the passengers. These cases were

[7] Transit bus. See section 1.9 (Definitions)
[8] http://www.volvo.com/

particularly chosen since they took different directions with respect to choice of public transport alternative, and it is thought that findings regarding the DMPs and their foundations will be very interesting when compared to each other.

The City of Gothenburg has been known to be a "tram city" for decades. This term refers to the fact that the tram has been present for a long time in Gothenburg in the public transport system, and not because of it being the exclusive mode of public transport. In fact, about 20% of all public transport vehicles are trams and the remaining part of the vehicle fleet, or about 80%, are buses[9]. The tram is something that is very dear to the heart of the "typical citizen" of Gothenburg and will most likely always be. It is the view of most people, especially traffic planners, that the tram will always play a great role in the public transport system in Gothenburg[10]. Further, according to some traffic planners in Gothenburg: "*it is not politically possible to suggest that parts of the present tram system should not be operated*[11]". This statement captures both the fondness of the tram to citizens of Gothenburg and the importance of it to politicians.

Stockholm, on the other hand, is not considered a "tram city" even though it does have some old tramlines. Most of the rail dependent public transport is commuter trains and underground, or subway. In Stockholm, the interesting issue is that a completely new light rail route was implemented on a route that had bus routes, and that it took place in a city that had not focused on light rail before. The belief is that the DMP will be quite different in Stockholm to that of Gothenburg, and therefore the expectation is to draw some valuable conclusions after the comparative analysis.

Leeds is a very fast growing city in the north of England with a huge problem of road congestion due to immense car traffic during peak hours. The city therefore took a bold step and stopped radial road building and introduced completely segregated guided bus ways to try to increase patronage in public transport and reduce the reliance of cars.

In the area around Croydon, London, there are many satellite towns and suburbs that were poorly connected to each other. The only good connections

[9] http://www.vasttrafik.se/
[10] Trafikkontoret & Västtrafik (1999)
[11] Hasselström (1981)

were the ones to the north, to the metropolitan area of London. The connections that did exist between the towns were poor since the bus services were plagued by no segregation from existing road traffic, which made them slow. To link up the satellite towns, Croydon built a complete modern light rail network to solve its problems.

1.3 Problem discussion

According to the Greek philosopher Aristotle, all philosophies start out with a process of wondering and so do all sciences too. To wonder about things means to formulate and specify a certain set of problems that are attempted to be solved through the scientific process. That is what the scientific process is all about. When problems are chosen in the scientific process, it is necessary to declare why the specific problems are chosen. What problems are chosen is completely up to the author.[12]

The research problems in this study were formulated after internal discussions, discussions with the case company, Volvo Buses, and the tutor for this thesis, Dr. Peter Rosén. What is important is that the problems are relevant to the purpose of the paper: there has to be an apparent connection between the problems and the purpose of the paper.

There appears to be no rules that govern what problems should be chosen since the author of each scientific paper is allowed to decide this with respect to the specific situation. However, within political science there are two general demands that should be satisfied related to the choice of problems. Firstly, the problems should one way or another be meaningful to the lives of the citizens. Secondly, the results of the scientific research should constitute a genuine contribution to the scientific development.[13] This study is meaningful to the citizens since it sheds light on if politicians and traffic planners make rational decisions based upon fundamental economics when choosing public transport alternatives. Or conversely, if the decisions are based upon other factors, which could result in decisions that are not in the best interests of the tax paying citizens. Everyone, regardless of using public transport or not, pays taxes. Moreover, the hope is that the study will also contribute to the scientific

[12] Laudan (1977)
[13] King et Al (1994)

development by offering inspiration to further research in an area, which is relatively unexplored[14].

The public transport industry is characterized by competitors from all over the world. There are a substantial amount of bus manufacturers who all claim to have a "better" bus than their competitors do. The fight to gain market share is an ongoing process and each company in the industry is trying to implement an idea on how to gain a competitive advantage over their competitors. Understanding the DMP would be one way to gain a competitive advantage and get ahead of competitors.

Nonetheless, bus manufacturers face additional competition from trams, light-rail and underground trams that also attempt to gain market share within the public transport industry. There is a light rail movement[15] across Europe that attempts to reintroduce the concept of rail dependent public transport systems in major western European cities[16]. During the last decade, a restoration of the light rail and tram systems has taken place in several western European countries, which has accelerated the market share of rail dependent public transport systems.[17] Further, the light rail movement has also reached Sweden, and the Swedish National Road and Transport Research Institute (VTI) has been commissioned by the Swedish Agency for Innovation Systems (VINNOVA) and the Swedish National Rail Administration (Banverket) to carry out light rail research and development for urban planning processes[18].

The increased competition among bus manufacturers, in general, and the light rail movement across Western Europe and Sweden, in particular, has made management of Volvo Buses concerned with the development of the public transport market in Europe[19]. Further, the light rail movement in western Europe and the renaissance of the tram as a major public transport alternative in major cities in western Europe has made the management of Volvo Buses to suspect that economic fundamentals are not only what constitute the basis for a decision taken by local politicians. Several studies show that the costs of

[14] Stålner, Bengt. Telephone interview. September, (2002)
[15] Light Rail. See section 1.9 (Definitions)
[16] Hylén & Pharoah (2002), Andersson et Al (1997), Hedström & Förstberg (1998) & Gry (2002)
[17] Johansson (2002)
[18] Hylén & Pharoah (2002)
[19] Mellquist, Heléne. Meeting. September, (2002)

building and operating rail dependent public transport systems in cities far surpass the costs of bus dependent systems[20]. The costs include the up front infrastructure costs and the operating and maintenance costs. Despite the difference in costs, to the benefit of the bus dependent public transport system, the tram/light rail is becoming more and more popular in major western European cities. The natural observation then becomes that there are other aspects than economic fundamentals that are taken into consideration when local politicians choose between public transport alternatives.

In view of the previous discussion, the first research problem is formulated to obtain information about the DMP itself. Therefore, the first research problem is simply defined as:

Research Problem I

How is the local decision making process (DMP) regarding the choice of a public transport alternative structured?

The hypothesis, and the suspicion of Volvo Buses, is that the decisions are based upon factors that are not only of economic fundamentals. Rather, the belief is that there are many "soft" factors such as environmental goals, cultural heritage and different political agendas that also play a vital role in the DMP. This hypothesis is explored by formulating the second research problem.

Research problem II

What are the significant factors for a choice of one public transport alternative over another?

Management of Volvo Buses seems confident that the DMP includes an evaluation of two or more public transport alternatives. Further, management also seems rather confident that the bus itself as a public transport alternative is evaluated in the DMP.[21] This may not be the case, however. Local politicians and traffic planners may only evaluate the feasibility and economic fundamentals of one alternative. The concern is not whether decision-makers ***consider*** alternatives, but rather whether decision-makers thoroughly ***evaluate*** alternatives. It would be a major setback to the bus manufacturing industry should it become evident that the bus as an alternative is not evaluated in the

[20] Fridh (1996) & Hass-Klau et Al (2000)
[21] Engström, Jan. Meeting. September, (2002)

DMP, and corrective measures such as lobbying efforts would have to be taken. The answer to the third research problem will clarify whether more than one alternative is being evaluated.

Research problem III

Are several public transport alternatives evaluated in the DMP or is it merely a question of evaluating one alternative?

Another relevant problem is to find out what stakeholders, such as passengers, operators and manufacturers of public transport vehicles, are being considered in the DMP. Ongoing research indicates that the three above stakeholders' interests are not considered, and that the local politicians often put their own interests in front of the above groups' preferences[22]. The fourth research question will address this issue.

Research problem IV

What stakeholders are considered in the DMP?

An additional important aspect of choices of public transport alternatives is the differences in the financing of each alternative. Generally, light rail and tram infrastructure investments require state involvement, as the investments in rail and vehicles are massive. In France, for example, 50% of all light rail infrastructure costs are directly subsidized by the government for urban regeneration purposes, and one of the reasons why light rail is favoured in its major cities. In Germany, different governmental authorities such as the "Bund" and "Land" also heavily subsidize light rail investments[23]. On the other hand, the traditional bus alternative does not involve any substantial infrastructure investments since the buses are owned by the private operators and most often driven on already existing roads. The funding incentives or subsidization from the national government may give a greater apparent advantage to one alternative over another. Determining whether alternatives are first chosen based upon financing, and then finally chosen and financed, or first evaluated through CBAs or other evaluation tools, and then chosen and consequently financed, can be achieved by answering the 5th research problem.

[22] See Falkemark (1999) & Ahlstrand (1998)
[23] Hedström & Förstberg (1999)

Research problem V

How is the chosen public transport alternative financed, and is the financing solution of the alternative a fundamental factor why the alternative was chosen?

The management of Volvo Buses is interested in getting a better understanding of the structure of the local DMPs in larger cities who have the ability to choose among public transport alternatives. Management is of the opinion that by addressing the above research problems, it would help them to better position, lobby and market themselves to politicians and public transport planners who evaluate and decide on public transport alternatives. These defined research problems will serve as the foundation for making specific and general conclusions. Further, these conclusions will facilitate recommendations that are firmly believed to benefit Volvo Buses.

1.4 Purpose

The purpose of this thesis is to gain knowledge about the foundations in local DMPs concerning the choice of public transport alternatives in large cities. This knowledge will help to draw conclusions and provide recommendations to Volvo Buses so that they can better position, lobby and market themselves to politicians and public transport planners.

1.5 Why Volvo Buses?

The interest of Volvo Buses arose when Volvo Buses contacted the School of Economics and Commercial Law and the Department of Business Administration with a broad problem with regard to public transport investments that they wanted investigated. After an interview, the researchers were selected and the work started. Discussions were conducted with executive management to jointly determine the specific problems to investigate. The researchers believe the topic of DMPs in public transport investments to be quite interesting since they have received a lot of attention lately, and since they affect a significant amount of stakeholders including the researchers themselves. The study was conducted in the fall of 2002.

1.6 Limitations

These are the limitations in the research:

- The thesis is not at all related to the issue of goods transport, but only to people transport. The choice of not including goods transport will not

have an adverse effect on the thesis as goods transport and people transport are completely segregated on the local level. Regionally and nationally the two can sometimes intertwine.

- The technological aspects of the different public transport modes will not be covered due to the background and education of the researchers being economically oriented. The researchers trust that the technology has been documented correctly in literature by individuals who are engineers or by individuals who are well acquainted with the technology through work.

1.7 Case company

Volvo Buses is a strategic business unit (SBU) of the Volvo Group, which has been a major contributor and pride of the Swedish economy for several decades. The famous core values "Quality, Safety and Environment" of the Volvo Group are well known throughout the world. The Volvo Group is all about mobility and consists of Volvo Powertrain, Mack Trucks, Renault Trucks, Volvo Trucks, Volvo Construction Equipment, Volvo Penta, Volvo Aero, Volvo Financial Services and Volvo Buses.

Volvo Buses is the world's second-largest manufacturer of heavy buses and coaches. The range comprises complete vehicles, bus bodies and chassis. The chassis and bodies are produced for the company's three product lines: coaches, intercity buses and city buses. The two latter are primarily used for public transport purposes. Volvo also offers transport system solutions for metropolitan traffic, leasing, financing and service contract maintenance. The product line of Volvo Buses is the most modern in the industry.

Volvo Buses contributed 9% of the global sales in 2001 for the Volvo Group. Volvo Buses has coined the term "Complete Offer" to their customers where they produce the "entire" bus experience including the body, chassis as well as a support services. Some customers, mainly operators, only pay a certain amount per distance driven and Volvo Buses takes care of the ownership, service and support of the vehicle. The operator only has to worry about what it does best: drive the bus, and Volvo Buses does what it is best at: build, own and maintain the bus. This is excellent for both parties as they can then focus on their respective core competencies.

Mexico, USA, China and Great Britain have been the biggest markets that Volvo Buses have been operating in during the last few years. Mexico is Volvo

Buses' main market but the demand for buses in Mexico is currently decreasing due to the weak economy. New rules and regulations in the U.S. have forced Volvo Buses to leave that market. That in turn has led to the shutdown of their plants in Connecticut and Texas, which is a major reason why Volvo Buses' operating income during 2001 was a negative SEK 524 million. A region of the world where Volvo Buses is further increasing its market share in, is Asia. The city of Shanghai, China, recently signed a contract with Volvo Buses on 500 buses to be delivered in 2003 with an option of an additional 500 buses to be delivered in the following year.

In Sweden, Volvo Buses sold 427 buses in 2001, which is less than 5 percent of the total world market for buses. Volvo Buses operates all over the globe and production and/or assembly plants can be found in Sweden, Finland, Denmark, Poland, Germany, Brazil, Mexico, Canada, Israel, Morocco, Botswana, Iran, India, Malaysia, Thailand and China. However, most of the product development is done in Sweden but the network of Volvo Buses covers more than 80 countries across the globe.

The sales reached SEK 16 675 million in 2001 which is slightly lower than the year before but still well above 1999. The decrease in sales has been reflected in the workforce, which decreased from 9060 in 2000 to 6228 in 2001.

1.8 Contribution of study

The field of local DMPs in public transport investments[24] and the favouring of a specific public transport alternative is largely unexplored, and the hope is that with this research more people will be involved with it in the future. The DMPs regarding public transport investments and alternatives affect all tax paying citizens economically, regardless of whether they use public transport or not. Therefore, they cannot be ignored. Even though the study is inquired by Volvo Buses, the study does pertain to other manufacturers of buses and other public transport vehicles. Moreover, the study also pertains to individuals who are interested in DMPs in public transport contexts.

[24] Stålner, Bengt. Telephone interview. September, (2002)

1.9 Definitions

Bus lanes: "*The with flow-bus lane is the commonest form of bus priority measure. A traffic lane, usually on the nearside, is reserved for the use of buses and other vehicles which are to be accorded priority"*.[25]

Bus ways: "*These are usually purpose-built dedicated bus lanes which do not allow other vehicles to share this space. Illegal parking is not possible. The buses are allowed to operate under congested conditions, achieving speeds equal or in excess of light rail systems and most heavy-rail systems*.[26]

Guided bus: "*Guided bus is an intermediary system between conventional buses and trams. It is a transport system, which is either always guided, except possibly in the depot or in the workshop areas, or truly bimodal (guided or autonomous). With the help of mechanical, electronic or electro-magnetic track-guidance, buses can be driven automatically, but the driver can also choose to switch off the automatic steering mechanism and the bus can be driven in the "normal" way. The driver only controls the acceleration and breaking once in the guided mode. It runs as a tram where necessary and as a bus where the road space is sufficient"*.[27]

Light rail: "*A rail borne form of transport which can be developed in stages from modern tramway to a rapid transit system operating its own right-of-way, underground, at ground or elevated. Each stage of development can be the final stage, but it should also permit development to the next higher stage*".[28]

Tram: "*The definition of light rail above allows older tram systems to be included which in part still have to operate together with other car traffic. The difference between light rail and the tram seems to be that the light rail operates to a higher extent in its own right of way*".[29]

[25] DETR (1997)
[26] Martinelli (1996)
[27] RATP (1997)
[28] ECMT (1994)
[29] Hass-Klau et Al (2000)

Transit bus: "*Transit buses refers to buses used for short trips within cities, between cities and surrounding suburbs, commonly used for public transport purposes. Transit buses excludes intercity and luxury buses and coaches used for regional, national and international travel*".[30]

Travel time factor: *"The relationship of car travel time with public transport time. If the factor is 2, then it takes twice as much time to travel with public transport as it does with car."*[31]

Stombusslinjer: "*This bus concept can be explained by its slogan: "Think Tram – Drive Buss". The attempt is to let modern articulated buses achieve many of the positive traits the light rail possesses such as significant priority, several entry/exit points, high quality and reliability, modern design of vehicles, etc*."[32]

[30] Own (2002)
[31] IBID
[32] IBID

2. Methodology

The methodology chapter will describe how the research is constructed and what methods and processes were used to base the thesis on.

2.1 Understanding of the subject

It is imperative that the researcher will, in addition to some rather normative decisions of a more philosophical nature, decide upon the choice of problem definition, method, theory, models, etc. Moreover, it is also crucial to show the reader the pre-research knowledge of the researcher about the research problem, i.e., what does the researcher know about DMPs regarding the choice of public transport alternatives in the chosen cities.[33]

Researchers have a predetermined view on what these public transport decisions should be based upon, which means that there could be bias in the research. It also means that researchers could disregard other factors in the DMP that they believe the decisions should not be based upon. Students of economics always try to make rational decisions that are based upon well-structured CBAs. However, this preset notion of what *should* be the foundation for decisions will not interfere in researching the *actual* foundations for the decisions in the selected cases. Although there exists a negative view of irrational decisions based upon criteria other than economic fundamentals, it will not hinder the careful analysis of each decision and the foundations leading up to the decisions.

It is believed to be many "soft" factors such as political agendas and cultural heritage that influence the DMPs, which could potentially lead to a decision that is irrational from an economic point of view. This qualitative study will determine whether these "soft" factor play a vital role or not in the DMPs in the chosen cases. The choice of why a qualitative study is chosen over a quantitative study will be explained in Section 2.5 (research method).

2.2 Research strategy

A very important issue to consider when choosing the appropriate research strategy is the research problem that the researcher is facing. Therefore, it is imperative for the researcher to investigate, and get to the bottom of, the research problem before it is determined what research strategy to use. This

[33] Falkemark (1999)

importance cannot be stressed enough since the research problem will be the base for what research strategy to choose. There are five different research methods to choose from. They are: case study, experiment, survey, history, and the analysis of archival information[34]. Moreover, the choice of research strategy will also depend upon a few other conditions since each and every strategy possesses advantages as well as disadvantages. Apart from the research problem, two other general conditions that should be considered at all times, when choosing the appropriate research strategy, are the control an investigator has over actual behavioural events and the focus on contemporary as opposed to historical phenomena.[35]

When choosing the appropriate research strategy, as mentioned before, one should evaluate what research problem must be solved. Since the research problems are designed to determine "how" Volvo Buses can benefit by addressing these research problems, the choice of research strategy suggests that a case study, history or experiment research strategy can be used as can be seen in Table 2.1. Moreover, the lack of control over the actual behavioural events of what is being researched implies the list of available research strategies can be narrowed down to the history or the case study approach. The last condition to be looked upon is whether it is a contemporary or historical phenomenon that will be investigated. Since the focus is on recent (contemporary) decisions in the public transport industry, it brings the list of available research strategies to one, namely the case study.

Strategy	*Form of research question*	*Requires control over behavioural events?*	*Focuses on contemporary events?*
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who, what, where, how many, how much	No	Yes /No
History	How, why	No	No
Case study	**How, why**	**No**	**Yes**

Table 2.1
Source: Yin (1994)

[34] Yin (1994)
[35] IBID

2.3 Research design

The research design is simply an action plan that should be followed by the researcher during the course of the research. The reason to implement a research design is to make it easier for the researcher, and the reader, to follow the study from the initial research problem to the concluding remarks. Better yet, a research design is an action plan for getting from *here* to *there*, where *here* may be defined as the initial set of questions to be answered, and *there* is some set of conclusions (answers) about these questions.[36]

Five components of a research design are especially important for case studies:

- a study's question
- its proposition, if any,
- its units of analysis (cases),
- the logic linking the data to the propositions, and
- the criteria for interpreting the findings.[37]

This ***first*** component deals with how to define the research problem and what question to pose, i.e. how, what, where, why, and who. The ***second*** component in the study deals with the proposition of how the local DMP, with regard to public transport alternatives, looks like in the chosen cases. The process itself is what will be investigated, and a few theories that have been found will serve as the foundation for the research. The ***third*** component is the units of analysis where in the classic case study a "case" may be an individual[38]. For this specific research, the units of analysis will be two cities in Sweden, (Gothenburg and Stockholm) and two cities in England (Leeds and Croydon). Specifically, the cases will be well-defined public transport investments in each city that have recently been made or are about to be made. The idea of pattern matching is the best way to describe the case study's ***fourth*** component. This component deals with linking the data obtained to the predetermined theoretical framework or the proposition. The ***fifth*** and last component is to try to match the results to other studies. This last step is extremely hard to specify, and there is no exact way to set the criteria for this component at this time[39].

[36] Yin (1994)
[37] IBID
[38] IBID
[39] IBID

2.4 Case study design

A case study can be a study of an individual, a group, an organization, or a DMP. One should also notice that more than one case could be studied.[40] The case study design can be divided into four different groups: (1) single-case holistic design, (2) multiple-case holistic design, (3) single-case embedded designs and (4) multiple-case embedded designs. This can be seen in Figure 2.1.

	Single-case Design	Multiple-case Design
Holistic	**TYPE 1**	**TYPE 2**
Embedded	**TYPE 3**	**TYPE 4**

Figure 2.1
Source: Yin (1994)

2.4.1 Single-case designs

There are different circumstances that would call for a single-case design. Here follows three of the rationales of why one should use the single-case design.

- a single-case design can be used when it represents the critical case in testing a well-formulated theory,
- when the case itself represents an extreme or unique case or,
- when the case is a revelatory case. The latter can, for example, occur when a researcher is given access to observe previously inaccessible data or phenomenon.

However, the single-case's biggest downside is that the case that is being investigated may turn out not to be the case the researcher thought that it would be at the beginning of the research. Therefore, there cannot be enough emphasis on how careful a researcher must be before the case to study is decided upon. The researcher must make sure that the case is a "case" so that

[40] Patel & Davidson (1994)

misrepresentation can be eliminated. Further, the researcher must try to maximize the access needed to collect the data needed for the case study.[41]

2.4.2 Multiple-case designs

What satisfies the rationale for a multiple-case design is simply that there is more than one case to study[42]. This is the approach that is used in this thesis since the focus is on four different cases in four different cities. What makes the multiple-case study design more superior to that of the single-case study design is the evidence of multiple cases. It is considered as being a more convincing and vigorous study since more cases are included in the study. However, the downside of it is that there must be an extensive amount of time allotted for the study, which might be too much for one researcher.

2.4.3 Single-case- and multiple-case designs: holistic or embedded?

Although the choice of a multiple-case study design is determined, the question whether to use a holistic or embedded design is still present. The holistic view is that of a single or multiple case where one unit of analysis is studied, whereas the embedded view will be where a single or multiple case have more than one unit of analysis[43]. Based on the previous statement, and by looking at the problem definition, the picture is quite clear what the choice will be. Since five research problems are used, the design that best satisfied the study is that of a multiple case embedded design (**TYPE 4**). There is nevertheless one big disadvantage with the multiple-case embedded design. The researchers can sometimes get so carried away with one of the research problems that they fail to return to properly address them all in detail[44].

2.5 Research method

There is not an absolute difference to point out between a qualitative and a quantitative approach. Both of them are tools to better analyse and conclude the information that is acquired during the research. In principal there is no competition between the two approaches, but it can (with their strengths and weaknesses) be beneficial to the researcher to complement the two methods with each other. Having said that, the choice of method to use does not depend on what others think is the superior method, but rather what method is the most suitable to solve the problem. This is more of a strategic choice since it is based

[41] Yin (1994)
[42] IBID
[43] IBID
[44] IBID

on the problem definition, the resources available and the knowledge that is possessed from prior similar studies. The ***quantitative*** method is a numerical approach where the researcher is trying to transform the information into numbers. When that is done, a statistical presentation will be given to summarize the findings. On the other hand, the ***qualitative*** method involves interpreting the answers given in the research when it comes to motive, social standard, preference, etc. Having said this, it is rather obvious that a quantitative or a qualitative approach will be suitable for different research problems. In many cases, either method will be possible to use, and the determining factor will be the preference of the researcher.[45]

For this specific study, a qualitative approach is chosen. The reason for this is that the attempt is not to summarize the findings statistically. Rather, the attempt is to investigate the local DMPs and then draw conclusions based on the answers and findings obtained.

2.6 Data collection

There are basically two types of data that can be collected; primary and secondary data. Both types of data are often gathered for research papers and can come from a multiple set of sources.

2.6.1 Primary data

Primary data is data that is gathered for the specific purpose of the paper. It is often collected by talking to and interviewing individuals, or by observing events and objects.[46] Further, it is used in the research since several interviews were conducted with selected individuals who had been or were involved in the DMPs. During the interviews, which were recorded, notes were taken to prevent misinterpretation should a technological mistake occur with respect to the tape recorder. Primary data was also used as events were observed during field trips to the case cities.

2.6.2 Secondary data

Secondary data refers to data already having been collected by another researcher who has devoted time to the specific research. Secondary data is often in the form of similar research reports or articles on the same topic. Secondary data is used in the research to complement the primary data obtained

[45] Holme & Solvang (1997)
[46] Merriam (1998)

in the interviews and during the observations. Rarely do primary and secondary data on the research topic perfectly mirror each other, which is the major reason for using both. Relying solely on either primary or secondary data is not desirable for this mismatch reason.[47] Therefore, this research relies on both.

2.7 Data analysis

The analysis of qualitative data is very complex and time consuming. The main reason is the form of the information or data.[48] In quantitative research, the data is often easily handled like the answers in a questionnaire. In qualitative research, however, the data is often the result of interviews whose results must be interpreted and organized. There are many steps in the process of analysing data in a qualitative case study. The first step includes organizing the data in chronological order so that it can be logically presented and so that the reader will find it convenient and useful. The next step involves sorting the data into categories where it can be attained easily. The last step involves making inferences from the data collected or developing models or theories from the analysis.[49] This research follows this very pattern pertaining to data analysis.

2.8 Quality of research

In general, the researcher must always strive to make sure that the paper is of the highest quality to attract readers and to pass, or even surpass, the existing academic and scientific demands set fourth[50]. In this case, the thesis was written for Volvo Buses and had to be of very high quality since they will take advantage of, and use, the information on a strategic level. Needless to say, the quality of this thesis also had to be very high from an academic point of view. Trusting research in applied fields, such as this case where Volvo Buses applies information received in future business strategies, is particularly important[51].

The terms validity and reliability are often used to judge the quality of a paper. When measuring validity and reliability in a case study, one measures the researcher's ability to plan the article, the analytical skills that the researcher possesses, and the conclusions drawn will be the base for the measurement. A qualitative research report should provide the reader with a detailed description

[47] Merriam (1998)
[48] Holme & Solvang (1996)
[49] Merriam (1998)
[50] IBID
[51] IBID

to make it possible for the reader to decide whether the conclusions drawn are logical or not.[52]

2.8.1 Internal validity

As described in "Understanding of the subject" (Section 2.1), every researcher has a preconceived notion or certain subjectivity about the topic to be explored. In addition to the importance of communicating that to the reader, it is also important to try to abandon them and remain objective in the way the research is done and the way the conclusions are drawn. This is referred to as internal validity and can be defined the following way; *"how well the researcher's findings match reality"*. This concerns whether the researcher is measuring what the researcher thinks is being measured, and whether this measurement captures the reality in a correct way.[53] Internal validity can also be defined as *to measure what one is supposed to measure*[54]. To ensure internal validity in this thesis, the attempt was made to remain utterly objective in the way work was done with respect to all aspects of the thesis.

2.8.2 External validity

When writing case studies, it is often desired that the case study can be generalized beyond the immediate scope of itself. Simply, this means that the results are, or should be, applicable to similar situations. Therefore, researchers often try to choose case studies that are as representative as possible to be able to make generalizations. However, no set of cases, no matter how large, is likely to be able to be generalized to other cases. The reason is that case studies deal with analytical generalizations, and not statistical generalizations where, if the sample is selected correctly, the generalizations can be made to other cases. Instead, what the case study researcher does is to generalize findings to develop broader theories that can be used to understand situations and behaviour better.[55]

In qualitative research, a few single cases or a non-random sample is selected precisely ***because*** the researcher wishes to understand that particular set of cases in depth, not to find out what is generally true of the many.[56] A representative selection in a statistic manner is impossible to achieve as it

[52] Merriam (1998)
[53] IBID
[54] Patel & Davidsson (1994)
[55] Yin (1994)
[56] Merriam (1998)

prevents the study from penetrating deeply enough into the subject matter. One way can be to minimize the differences between the studied cases for the purpose of clarifying the analysed phenomenon, but selecting cases based upon similarity can still not be a foundation for substantial generalizations.[57] In this case, therefore, one should be very hesitant in trying to generalize the findings too much to other similar situations and try to forecast behaviour and outcomes of other DMPs. However, using the thesis in trying to understand DMPs, and some specific foundations of them, is something completely different and something that is recommended.

2.8.3 Reliability

Reliability is to try to minimize the errors and the biases within the study. In quantitative research, it is possible to develop a measure of reliability. In qualitative research, on the other hand, it is not possible. Reliability is ensured in other ways. When conducting interviews, the reliability is connected to the ability of the researcher to objectively interview and record the respondent's answers and beliefs. Interviews can lead to errors and lack of reliability if conducted and judged improperly.[58] Therefore, all but one interview were conducted, recorded, analysed and judged together. These measures were taken to ensure the reliability of the thesis work.

Human nature always changes so it can be hard to achieve reliability in social sciences. Reliability in qualitative research is obviously important, but is not as important as in quantitative research since the statistical representation is not in focus.[59] The issue, however, is to determine whether the result is consistent with the data collected. This means that the results derived from the collected data should make sense to outsiders, rather than lead to the exact same results achieved by another researcher since people and procedures change over time.[60] However, if the same study was conducted with the same underlying information the results should be the same if the study is reliable.

2.9 Possible errors in research

When researching, one can mainly make two types of general errors, whose magnitude vary. Firstly, one can make the more serious error, the systematic error that refers to the incorrect method being used. This adversely affects the

[57] Brorström (1998)
[58] Patel & Davidsson (1994)
[59] Holme & Solvang (1996)
[60] Merriam (1998)

validity of the results since the conclusions were drawn based upon information organized in a certain matter consistent with the method used. The less serious error is the misinterpretation error that refers to information and situations being misinterpreted from the viewpoint of the researcher.[61]

2.10 Ethics in research

In any type of research situation, there is always some bias that results in some ethical problems. Research is generally not unbiased and free from preconceived notions as discussed before. The respect for humans is a cornerstone in ethics for all types of societal research. This means that people cannot be made into the means to obtain certain ends or goals. It also means to protect the integrity, mentally and physically, of the people who contribute with information.[62] In qualitative research, like this thesis, ethical dilemmas are likely to emerge with the collection of data and the dissemination of findings[63]. In this research, interactions were made with many individuals whose reputation and integrity had to be protected. Specifically, the integrity and reputation of the respondents before, during and after the interviews had to be safeguarded. All respondents should have the right to privacy and remain anonymous if desired, and none of the respondents had to answer questions that they either did not want to answer, or whose answers potentially could directly or indirectly be self-incriminating.

When disseminating findings it is of great importance to take into account all relevant information and not filter out information that is contradictory to the findings the researcher has made.[64] In this thesis, an attempt was made to adhere to the absolute highest ethical standards, specifically when it came to individual integrity of respondents interviewed and when drawing conclusions. Additionally, ethics were also very important in the process of searching for, finding, selecting and referencing relevant literature.

2.11 Critique of literature and other sources

What characterizes the search for literature and other relevant material is the difficulty of establishing within which subject area the relevant literature exists. Therefore, the search for literature and other relevant material was conducted in

[61] Merriam (1998)
[62] Holme & Solvang (1996)
[63] Merriam (1998)
[64] IBID

many subject areas. Within this variety of subject areas there was a lot of literature, which means that a sizeable, or even huge, collection of books and reports had to be gone through. Needless to say, this was not possible and broad criteria therefore had to established for what literature to search for and to use. Firstly, the literature and the relevant material had to be very relevant to what was investigated. Secondly, the authors, or the respondents in the cases of interviews, had to be very credible. Finally, the literature and the relevant material also had to be rather current and could not be considered too old.

In order for a book or an article to be *relevant*, there had to be a clear connection between the content of it, and the purpose and core of the thesis. The literature that was collected was carefully analysed with respect to relevancy. In order for respondents to be relevant, they had to have been involved in the DMP for each specific case or knowledgeable about the DMPs.

To make sure that the literature and other relevant material is *credible*, it was confirmed that sources were credible from an academic standpoint. An example of this would be to use a scientific journal as opposed to an Internet site, where it is not clear who the author is or where the information comes from. An effort was made not to overuse Internet sources, and instead to try to rely on respected sources such as theses or doctorate papers on the subject matter where possible. The respondents also had to be credible, and where there were any doubts about the credibility of the information supplied by the respondents it was not incorporated.

Since subject areas in general tend to develop and change over time, it is necessary to try to be *current* with respect to sources of these subject areas and theories. Theories that are old are sometimes discarded by newer theories, which must be taken into account. There are no general rules that govern when a theory or source is too old, but an effort was made to ensure that the theory or source used was considered current and widely accepted.

Mainly, the literature has been found through a wide variety of methods. Databases such as GUNDA and LIBRIS were used to find books, articles, reports and journals. Moreover, government and corporate libraries were used to access the most recent research in the area. Also, several researchers were contacted at well-known universities such as Royal Institute of Technology, Lund Institute of Technology, University of Linköping, and New York

University (NYU) to ensure that the correct sources were utilized and for general advice. The above databases, including the Internet, were utilized using search words that can be found in Appendix II.

3. The research model

This chapter will introduce the reader to the model that will be used for obtaining answers to the research problems. The model is based on the model by Bostedt and Larsson, whose model firstly will be described. In the latter part of the chapter, the modified model will be presented.

3.1 The Bostedt & Larsson model

The Bostedt & Larsson model was developed in 2000 when Göran Bostedt and Sven Olof Larsson conducted a study called "Beslutsprocesser och planeringsunderlag: En kunskapsöversikt" (Decision process and planning outcome). In this project, they developed a model that could be used when looking at DMPs for different transport and public transport related projects and investments. This specific project was sponsored and financed by VINNOVA (Swedish Agency for Innovative Systems), which is an institution dealing with different research projects in technology, transport and working life[65]. Additionally, the Bostedt & Larsson model was used in 2002 by three other researchers in a VTI (Swedish National Road and Transport Institute) sponsored project that addressed the issue of investments in safety barriers between lanes on Swedish highways.[66] No other suitable models were found in the research that could best facilitate the addressing of the research problems and purpose to the extent needed and desired.

Since it is established that the decision process in itself is a dynamic process that contains several dimensions, the analysis of the decision process should also contain several dimensions[67]. The Bostedt & Larsson model contains 17 steps in the DMP under five headlines that should serve as a foundation for the collection of data from different sources such as planning documents, articles, surveys and interviews.

Below is the list of the steps that Bostedt & Larsson (2000) developed that is used when studying practical DMPs. These steps will serve as the basis for the analysis in this chapter and were used to address the research problems.

[65] http://www.vinnova.se/
[66] See Larsson et Al (2002) and Bostedt & Larsson (2000).
[67] Bostedt & Larsson (2000).

The framework of the process

1. *The overall process.* What is the bigger picture? How did this project come about? Is there a history to this project? What stage of the bigger picture are we in? If a specific plan is implemented, what decisions were used to come up with that plan? What were the motives? When was it determined that this project would follow the same type of plan? What is the next stage? When?
2. *Time.* Start with the already available data of the decision process. Is this description correct? How long time did the specific parts require? Are there parts of the process that should be of importance to understand without being a part of the description of the project? Is a time line present? Is there a due date for the decision and an implementation date? Is the predetermined plan followed? How and why was it changed?
3. *Goals and limitations.* What is the problem that must be solved? When did it become a problem and who formulated it? What are the official goals for the project? Are there any other goals for the project? What are the limitations for the project? Laws, environmental limitations, financial limitations, territorial limitations, traffic limitations, etc? Were the goals changed during the decision making process? What were the reasons for these changes? Has the problem definition changed during the decision making process? How and why?

Alternatives, consequences, values and relation

4. *Alternatives.* What alternatives will be evaluated? How were the alternatives chosen? Who determined what alternatives to evaluate? Were there alternatives that were not evaluated although they might have been interested or that were not looked upon in detail?
5. *Consequences.* What consequences will be considered? Who and what have decided what consequences or decision criteria that will be analysed? Are there consequences or decision criteria that ought to be analysed? Have new decision criteria developed or have those, if any, developed during the course of the decision process? In that case, why?
6. *Values and choice.* How did the values of the alternatives and the consequences of them come about? Are they documented? How have the values changed during the decision process? Whose values have been of special importance to decide what alternative to evaluate? What were the most important aspects in the project? What was the result and why? What decision criteria have been especially important when determining

the choice of alternatives? What decision criteria have been of lesser importance? What determined the final recommendations?

7. *Project Theory.* There has to be a good idea of how different alternatives lead to different consequences and effects. In what way are travel time, vehicle costs, accidents, noise or the aesthetics of the countryside affected by the different alternatives? Are there explicit relationships between cause and effect? A public CBA contains assumptions about and relationships between different effects, but these are often concealed to decision-makers. Consequence analyses regarding environmental effects are sometimes used to convey these cause and effect relationships, but are often quite vague. A deliberate project theory is the prerequisite for an informed decision or choice.

Course of events

8. *Decisions during the process.* What decisions of particular importance are made under different circumstances? What decisions remain? This concerns for example the decisions regarding the alternatives to be evaluated, what alternatives should be presented for evaluation, etc. Who makes these decisions? Detailed decisions can also be of interest in this period. For example: who hired consultants with specific competence, who decided upon evaluating additional alternatives, who ordered the elimination of some alternatives, what consequences should be analysed, etc?
9. *External Demands.* A delimitation of the decision process unit must be made to be able to distinguish external demands from internal demands. Internal demands come from the decision process unit itself, while external demands come from outside organizations and individuals. What external demands are the planning work and decision process unit subjected to? Where are these demands coming from? From media, think tanks, special interest groups, and individuals? From the national government, county government or local government? How are they (the demands) presented? How is the decision process affected by the external demands? These demands can directly lead to a critical point or affect the decision process. The public debate in media can play a role in the final decision.
10. *Critical Points.* Are there events in the shape of internal or external demands, confrontations or other issues that mean that the project comes to a standstill with respect to development, or where the direction

suddenly changes for the continued work? At what moments during the planning process (if at all) do the following things happen: Some unpredictable obstruction or problem arises? Some obvious partial problem gets a solution? One or a few participants in the project group or other interest groups change their attitude to the project? Why and in what way? A partial decision is transferred to another authority, away from the project manager, or decisive decisions are procrastinated to later be transferred to a higher authority. A decisive decision is made. The decision process is concluded. When and on what grounds?

11. *The search and learning process as well as the waiting game.* Critical events are often connected with a meeting, a letter of protest or some other phenomena that is documented. However, individuals or the whole group, can participate in informative or educational courses with regard to the subject matter. The consultants will work on what is going to be the base for the decision. The individuals will ponder over the alternatives that have been chosen by trying to apply their personal knowledge within the subject. What complimentary means are available to support the base for the decision and which ones are used? These complimentary support means can consist of different calculations (investment calculations, technical calculations, calculation of the object, etc.) and other descriptive means, simulations, interactive video and computer programs. Do unplanned events occur that slow down the process while waiting for the decision, and does any of these events especially require additional information to be collected?
12. *The logic of the process.* Do the decision and the critical points occur in the "right" order? What is "right" can be hard to define but it is rather simple to define what is not "right". What can be included here are factors that have slowed the process down at an earlier stage and that have caused the alternatives to be considered later on in the decision making process. Moreover, it can also entail that some alternatives will be inevitable to use since money and manpower have already been invested in.

Participants and activities

13. *The participators.* Who will participate in the decision making process? Upper management, other reference groups or a well-defined project group? Anyone else outside this group? What is the determining factor(s) to be elected to become a member of the project group? Who chooses

what individuals that should be a part of the group? Who is in charge of the ones that are chosen? Who, outside the project group, will participate in the decision making process? Public meetings, press debates, referrals, and other written information that is communicated to the public. How is the planning process organized? Groups, contacts, who is responsible?

14. *Responsibility and the role of the individual in the process.* What are the roles of the participants in the project group? Is there a formal role that has already been assigned to each individual in the group so that everyone knows what their responsibilities are? Is the role of the (1) project leader, (2) the role of the consultants, (3) the role of the county representatives, (4) the role of the governmental representatives etc, discussed prior to the decision making process? What are the participants' specific responsibilities in the process? Are there any conflicts of interest between the preference of the individual and the group? Are the roles and the responsibilities of the participants affecting the choice of the alternatives, the evaluation of the alternatives, the consequences of these choices?
15. *The activities of the group.* How often does the project group meet? Is the amount of times that they meet sufficient, or do they meet too often or too seldom? Is the group only focused on meetings or are they also involved in other activities such as field trips and expert consultation? When, and if, are these activities ceased?
16. *The activities of the specific individuals of the group.* Are the chosen individuals for the project putting in enough time on researching the alternatives? Is more time needed? What is the time used for? Are there demands for additional information, investigations, and other alternatives needed? Is there a need for quicker handling of the problem(s)? Is there a need for specific consideration(s) (cultural, aesthetic, etc.)? Have groups developed within the group? What are the characteristics of the discussion within the group: constructive, active, passive, oppositional or a mutual understanding? Are conflicts present between group members with regard to their personal preference(s)? How are those conflicts solved? Are the roles vague or well defined? Does any one individual have a special impact on the group? What are the responsibilities of the individuals in the groups to the external environment, to the organization that they are working for (lobbying groups, organizations, governmental instances, etc.) and their own gathering of knowledge? How is the

network that the individual in the group possesses valued in the decision making process?

The result of the DMP

17. *The decision and the result.* In what terms can the decision and the result of the decision making process be described? What is the final decision of this planning and decision making process? What is the end product? Were the goals that were stated earlier achieved? Have all the restrictions been adhered to (budget, environment, etc.)? How is this result of the decision making process met by the public and the organization itself? Who will inform about the result and how? How do the individuals in the group value the result of the decision making process? Could they have done it better? Did the individuals in the group obtain what they thought that they would obtain when they started? Have unexpected solutions been obtained or are the solutions based on conventional decision making processes? Could the problem have been solved in a different way?

3.2 The Johansson & Westlin model

This model is based upon the model of Bostedt & Larsson, but is modified; as the intention is to focus on the steps in the model that specifically deal with the stated research problems and the solving of them. The modification refers to the elimination of irrelevant questions and additions of questions that facilitate the ability to fully address the research problems. Moreover, some questions were added to investigate whether the behaviour of the DMPs were consistent with established theories or not. The model was obtained by taking each research problem and to find the appropriate questions that would help to solve the problems and to fulfil the purpose of the thesis. This model is believed by the researchers to answer the research questions in the best way. Below is the questionnaire that served as the foundation for the meetings and interviews with representatives of the four cases.

Introduction

What was your role in the project?

How long have you been working with public transport issues?

The participants and their responsibility

What organizations and individuals participated in the decision making process?

Who chooses what individuals that should be a part of the decision process?

Who, outside the decision making process, such as external consultants, experts and stakeholders participated in the decision making process?

What were the roles and responsibilities of the different participants (organizations) in the project?

The overall process

How did the project come about?

What were the motives with the project?

Problem

What was the problem that had to be solved?

When did it become a problem and who formulated it?

Did the problem definition change during the decision making process? If yes, how and why?

Goals

What was the official goal for the project?

Who formulated the official goal for the project?

Were there any other goals for the project?

Were the goals changed during the decision making process? If yes, why?

Restrictions

What were the restrictions for the project?

- Regulatory?
- Environmental?
- Financial?
- Territorial?
- Traffic Related?
- Time?
- Other?

Alternatives

What alternatives were evaluated?

How were the alternatives chosen i.e., what factors were of importance?

- Environmental?

Financial?
Capacity related?
Regulatory?
Cultural?
Political?
Priority & Segregation
Other?

Who determined what alternatives to evaluate?
Were there any alternatives that were not evaluated even though they might have been interested or that were not looked upon in detail?
If more than one public transport alternative was evaluated, how was the evaluation between the alternatives carried out?
Were several alternatives evaluated or was it always a question of only one alternative being evaluated?
If only one alternative was evaluated, why?
How was the chosen alternative financed?
Was the financing of the alternative important to the decision of including the alternative in the evaluation process?
What decision criteria have been especially important when determining the choice of public transport alternatives?
What decision criteria have been of lesser importance?
What determined the final recommendation of the alternative(s)?

Evaluation method

What kind of financial calculations were performed?
Was a public CBA used in the decision process to try to determine the public costs and benefits of the investment?
Do you think it's important to perform a public CBA?

If yes, why?
If no, why?

Was a corporate CBA performed?
Was the project at all analysed in steps where the project was considered to have various options during its useful life?
Were options such as the option to expand, the option to delay or the option to abandon ever considered in the decision process?

If yes, in what way?
If no, why?

Was the flexibility of alternative(s) important in the selection and in the evaluation process?
Are passenger prognoses used?
If yes, who makes them? Are they credible?
If no, why not?
Are passenger prognoses important in the decision process?
If yes, why?
If no, why?

Personal values
Whose personal values were of special importance to decide what alternatives to evaluate?
In your opinion, what information is important for the decision process?

Important information to the DMP
Were any field trips conducted in order to get additional information and real life experience of public transport alternatives?
If yes, do you think they affected the decision making process? If yes, in what way?
If no, why were not any field trips made?

Decisions during the process
If applicable, who hired consultants with specific competence?
If applicable, who decided upon evaluating additional alternatives?
If applicable, who ordered upon the elimination of alternatives?

External demands and interests
What, if any, external demands were the decision making process subjected to, and where did they come from?
How were these demands presented?
Was the decision process affected by the external demands?
If yes, in what way?
If no, why not?
What stakeholders were considered in the decision process?
Environmental groups?
Passengers?
Operators?
Suppliers of vehicles (entrepreneurs)?

Special interest groups?
Others?

At what stage in the process were they considered?
Did the interests of stakeholders at all affect the decision?
If yes, how?
If no, why?

Critical points

Were there events in the shape of internal or external demands, confrontations or other issues that meant that the project came to a standstill with respect to development, or was the direction suddenly changed for the continued work?
Were there any conflicts of interest between the different organizations in the decision making process?

Activities of specific individuals of the organization

Were the individuals responsible for their own gathering of information or was the information provided to them?
Were the chosen individuals for the project putting in enough time on researching the alternatives?
Were there demands made for additional information, investigations, and other alternatives by any individual?
Did any one individual have a special impact on the group or the decision?

The decision and the result

What was the final decision of the decision making process?
Who made the final recommendation to what alternative to implement?
Were the goals that were stated initially met?
Were all of the restrictions met?
How was the result of the decision making process met by the public?
How did the individuals in the group value the result of the decision making process?
Could the problem have been solved in a different way?

4. Theoretical Framework

The following chapter will present the theoretical framework. The theories relate to the structure of DMPs as well as the evaluation tools used in choosing alternative in the DMPs. The theories are thought to be relevant to the research problems, and will enable the reader to continue reading and fully comprehend the thesis.

4.1 Motivation of selected theories

The theories of choice are the theory of the rational DMP, communication theory, theory of cost-benefit analysis and real options theory. Since DMPs are expected and desired to be rational, the rational DMP theory will be used in order to analyse them in the cases. The theory of communication will be used to analyse the relationship between politicians and officials, and to shed light on who actually determine the alternative of choice. The theory of cost-benefit analysis will describe the evaluation method used and since most public transport investments require such an evaluation. The theory of real options will be used to establish whether public transport investments resemble the rationale in real options.

4.2 The decision-making process (DMP)

A DMP can be described the following way: "The decision-maker identifies the problem, clarifies the particular goals which are desired to be achieved, examines the various possibilities for achieving the determined goals, and completes or terminates the process by a definitive choice of action". The well-informed rational decision is often at the base when analysing the DMP. As can be seen from the model below, the DMP outline will impact the decision that will be made. More importantly, the outline of the DMP will determine the result of the decision. A good decision is one that will generate a good outcome, but to get to that good outcome, a good decision must be made which in turn have to be based on a detailed DMP.[68]

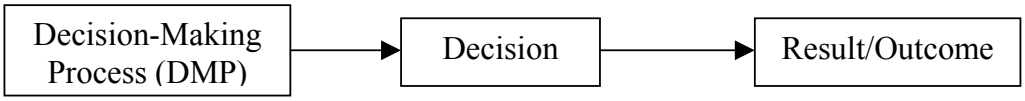

Figure 4.1
Source: Bostedt & Larsson (2000)

[68] Bostedt & Larsson (2000)

The DMP itself describes what actually happens when a decision is made, without referring to a method or model that was used. The DMP can even be said to be the object that is not determined or the aspect that changes during the process: the DMP is dynamic and not static.

The difference between the individual and the organizational DMP is of importance since it exhibits what the differences are between an individual decision and a collective decision. Whereas the individual only has to consider the goal(s) and preference(s) of him or herself, the organization has a lot of different goals and different preferences to consider. However, the decision-making of the individual with the individual's goals and preferences is of importance since an organization is made up of such individuals.[69]

Also, the task that the decision-makers are faced with is that of how to make a decision that is economically beneficial for the society at large. The calculations used in models for determining the costs and benefits for the society are of importance when determining which model to use. The social economic methods are therefore of importance in the DMP. Why? Well, this or these method(s) will determine what project that will be decided upon, which ones that will be dormant for a while, and which ones that will be eliminated. Further, it is also vital to notice the limitations of the model in the DMP. Otherwise, the findings of the study will not be relevant or useful.[70]

The DMP can be seen in different ways. Two different approaches are illustrated on the following page[71]:

[69] Eklund et Al (1999)
[70] IBID
[71] IBID

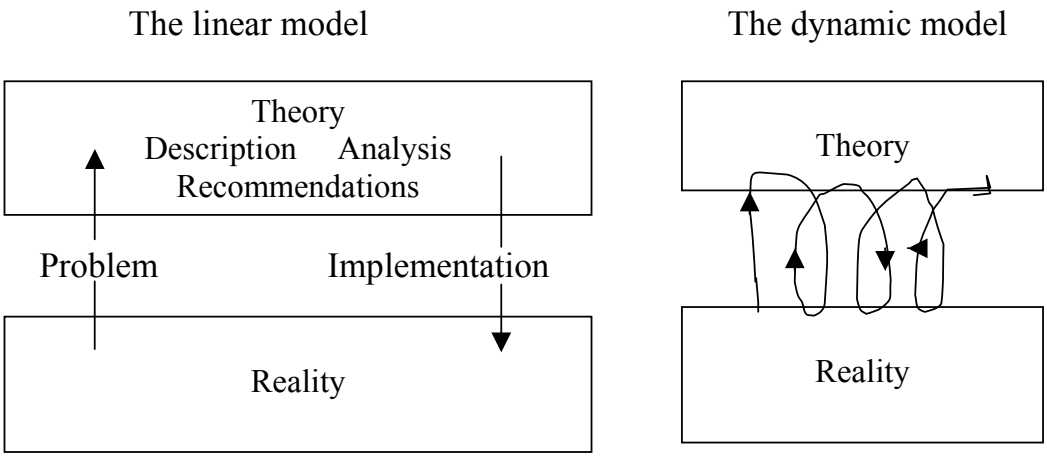

Figure 4.2
Source: Eklund et Al. (1999)

The linear model assumes that the DMP is well defined and characterized by a detailed step-by-step, predetermined course of action. It starts with the defined goal or problem, and then goes through the alternatives available, the recommendations of the researcher, and how to implement the chosen course of action.[72]

On the other hand, *the dynamic model* assumes that it is impossible to define all of the decision steps in advance. The decision-makers are directly or indirectly involved in the DMP. This can lead to that the goal or problem will be redefined several times. Therefore, there is no need to define the process in greater detail. The budget set aside for the project might be defined but changed upwards or downwards during the process all depending on preferences and decisions made during the process.[73]

4.2.1 Individual Rationality

The common denominator and the foundation for all decision-making theories is the assumption of ***individual rationality***. The word rationality comes from Latin where the word *ratio* means reason or sense. In this theory, the rational "human being" is thought to possess a complete overview of the situation and considers all different alternatives. Moreover, the rational "human being" will elect to choose the most logical decision. However, the individual often feels ambivalent before making a choice since all information about a decision is often never present. The missing information needed is often costly and takes

[72] Eklund et Al (1999)
[73] IBID

additional time to gather, so it can be understood if an individual is hesitant before making a decision.[74] The rational model states that all possible alternatives should be evaluated. Since this is practically impossible, it is therefore restated that in every DMP as many alternatives as possible should be evaluated.[75]

4.2.2 Criticism of individual rationality

When looking at real life case, it is easier to find DMPs, which consider few alternatives (normally two) than DMPs that consider several alternatives. Moreover, it is also easy to find DMPs that consider only one alternative. This makes sense from an action point of view since considering multiple alternatives evokes uncertainty, which in turn reduces motivation and commitment. If the decision-makers are uncertain whether one alternative is of high quality or not, they are then less willing to undertake it, and to commit themselves to making it succeed. In view of this, decision-makers should, if possible before the process even start or very early in the DMP, try to eliminate as many alternatives as possible that have weak or rather moderate chances of being chosen. Further, alternatives that are considered as having no chances of being chosen can have a positive effect since the negative aspects of these alternatives can further highlight the positive aspects of the alternative that is chosen.[76]

Five areas of critique have been directed to the rational decision model:

1. It does not take into consideration factors that limit the possibility of deciding between different alternatives. The individual that is taking the decision is not working in a "bubble", and is affected by views of the people around him and by society at large.
2. The rational decision-making model has been described as a theoretical product that does not provide any grounds for empirical research. The model represents, perhaps, the planner's dream. In the real world, ends are not that clear, decisions are not that neat, and evaluations are not that systematic.

[74] Pålsson (1988)
[75] Salaman (2002)
[76] IBID

3. The rational decision model is often compared and said to be equal to a well functioning organization. However, modern organizational research questions whether organizations are well functioning.
4. The rational decision model separates the goals and the means of achieving them, ethics, and the decision as well as facts and values.
5. The rational decision model is also said to be impractical. The technical knowledge might be there to implement the model, but the time to perform the model, with the assumption of rationality, would take too long which in turn would be extremely costly.[77]

4.2.3 Collective Rationality

Another issue that must be considered is ***collective rationality***. The dilemma that is present when it comes to making a collective decision is how to gather and combine the preference(s) of different individuals. Individual rationality is assumed during the DMP but the individual's rationality might not be present when the individual must make a decision in a group. An assumption is that the group assigns rank to the different individuals of the group, which will give a better structure when choosing one of the alternatives that are presented. Different rules and procedures have been suggested during the years, but the one that often serve as the foundation is the impossibility theorem[78]. According to the impossibility theorem, given certain plausible assumptions, no truly rational group reference rule exists, i.e., the theory states that a collectively rational decision is unattainable. However, it is debatable what each and every researcher defines as rational.[79]

According to the impossibility theorem, for the decision to be collectively rational, some group reference rule must be applied:

1. The rule must apply for all logical possible combinations of individual preferences.
2. If everyone in the group prefers x over y, so too must the group.
3. A group's decision can only be dependent on the individuals' rankings of the alternatives in the specific subset of choices.
4. There cannot be an individual in the group who is influential enough to impact the decision of the group to favour his choice, i.e. should he

[77] Bostedt & Larsson (2000)
[78] Arrow (1963)
[79] Pålsson (1987)

> choose x over y, then the whole group cannot choose x over y as a result.[80]

These rules are rather straightforward when they stand-alone individually. The problem arises when two or more rules have to be applied. Actually, there is no single situation that has been found to fulfil all four rules simultaneously.[81]

4.2.4 Optimisation

In addition to assuming individual rationality, the rational DMP is also assuming optimisation. Optimising something in theory is rather simple to achieve but a rather difficult task to prove empirically. This implies that it is easy to get a detailed answer when it comes to questions such as what, who, how and when. In reality, however, this is almost impossible to achieve since the answers to the questions differ between individuals. Moreover, the rational decision also assumes that the decision made does not have to consider the consequences of the decisions. Making a decision based upon other optimal decisions cannot be irrational and cannot contain negative consequences since optimisation is assumed.[82]

4.2.5 Bounded Rationality

Rarely do two different individuals possess the same amount of information. Rather, they are boundedly rational where they attempt to satisfy rather than to maximize. What is trying to be achieved in this model, within the limits of available information, is to obtain a satisfactory decision, which may be the best possible outcome. According to this model, it is rational to accept such satisfying behaviour. The reason for this is that the cost of searching out the information to maximize the needs is tremendous and unacceptably high[83]. It is almost impossible to try to achieve perfect and complete information, and that in turn will limit the rationality in a decision. Moreover, the individual that is a major part of the DMP cannot always be 100% concentrated when he or she listens to important information. This limits the amount of information that can be processed. Further, the individual's memory of what has been said is limited since the individual cannot remember everything. Also, the understanding and ability to communicate the information is limited.[84]

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[80] Pålsson (1987)
[81] IBID
[82] Bostedt & Larsson (2000)
[83] Reekie & Crook (1995)
[84] Bostedt & Larsson (2000)

This theory has been acknowledged a lot lately and is becoming more and more used as a starting point when discussing rational decision-making. The reason is that the decision-maker is trying to achieve a goal although the goal can be both unstable and unclear. The decision-maker can have several goals that have to be fulfilled, and often has goals that are more important than others. Moreover, during the course of the process, additional goals might arise, which will bring more thought into the process. The goals that were not presented at the beginning of the process can actually be the best goal to choose. Therefore, the goals themselves are not determined before hand but rather developed during the DMP. All these different goals that the decision-maker is faced with motivates the decision-maker to try to satisfy instead of to optimise since an alternative to optimise would be almost impossible to achieve.[85]

4.3 Communication Theory

It is imperative to look at a communication strategy when a DMP is analyzed. A general communication model is illustrated below.

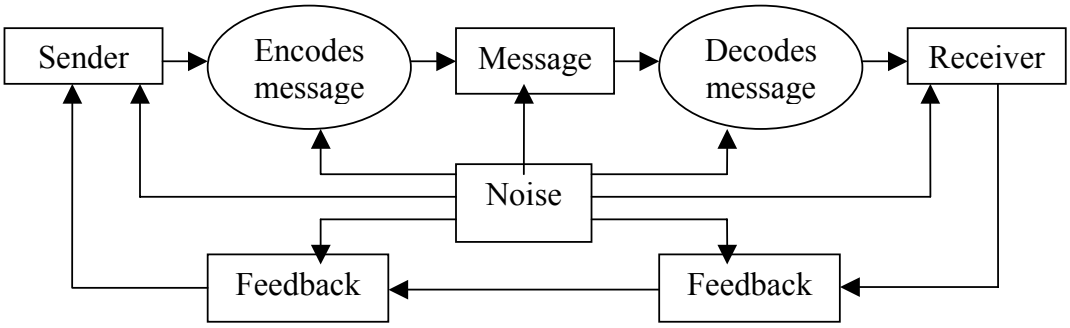

Figure 4.3
Source: Schultz & Kitchen (2000)

It is evident by Figure 4.3 that the receiver can transpose position and become the sender, thus transmitting the information back to the original sender who is now the receiver.

An example of the communication model can be a teacher (sender) and a student (receiver). When the message is sent by the teacher to the student, it is also exposed to noise which can be any possible distraction that one can think of. For example, noise can be any of the few thousand commercial messages

[85] Bostedt & Larsson (2000)

that an individual is exposed to daily. Most of these messages are however, automatically screened out as irrelevant by the brain.[86]

How well the communication will work is dependent on whether the sender and the receiver are on the same wavelength. The sender has a well organized picture of the issue and has therefore a much easier time to segregate between useful and unuseful information. Additionally, the sender is also more reluctant to change its position in the issue since a minor change will change the structure of the organized picture, which in turn will lead to a series of changes in the future. The receiver, on the other hand, is more open to information since the organized picture of the issue is not defined yet as is the case for the sender. Thus, it makes it harder to segragate between relevant and irrelevant information.[87]

4.3.1 Traditional view of political communication model

The traditional view of politics in most democratic nations is that politicians take decisions that are in the best interests of the citizens. The authorities and their officials inform politicians about the needs and possibilities for reform in society. They develop information into foundations for taking decisions. In this framework, the politicians are perceived the senders as they take the decisions and communicate them to the authorities, who are the receivers, and who carry out these decisions. This traditional model of politicians and officials is illustrated below. [88]

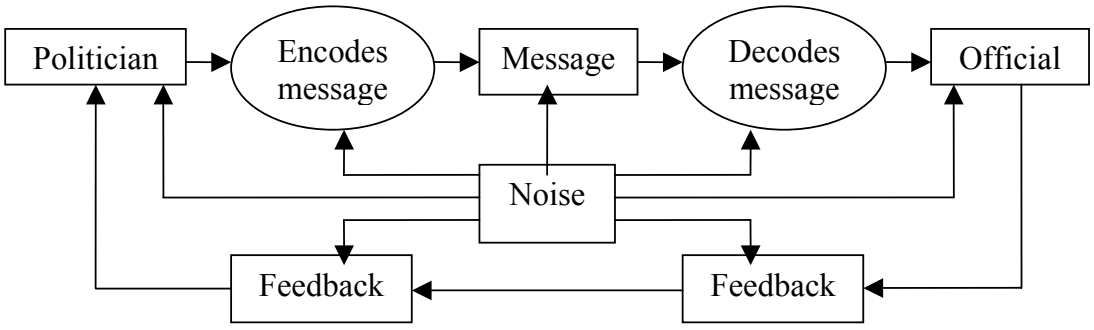

Figure 4.4
Source: Own based on Schultz & Kitchen (2002)

The politician's role is plainly, to the best of the individual's comprehension, to try to implement the party's standpoint within the specific issue. At the

[86] Schultz & Kitchen (2000)
[87] Brunsson & Jönsson (1981)
[88] Salaman (2002)

beginning of a discussion between politicans and officials, the frame of reference is often split. It is often difficult to make the other party understand the arguments for one's standpoint. A view point from the officials might be the superior one, but the politicians often do not consider it since the paradigm of the party could be contradicted and challenged.[89]

4.3.2 Listening theory in the communication model

As opposed to the traditional view where politicians are considered senders and officials considered receivers, the listening theory reverses the roles. The communication structure in the listening theory is not really seen by the general public since most individuals believe the politicians to be the senders and the officials the receivers.

The politicians, although they are receivers, are the determining political body and their views must always be listened to. (1) The officials (senders) suggest several alternatives to the politicians that the officials favour. (2) The politicians then defensively evaluate the suggested alternatives and chooses the alternatives that they approve of. The politicians also communicate their dislike of the other alternatives. (3) The officials then listen to what kind of alternatives the politicians favour. When it has been established what the politicians favour, the officials will look at these favoured alternatives and suggest to the politicians which ones that are most suiteable. (4) After that, the politicians will communicate what alternatives that should be officially evaluated by the officials. By doing this, the officials actually suggest what alternatives should be evalutad and implicitly determine the alternatives. Therefore, the officials are the senders.

The initial alternatives that were communicated by the officials to the politicians were all alternatives that the officials favoured and initiated. However, it is the politicians who are making the official decision, and believe that they are the senders in the communication model although they are, in fact, the receivers. On the outside, the politicians are the decison-makers, but on the inside, the officials take the actual decision by listening to the views of the politicians, and can therefore be considered as the decision-makers. The decision taken by the politicians are only a fasad of what actually ocurrs within

[89] Salaman (2002)

the communication model called the listening theory.[90] These relationships is illustrated in Figure 4.5.

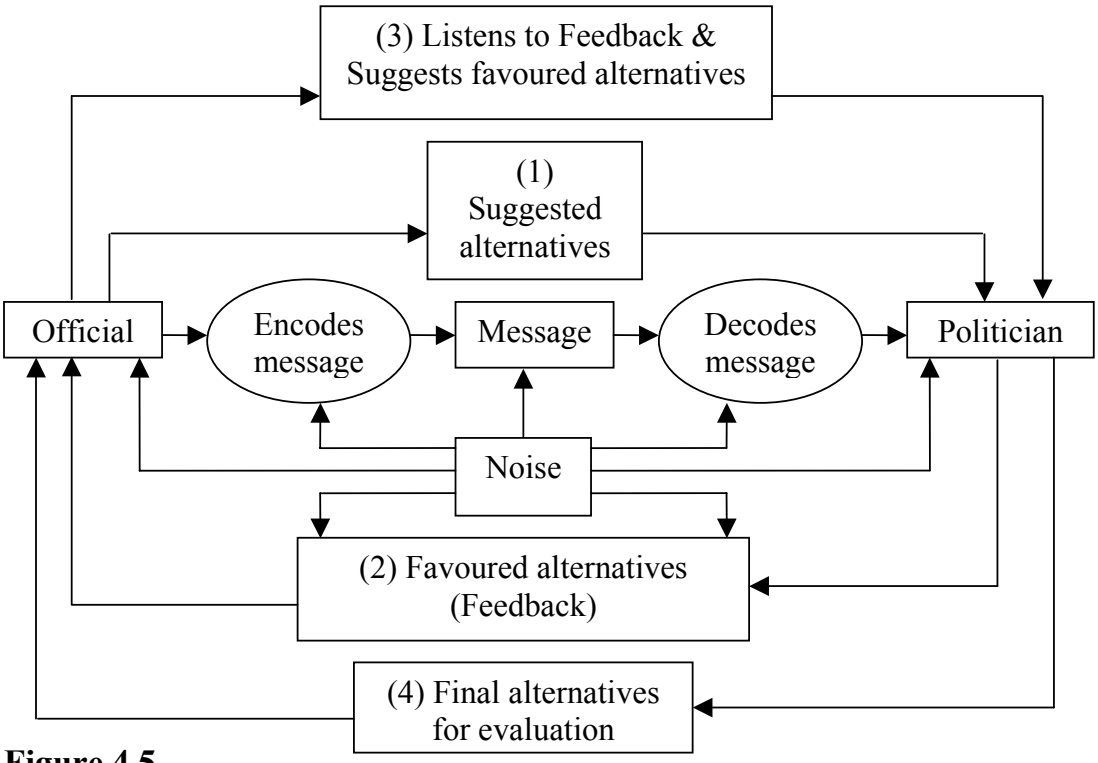

Figure 4.5
Source: Own (2002) based upon Brunsson & Jönsson (1981)

4.4 Cost-benefit analysis (CBA)

When decision-makers, such as the government, evaluates an investment, compares two investments to each other or evaluates when to undertake an investment, a CBA is often used to attempt to arrive at the best decision from a societal and economic perspective. It is widely accepted that corporations evaluate investment opportunities by discounting cash flows in CBAs, and that it is an integral part of modern corporate finance. It is also generally accepted that society on the whole also need to construct CBAs, but the latter have received much less attention and interest.[91]

Public CBAs are more complex by nature than corporate CBAs as they include more posts on both the cost and the benefit side, and have posts that are extremely hard to identify, quantify and value. Since CBAs are often used to compare different investments, such as two public transport alternatives, it is of

[90] Brunsson & Jönsson (1981)
[91] Mattsson (1970)

great importance to analyse them. Moreover, public CBAs often have costs and benefits that are not priced through a liquid market, which poses severe estimation problems.[92]

4.4.1 Consumer Surplus

At this stage, it is important to explain what the economists mean by a societal benefit. The ambition of a public CBA is to decide between projects or whether to undertake projects at all. Society picks a project that is good, or the best project if there are several. But good for whom? Or, best for whom? The natural answer is for the society as a whole.

In economics, when a product is "good", it gives utility when it is consumed. In economic theory, individuals have a budget that they can spend on products and services, and the combination of various products and services that can be purchased is infinite. Normally, when prices go down an individual is willing to spend more money on the products. This is referred to as the demand function, and relates the price with the desirability of a product or service. The demand function is the starting point for measuring peoples' utility, or their consumer surplus.[93]

The consumer surplus is the gap between the value of the product and the amount paid for the product. The utility of the product must at least be as great as the market price of the product; otherwise the person would not buy the product. It is not difficult to see how the surplus arises. Each product that the consumers purchase costs them only as much as the last unit is worth. But, due to the law of diminishing marginal utility, the earlier units are worth more to them than the last. Therefore, they enjoy a surplus on each of these earlier units. When trade stops benefiting them and giving them a surplus, they stop buying.[94]

Figure 4.6 illustrates this relationship. It represents the demand function. At price p_0 the consumer purchases x_0 amount of the product. If the price were higher, then the consumer would have purchased less. The consumer will not

[92] Mattsson (1970)
[93] Samuelsson (1961)
[94] IBID

stop buying the product at prices above $p_{0,}$ but since the consumer has a limited budget, the consumer will without a doubt purchase less.[95]

Technically, the consumer surplus can be described as an integral. The demand function relates price and quantity p(x). Each possible amount of x represents the difference between a person's willingness to pay and actual price explained by $p(x) - p_0$. The consumer surplus can now be calculated by integrating over the amount x from 0 to x_0 where x_0 is the amount demanded at price p_0. The consumer surplus is therefore:

$$CS = \int_0^{x_0} (p(x) - p_0)dx$$

The consumer surplus is the shaded area in figure 4.6.

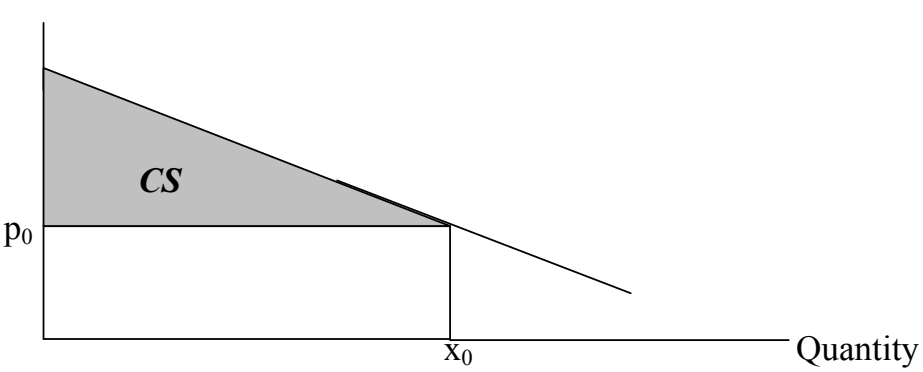

Figure 4.6
Source: Minken et Al. (2000)

Note that the unit of consumer surplus is price (p) multiplied by quantity (q), that is, a monetary unit. The consumer surplus is therefore a way to convert the concept of utility into monetary terms.[96]

4.4.2 Cost-benefit analysis in public investments

The most simplified public CBA is called a consequence analysis. A consequence analysis does not demand that the consequences of different courses of action or decisions to be valued in monetary terms[97]. This poses a problem; the positive and negative consequences cannot be compared and the

[95] Minken et Al (2000)
[96] IBID
[97] IBID

wrong decision can be made despite a rigorous analysis establishing the correct kind of consequences.

The CBA, on the other hand, tries to reduce the uncertainty involved in the consequence analysis by identifying, quantifying and valuing all costs and benefits, which enables the costs and benefits to be compared on an "apples to apples" basis that can facilitate a correct decision. The public CBA is often characterized as a capital budgeting technique that involves the economic affects of the society as a whole.[98]

A societal evaluation of an investment in a new public transport route or system may show that some individuals, who are to travel on the new route, are net gainers on the investment while other individuals, who live along the new route, are net losers if the investment is made. If the utility of the individuals who are the net gainers is large enough to compensate the entire net loss incurred by the "losers", and still yields a net gain or surplus, the investment is said to be economically efficient from the society's point of view. This is true whether or not the gainers actually pay out compensation to the losers. This type of thinking resembles a public CBA.[99]

The decision criterion that most public investments or projects are based upon is that at least one individual should be better off while at the same time no one should be worse off after the investment is made. If this criterion is applied, then all public investments are increasing the total surplus in the economy. This is called the *"Pareto Criterion[100]"* and is difficult to object to, as it upon first examination seems very logical. However, upon closer examination, one finds that it is impossible to apply since in public investments, it is impossible to find a solution that makes sure that everyone is better off while no one is worse off after the investment. This fact eliminates the Pareto Criterion as a criterion for selecting projects and investments on a public basis.

The economists Kaldor & Hicks further developed the Pareto Criterion by adding a new rule. The rule is that individuals who are net gainers of the investment or project *should be able to* compensate the net losers of the project,

[98] Niklasson (1976)
[99] Ahlstrand (1983)
[100] Mattsson (1979)

which prevents these individuals being worse off[101]. If the monetary value of the benefits is greater than the monetary value of the costs, the gainers could hypothetically compensate the losers and still enjoy a public surplus[102]. The words *should be able to* are important in the context. The Kaldor-Hicks Criterion says that an actual compensation does not have to be transferred. It is enough with the winners' benefits surpassing the losers' costs. The Pareto Criterion, on the other hand, demands an actual compensation takes place, which explicitly means that no one is worse off after the investment.

The Kaldor-Hicks Criterion simply states that a project should be invested in as long as the societal benefits surpass the societal costs, regardless of whether compensations (lump-sum transfers) actually take place. If we label the benefits in year 1,2…n with b_1, b_2,…b_n, the costs with c_1, c_2,…c_n and the discount rate with i, the Kaldor-Hicks Criterion can be formulated: [103]

$$\frac{b_1}{1+i}+\frac{b_2}{(1+i)^2}+...+\frac{b_n}{(1+i)^n} \text{ should be} > \frac{c_1}{1+i}+\frac{c_2}{(1+i)^2}+...+\frac{c_n}{(1+i)^n}$$

or, if summation signs are used:

$$\sum_{t=1}^{n}\frac{b_t}{(1+i)^t} > \sum_{t=1}^{n}\frac{c_t}{(1+i)^t}$$ or, consumer surplus (CS) > 0, i.e.:

$$CS = \sum_{t=1}^{n}\frac{b_t}{(1+i)^t} - \sum_{t=1}^{n}\frac{c_t}{(1+i)^t} > 0$$

The formulation of a description of the CBA after surveying relevant literature is: "to try to maximize the present value of all benefits less the associated costs, subject to different constraints"[104]. This formulation immediately poses some questions such as:

1. What are the benefits and costs that are to be included?
2. How are they to be valued?
3. What interest rate should be used to discount them?
4. What are the relevant constraints?

[101] Eklund et Al (1999)
[102] Mattsson (1979)
[103] IBID
[104] Prest & Turvey (1965)

4.4.3 To identify, quantify and value

The first two questions in the prior paragraph can be addressed with the concept of identify, quantify and value. The first task in a CBA involves ***identifying*** what effects the investment or project might have and the magnitude of these effects. In the CBA, the effects that are included are said to be of interest to individuals or to the society as a whole. Since the effect is of interest, the individuals or society is said to be willing to sacrifice something to get something else or to sacrifice something to not having to feel the impact of the effect[105].

It is very important to identify and to include all effects in the CBA, even if they are not immediate to the investment or project. Effects that are not directly related to the investment or project are called external effects and can be positive or negative. The building of a public transport route can result in negative external effects through the loss of aesthetics in the vicinity due to infrastructure changes and the potential loss of recreational areas for individuals. Or, it can produce positive external effects by a faster, more reliable service.

The second step involves ***quantifying*** the identified effects. The public transport system is very complex and advanced models will have to be used to achieve this objective. Some effects cannot, however, be quantified, which requires that they are verbally described and addressed how they will influence the outcome of the CBA. Lastly, the effects have to be ***valued*** i.e., find out what economic values the identified and quantified effects have.[106]

The effects (costs and benefits) that cannot be valued such as the scenic effect of building public transport infrastructure such as rail are called intangible costs and benefits. In the above example there is no market where these effects are traded and thus no market value for them. Intangibles are obviously also important in the DMP and have to be verbally presented to the decision-maker through an accompanying statement to the arithmetic since they themselves cannot be included in the arithmetic. Questionnaires can sometimes be used to value intangibles, but one has to be careful of the known difficulties this effort results in. Simply because an effect cannot be valued through a market does not

[105] Niklasson (1976)
[106] Minken et Al (2000)

imply that the effect can be excluded from the analysis. Conversely, it must be included and can be valued through identifying the willingness to pay for a benefit, or the desired amount to be received for incurring a specific cost. [107]

A project can be assumed to have different effects (*n*) for the future time period. The following matrix, where x_{ti} refers to effects of type *i* in period *t*, would then comprise all imaginable effects of the project.

Period 1: $\mathbf{x_{11}}$ $\mathbf{x_{12}\ldots}$ $\mathbf{x_{1n}}$
Period 2: $\mathbf{x_{21}}$ $\mathbf{x_{22}\ldots}$ $\mathbf{x_{2n}}$
.
.
.

Effects that are considered negative are negatively denoted ($x_{ti} < 0$) and are called costs. Effects that are considered positive are positively denoted ($x_{ti} > 0$) and called benefits. The CBA means that the costs and benefits of the project, as much as possible, are valued with a uniform measure (v_{ti} \$). The costs and benefits are then discounted with a discount rate that is greater than 0 ($r_t < 0$) and summed to a present value.

The cost-benefit criterion can now be defined for a project that is acceptable from a societal standpoint, i.e., a project whose discounted benefits surpass the discounted costs, or where the difference between the discounted benefits less the discounted costs is positive:[108]

$$\sum_{t=1}^{\infty} \frac{\sum_{i=1}^{n} v_{ti} x_{ti}}{(1+r_1)(1+r_2)(1+r_3)...(1+r_t)...} > 0 .$$

4.4.4 Discount and discount interest rate

The third question that arises from describing the CBA is the one concerning the discounting and the applicable discount rate. Since the costs and benefits (effects) are not incurred at the same time, and since they often are spread out over a long period of time, the effects or consequences need to be discounted to be able to be compared. “Pears must be turned into apples to be able to be compared to other apples”. Many projects are capital intensive and have long duration. A dollar today is worth more than a dollar tomorrow due to inflation

[107] Prest & Turvey (1965)
[108] Bohm (1977)

and time, among other factors, that erode the value of money. This relationship between a dollar today and a dollar in the future is called the *time-value-of-money concept*[109].

The process of enabling the costs and benefits to be compared to each other, regardless of when they are incurred, is called discounting. It simply means calculating the present value of future cash outflows (costs) and future inflows (benefits)[110]. The most common method is applying a rate that is equal, or close to, the current risk free interest rate.[111] Even if some argue that a market rate of interest should be used since capital markets do work perfectly according to financial market theory, there is still an issue with the social time preference. It is argued that social time preference attaches more weight to the future than private time preference, and that the former is more relevant for determining the allocation of society's current resources between investment and consumption. The argument is that the individuals facing investment decisions are short sighted about the future and that some government intervention is needed to give the adequate weight to unborn generations[112]. The reason the private time preference is short sighted as opposed to the social time preference that takes a long-term view can be that the individual passes away while the society lives on[113].

4.4.5 Constraints

The fourth and last question, as mentioned in Section 4.3.2, that arises from describing the CBA deals with the relevant constraints of the CBA. In addition to the criterion of the project being economical from a societal standpoint, there are other constraints that can be combined with the economic desirability in the CBA. These constraints can take the form of for example a negative effect not allowed to go beyond a certain limit (say, $x_{13} \geq \overline{x}_{13} < 0$) or, the value of certain effects during a period must amount to a certain value (say, $\sum_{i=1}^{k} v_{2i}x_{2i} > 0$) or, with an unspecified formulation, that $F_j\ (x_{11},x_{12}\ldots;v_{11},\ v_{12}\ldots) = 0$ for each restriction *j*.[114]

[109] Ross et Al (1999)
[110] IBID
[111] Bohm (1977)
[112] Prest & Turvey (1965)
[113] Mattsson (1970)
[114] Bohm (1977)

Next there are regulatory constraints that must be taken care of. The project or investment in itself must obviously be in accordance with the applicable law. Many public transport infrastructure investments are also required by law to take into account the views and opinions of stakeholders or interest groups that are affected by the effects or consequences of the investment.[115]

4.4.6 Limitations to cost-benefit analysis

A problem of making decisions solely based upon CBAs is that it gives the decision-maker a false sense of security that the correct decision always is made. If the CBA is relied upon, the decision-maker always makes the decision with the prevailing benefits relative to the costs if two alternatives are considered. Further, if an investment has more costs than benefits, the decision-maker does not make the decision to invest. This type of behaviour can be incorrect as the CBA itself can be incorrect. Firstly, the CBA is seldom the only information that is important in a DMP. Many other factors are often given importance too. Secondly, there is often argument and discussion over what consequences have been included or excluded (identification) in the CBA, and how these consequences have been quantified and valued[116]. If, for example, the right kinds of consequences have been identified, but incorrectly quantified and valued, then there is risk that the wrong decision is made. Moreover, if the wrong kinds of consequences in the CBA are identified, regardless of being correctly or incorrectly quantified and valued, the risk of making the wrong decision is naturally inherent. One cannot expect everyone to equally quantify or value costs and benefits that are not priced by efficient markets as humans have different values and backgrounds.

Thirdly, another drawback is that the applicability of CBAs is less for what one might call large size investment decisions. If investment decisions are very large relative to an economy (e.g., a major public transport infrastructure investment in a city) they are likely to alter the constellation of relative outputs and prices in the given economy, which might mean that the traditional CBA is likely to fail.[117]

[115] Bohm (1977)
[116] IBID
[117] Prest & Turvey (1965)

Despite these limitations, the CBA unarguably lays the foundation for a well-informed decision in the democratic process as costs and benefits are attempted to be correctly identified, quantified and valued[118].

4.5 Real options

In corporate finance the discounted cash flow method (DCF) is commonly used as the analytical framework for valuation analysis. In investment decisions, the analysis is mainly carried out using the net present value method (NPV) as it signals to management if the investment is profitable, or which investment is more profitable if several or even mutually exclusive investments are evaluated. The project with a positive NPV is selected, or the one with the highest NPV is selected if two or more are evaluated. The NPV and the DCF methods are very similar as they discount cash flows less applicable discounted costs to arrive at a value in today's monetary terms.

These methods have been used for decades and are taught at virtually every MBA-program at every business school in the world[119]. However, these methods have been criticized for failing to consider the options that are included in projects and investments[120]. It is now widely recognized that the traditional discounted cash flow (DCF) approaches to evaluating capital investment projects, such as the standard net present value (NPV) method, cannot sufficiently capture management's flexibility to adapt and revise later decisions in response to unexpected developments[121]. The actual market place is characterized by change, uncertainty and unpredicted competitive forces that can, and often do, change the realization of cash flows relative to what management expected at the outset. As management becomes aware of new information, management may have valuable flexibility to change its strategy in order to capitalize on favourable future opportunities or to react to mitigate losses should market development be less favourable than expected. For example, management may be able to defer, expand, contract, abandon or alter it during its useful operating life[122]. Moreover, the irreversibility and the choice of timing change the investment decision in critical ways[123]. These aspects of the investment are very difficult to incorporate in the conventional NPV and

[118] Prest & Turvey (1965)
[119] Copeland & Weiner (1990)
[120] Damodaran (2000)
[121] Trigeorgis (1995)
[122] IBID
[123] Dixit & Pindyck (1995)

DCF methods, and these aspects of the investments are all options that can be taken at various stages of the investment. Therefore, the investment projects can be evaluated using the framework of options.

Companies essentially take on projects to exploit profit opportunities. Investments in R&D, for example, can lead to patents and new technologies. The commercialisation of these patents allows a company to take advantage of a profit opportunity. Less obviously, companies that shut down loss-incurring operations are also investing: payments to extract themselves from contractual agreements are the initial expenditure and the payoff is the reduction of losses. These opportunities are options: rights but not obligations to take some action in the future. Thus, capital investment projects are essentially about options.[124]

The choice of a public transport alternative in a city can be characterized as a capital investment project, often evaluated using a public NPV calculation, or a CBA. Hence, the shortcomings of the traditional NPV method can be directly translated into shortcomings of the CBA as the framework for evaluating public transport alternatives. Therefore, the applicability of options in investments in public transport alternatives is presumably as large as the applicability of it in capital investment projects in corporations.

4.5.1 How real options capture the value of flexibility[125]

The following example will consider the difficulties of traditional capital budgeting techniques such as the DCF or NPV in the presence of an option. Suppose a company must settle on investing 100 million in building a new factory in the wake of uncertain demand for its products. If this investment is the only one, and if there are no additional investments, the company is essentially taking on a bet and not an option. If it invests, it can win or lose.

Instead, suppose the investment of 100 million can be changed into a pilot project of 10 million and a new investment in a year's time of 110 million to build the factory should the demand for the product be strong enough. Under this scenario, paying the 10 million initially gives the management the option to proceed with the 110 million investment a year from now subject to the success of the pilot project. And if it fails management has no obligation to proceed. Despite the building of the factory costs more this way (110 million discounted

[124] Dixit & Pindyck (1995)
[125] This section is inspired by Keenan & Copeland (1998) p.43-44

at 10% cost of capital rather than 100 million), it may make economic sense anyway. In particular, if the demand is so uncertain that the correct decision may be not to go ahead with the investment, the option may be worth more than the cost of creating it.

This is where the flexibility comes into play. Consider the above example. Suppose there is a 50% chance of product demand being strong and management is rewarded with strong sales after having invested the 100 million. Revenues in this case of strong demand are high, and the cash flows are valued in present value terms at 150 million. On the other hand, suppose the demand for the product is weak and the present value of the cash flows from the investment of 100 million is only 10 million. The traditional NPV analysis would value this investment at 80 million (0,5*150+0,5*10). This is not enough to cover the initial investment of 100 million and the investment project would most likely be thrown out.

But let's say that management instead of investing the 100 million invests in the pilot project of 10 million and elects to consider it an *option*? As stated before, there is a 50% chance of the project succeeding after which case the management builds the factory at the cost of 110 million, rewarding it with 150 million in the present value cash flows. But since the cash flows are delayed one year they are discounted at 10% cost of capital, present value is now 135 million ($150/1{,}10^1$). The 110 million investment is also delayed one year and must also be discounted ($110/1{,}10^1$) = 100. So, the net gain is 35 million (135-100). But we cannot forget about the 50% risk of weak demand in case which management loses the 10 million for the pilot project.

The overall value of this project, valuing it in the real options framework, would be 7,5 million (the average of 35 million and 0 (17,5) less the upfront cost of the pilot project, 10 million. Management valuing the investment this way should indeed go ahead with the pilot project despite capital budgeting techniques indicating the opposite.

4.5.2 Option basics

An option gives the holder the right, but not the obligation, to buy or sell a predetermined amount of an underlying asset at a fixed price (called strike or exercise price) at or before the expiration date of the option. The option is a

right and not an obligation, which means that the holder of the option can choose not to exercise the right and allow it to expire.

4.5.2.1 Call option

A call option gives the holder of the option the right, but not the obligation, to buy the underlying asset at a fixed price, which is called the strike price or exercise price. The holder of the call option can do this before or at the expiration date of the option and pays a price for this right called a premium. If the value of the underlying asset is less than the strike price the option is not exercised and expires worthless. Conversely, if the value of the underlying asset is greater than the strike price, the option is exercised.[126]

4.5.2.2 Put option

A put option gives the holder of the option the right, but not the obligation, to sell the underlying asset at a fixed price, which is called the strike price or exercise price. Again, the holder of the option can do this before or at the expiration date of the option and pays a price for this right called a premium. If the value of the underlying asset is greater than the strike price the option is not exercised and expires worthless, and if the value of the underlying security is less than the strike price, the option is exercised.[127]

4.5.3 The six levers of real (and financial) options

The value of an option is determined by a number of factors related to the financial markets and the underlying asset itself. These will be briefly described below. This entire section mainly relies on the information obtained from one researcher[128].

4.5.3.1 Current price of underlying asset

The current price is the value of the underlying asset on which an option is purchased. It is simply the market's estimate of all future cash flows associated with that asset. In real option terms, it is the present value of cash flows expected from the investment opportunity on which the option is held. Changes in the underlying asset are reflected in changes of the value of the option. In the case of a call option, the price of the option increases as the price of the

[126] Ross et Al (1999)
[127] IBID
[128] Damodaran (2000)

underlying asset increases. And with put options that value of the option increases when the value of the underlying asset decreases [129].

4.5.3.2 Uncertainty or variance in value of underlying asset

The higher the uncertainty of the value of the underlying asset is, the higher the variance is and thus the higher is the value of the option. This holds for both call options and put options. It may seem strange that an increase in a risk measure (variance) increases the value of the option, but that holds true as leverage is at play with options and because the holder of the option can never lose more than the price paid for it.

4.5.3.3 The exercise price of the option

The exercise price is the predetermined price at which the option can be exercised. For calls, the value of the call option will decline as the strike price increases, and in the case of puts the value of it will increase as the strike price increases.

4.5.3.4 The time to expiry

The time to expiry is the period during which the option can be exercised. The value of both call options and put options increase the longer the expiration time is. This is due to the fact that the longer the time period to expiry, the longer time the option has to go "in the money", i.e., where the option is profitable (net).

4.5.3.5 The risk-free interest rate

The risk-free interest rate is the yield of a risk-less security with the same maturity as the duration of the option. The risk-less rate affects the valuation of the options by mostly affecting the present value of the exercise price. Increases in the risk-free rate will increase the value of calls and reduce the value of puts.

4.5.3.6 Dividends paid on underlying asset

Dividends are paid regularly to stockholders and capital projects can and often do throw off cash flows to owners during its life. In real terms, dividends are represented by the value drained away over the duration of the option. Therefore, dividends can be expected to reduce the value of the option.

[129] Copeland & Weiner (1990)

4.5.4 Examples of real options

There are many examples of real options in real life capital investments that can provide the decision-maker with valuable operating flexibility and strategic adaptability. A few of them will be gone through, which are believed to be the most relevant ones to investments in public transport alternatives.

4.5.4.1 Option to defer

The option to delay or defer is quite straight forward as it is exactly what it implies; hold off the investments due to demand of the product being unexpectedly weak or because new information indicating that the project will result in a loss. Another reason to delay would be to wait until more skilled labour is acquired for a special investment. Projects are commonly valued in present value terms, which essentially means that a project is profitable at a given point in time. However, expected future cash flows change over time. So a project with a negative NPV now may have a positive NPV in the future. In a competitive environment where a firm has no special advantage over another firm, this may not seem significant. But in an environment where a project can be taken by only one firm due to legal restrictions and other barriers to entry, the changes in the project's value changes over time and gives it the characteristics of a call option. If the project is taken due to favourable conditions the pay off is similar to a call option, but if the project is deferred the company loses the initial costs, which in option terms is the premium originally paid.[130] The figure below indicates this relationship. The underlying asset is the project itself, the strike price of the option is the investment needed to take the project and the life of the option during which the firm has exclusive rights to the project.

The option to delay/defer a project

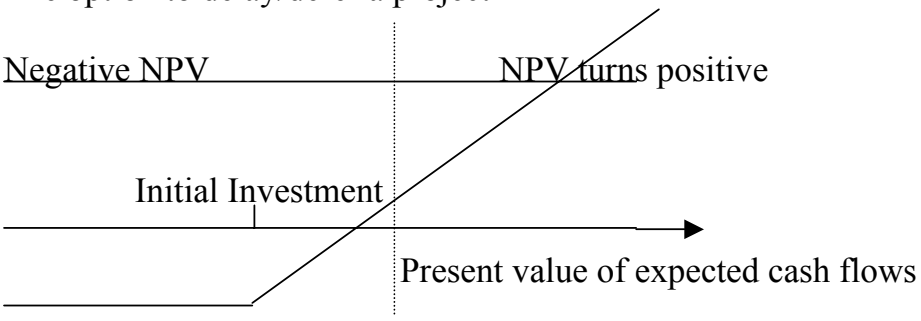

Figure 4.7
Source: Damodaran (2000)

[130] Damodaran (2000)

In coal mining the option to defer has been used extensively. A US coal mining company needed to determine how much to bid for the lease of a piece of land that could be developed into a coal mine. The current price of coal was incorporated into the company's NPV calculation of expected extraction costs, etc, and valued the lease at 59 million, which was in the company's views not good enough. But the company knew that the price of coal fluctuated substantially, and the current price of coal was close to break even of the project, and projections were very sensitive to the price of coal. The company realized that the lease was an option; to defer opening the mine until the price of coal had reached levels where the entire investment was economically viable. The option turned out to be worth 57 million and when it was factored in the entire project was worth 116 million. The company bid and won the lease for 72 million and waited until the coal reached a high enough price and profited from the project.[131]

4.5.4.2 Option to abandon

The option to abandon a project is referred to a project that gets shut down due to the project not meeting the requirements with respect to expected cash flows. The issue of the option to abandon has value relies upon the foundation that firms are valuing flexibility and that it pays to scale back or terminate projects that do not measure up to expectations. To illustrate, assume that V is the value of the project at the end of its life and L is the liquidation or abandonment value for the same project at the same point in time. The value of the project can then be compared to the abandonment value of the project. If the value of continuing the project is higher than the abandonment value, then the project should be continued. If the abandonment value of the project is higher than the continuation value of the project, the holder of the option could consider abandoning the project. The payoff from this project is either L-V (if V<L) or 0 (if V>L). This analysis requires that the salvage or abandonment value of the project can be determined, but that is often difficult. And there is risk that there is no abandonment value at all, which may affect the choice of project initially. The option to abandon is illustrated by the following figure.[132]

[131] Copeland & Keenan (1998)
[132] Damodaran (2000)

The option to abandon

PV of cash flows from project

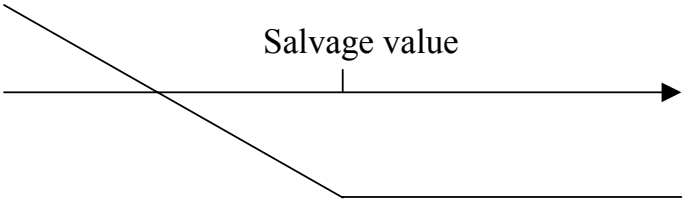

Figure 4.8
Source: Damodaran (2000)

4.5.4.3 Option to expand

Companies often take on projects to get the opportunity to take further projects in the future. In these cases it can be argued that the initial projects are options that allow the firm to take on further projects. Therefore, the firm should be willing to pay a price for that option. This means that the firm should be willing to accept a negative NPV project initially to be able to take on positive NPV projects in the future. Options to expand are usually applied in multistage investments. While entering into multistage investments, the company may reduce upside potential but it also protects itself from further downside by allowing it at each stage to estimate demand and decide whether to go ahead to the next stage.[133]

4.5.5 Applications of real options

The field of real options has been applied to many industries such as the petroleum industry with respect of oil well exploration, and to the entertainment industry where real options helped a film producer to determine whether to make a sequel of a movie or not. To the researchers' knowledge, it has never been applied to investments in public transport.

[133] Damodaran (2000)

5. Empirical Findings

This chapter summarizes the findings in each case based upon primary and secondary data. This is achieved by using the Johansson & Westlin model described in Chapter 3.

The difference with which the cases are described and summarized is primarily affected by the amount of information available with regard to the DMPs. The case of Tvärbanan is older than that of the recent Stombusslinjer and has been operational for about a year. Thus, the amount of information is significantly greater for Tvärbanan where there exists a wide variety of written material. Stombusslinjer, on the other hand, has received very little attention in the media due to the fact that it has actually not been implemented yet. However, an extensive interview process was made to achieve a significant amount of relevant information on the project Stombusslinjer.

The two English cases, Croydon Tramlink and Leeds Superbus, are both operational, but differ from the Swedish cases in the way the information was obtained. The appropriate politicians and decision-makers were not available for interviews and the information was congregated from executives of First Group who are the operators of both systems. However, the First Group executives were very knowledgeable and involved in the DMPs since they represented the private part of the Private Financing Initiative (PFI) of the project. Further, secondary data was also relied upon to compliment the primary data.

The selection of cases was not made with respect to the belief that the cases perfectly represented the modified model, but rather, they were believed (by Volvo Buses management and the researchers) to be able to answer the stated research problems. Further, the cases were also selected because the results of the DMPs were believed to be quite different from each other.

5.1 Stombusslinjer

The Stombusslinjer project is an attempt in Gothenburg to try to harmonize the bus system in the city's public transport system. For many years, there has been a separation between the bus system and the tram system in the minds of the passengers due to the dissimilar characteristics of vehicles and routes. Moreover, there is much confusion among passengers regarding the present

varieties of existing bus routes; express routes, service routes, industry routes, night routes in addition to the ordinary routes; the line routes. This system is not believed to be able to attract the amount of passengers needed to achieve the city's goal of a growth of 20% for the city's public transport system by 2005 using 1997 as the base year. The project is a part of the city's larger project from 1997 to try to look over and enhance the city's entire bus system. There are three bus routes planned, but only one will be implemented come January 8th, 2003. The first route (1) will originate in Högsbohöjd, go via Göta Älvsbron and along Norra Älvstranden to Eriksberg. Since the picture was drawn in 1999, there have been some changes to the first route. The route will not operate to and from Mölndal as the picture indicates. The second route (2) will go from Tuve to Östra Sjukhuset and the third route (3) will go from Backa to Johanneberg. The routes will be operated by modern articulated buses with the capability of several entry and exit points to facilitate faster stops. The bus stops will be inline with the bus route, which means that the buses will not have to travel sideways when stopping. These features will increase the average speed of the bus.

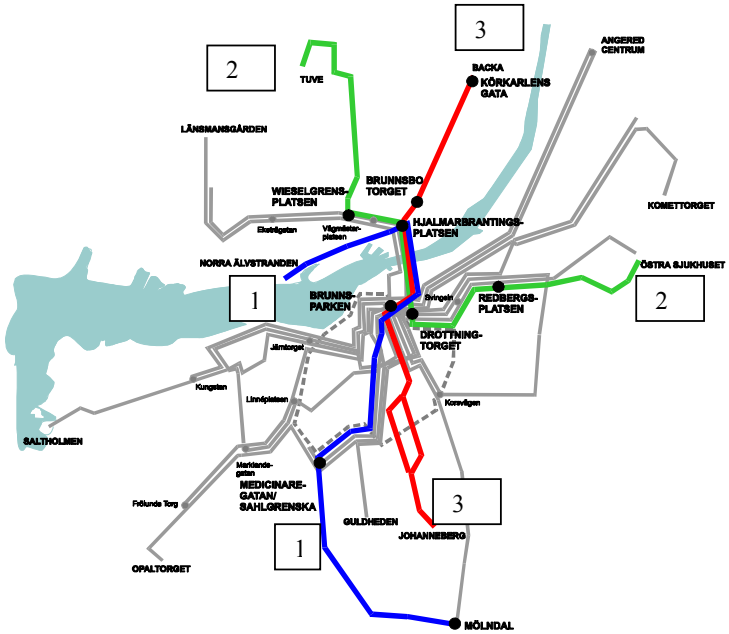

Figure 5.1
Source: Trafikkontoret & Västtrafik Göteborgsområdet AB (1999)

The methodology of Stombusslinjer as a case was conducted in the following manner. Interviews were made with representatives of the Traffic Board, the Traffic Office and Västtrafik. Interviews were conducted with the Chairman and Vice Chairman of the Traffic Board, the President and President of Public

Transport of the Traffic Office, and the Project Leader for Stombusslinjer at Västtrafik. Further, written information has also been used in addition to the interviews.

5.1.1 The participants and their responsibility

The organizations involved in the DMP and their respective responsibilities are:

- The Municipal Executive Board. This body lays forward the guiding principles, or strategic direction, for the city's public transport. These guiding principles include the budget for which the decision-makers have to abide by.[134]
- The Traffic Board. This body is made up of politicians with the same democratic representation as in the municipal council. This body takes all formal decisions. The representatives of traffic board are appointed by their respective political parties.[135]
- The Traffic Office. This body serves directly under traffic board and has no political affiliation. It enforces the decisions taken by the Traffic Board. It also develops information and data that will serve as the foundation for the decisions made by traffic board.[136]
- Västtrafik. This body is the organization responsible for carrying out the public transport in the region and is owned by 49 municipalities. Employees are not politically affiliated, but the Board is. The Chairman of Västtrafik is also the Chairman of the Traffic Board.[137]
- Norra Älvstrandens Utvecklings AB. This is a municipal company whose strategy is to lead, run and to be a catalyst for the development of the area on Norra Älvstranden. The main interest lies with the area's real estate and buildings.[138]

5.1.2 The overall process

The concept of Stombusslinjer came up as officials from the Traffic Office expressed that the existing bus network and services were complicated and difficult to comprehend in the eyes of the passengers. The bus route network had no good stable structure and was hard to comprehend. There were many types of bus services, each with different names. The Traffic Office felt that the

[134] http://www.goteborg.se/
[135] http://www.trafikkontoret.goteborg.se/
[136] IBID
[137] http://www.vasttrafik.se/
[138] http://www.norraalvstranden.com/

city's tram network was more stable and comprehendible in the eyes of the passengers. The tram route network contributes to a stable structural effect that the bus route network does not. Due to this problem, the Traffic Office realized that the current bus system needed to be upgraded to gain a higher status among the passengers and achieve the same structural effect.

Respondents said that the bus had low image and was mainly used by students and senior citizens. The philosophy is to take advantage of the tram's traits while still using the bus as the means of public transport. This philosophy or way of thinking is called: "think tram, drive bus" where one aspect is route stability through bus lanes and other priority measures, which prevent the bus routes to change frequently. Additionally, the length between bus stops would be greater to increase the average speed. There was also a belief that the expanding areas on Norra Älvstranden (NÄ), where the first route will be implemented, had higher demands with respect to capacity and quality on the public transport system. Passenger prognoses for NÄ also indicated that existing buses would not be sufficient to handle the prognosticated passengers. However, modern articulated, highly visible and reliable buses with high density that are given significant priority could. These prognoses indicated significant growth of passengers within only a few years, and therefore there was not enough time to look at any other alternatives but bus. Västtrafik also expressed that the city could not afford additional tram routes at that point in time, but it could afford buses with similar traits at lower costs. Additionally, studies of similar Stombusslinjer in Jönköping and Stockholm functioned as inspirational sources. The project was started without looking at the applicable costs.

5.1.3 Problem

Many problems were presented in the interviews and in the literature.

- The current bus system cannot take care of capacity and quality demands in selected areas.
- The rapid expansion of NÄ requires something to be done about the current public transport system. The Traffic Office realized that big corporations will not choose to expand into a city with poor communication and public transport.
- The current bus system is not prioritised enough. Perfect priority of buses is a tough political sell, as it is intrusive on car drivers, which rail for trams does not seem to be.

There was a clear confusion among the respondents over what body/organization formulated the problem and at what time.

5.1.4 Goals

The unanimous goal is to increase the market share of public transport by implementing Stombusslinjer with higher quality, modern look and higher priority than current buses. By taking these measures, the image of the bus will hopefully improve. Additional goals are to reduce emissions and to better compete with cars by reducing their market share. The goal of reducing the amount of time spent in the public transport system was not mentioned during the interviews despite being one of the three main goals found in the literature.

5.1.5 Restrictions

There are no legal, territorial and environmental restrictions, according to the respondents, that have to be adhered to. Despite the lack of expressed environmental restrictions, the importance of a high environmentally friendly profile of the buses was needed to arouse enthusiasm for the bus as the alternative of choice for this project. The Traffic Board did say that the environmental regulations were no problem to follow with the new buses. As odd as it may seem, no financial restrictions were subjected to the project. The one financial aspect that did have to be adhered to was that the new bus project did have to have considerably lower costs than that of a comparative tram project. However, the investment has to be high enough to encompass the costs associated with advanced priority of the bus. The Traffic Office did, however, mention that a bus lane in Eriksberg was outside the budget and thus implicitly financial restrictions existed. Västtrafik expressed that there was time restrictions involved as the expansion of NÄ was rapid and would therefore need a quick solution. The amount of time available would never be enough to plan and build rail for trams.

5.1.6 Alternatives

The city has established that the tram should constitute the core of the public transport system and is thus always considered for new projects. In this case, however, the bus was the only alternative that was seriously evaluated. The reason to only evaluate one alternative was because the bus is already operating on the new routes and because of a lack of directive from the Municipal Executive Board. Respondents all said that the city could not afford, and did not have the appropriate amount of time, to build rail for the tram. The Traffic Board mentioned that the city could afford and finance the purchase of rail cars

and the applicable rail infrastructure due to its high credit rating, but the city could not afford the high maintenance costs of the new tram routes. According to the Traffic Board, if it becomes evident that the new buses cannot handle the capacity demands from passengers in the expanding areas, the tram will have to be implemented in the future. The new system of buses with high priority can also be the bus' downfall since it enables a smooth transfer to rail for trams. The new buses will mainly travel on regular streets, and if it becomes evident that trams should replace the buses, new foundations will have to be built due to the weight of the tram. However, if the buses work well there will be no need for trams. The determining factor is capacity. Some parties believe the bus will be able to handle the capacity demands while others do not.

The alternative of choice, the bus, was selected on the foundations of capacity, economics, priority and time. The bus system will have high priority and is considerably less expensive than tram. Västtrafik is of the opinion that the bus was chosen since it already is the main alternative on the existing routes that will be replaced by Stombusslinjer. Further, Västtrafik expressed that there is not enough time to lay tracks and implement tram on the route since a solution has to be achieved come January 2003. Comfort was of lesser importance to the choice of alternative. Västtrafik and the Chairman of the Traffic Board did say that they were aware of the higher comfort associated with rail dependent public transport alternatives, but also said they had to put this fact aside in the project.

The alternatives that were analysed were determined by the Traffic Board according to themselves. Västtrafik, however, said it was an unconscious decision by someone. They also said that there are no specific rules stating that more than one alternative have to be evaluated. The Traffic Office said that they decided what alternatives to evaluate. The Traffic Office also said that the operator of the new bus routes, Göteborgs Spårvägar, expressed a desire of tram on these new routes. When it became evident that that would not become a reality, they told the Traffic Office to make the new bus system as ineffective as possible so that they instead could implement the tram. The level of seriousness of that particular statement expressed by Göteborgs Spårvägar is not known. Noteworthy is the discrepancy among answers of who determined what alternatives to evaluate.

No other interesting alternatives were left out in the evaluation process in the eyes of the respondents. There is a belief that the capacity of this new bus system is in line with the prognosticated amount of passengers and due to the old habit of driving bus. No alternatives were neither added nor eliminated during the DMP for evaluation. However, the Municipal Executive Board is the body that would determine upon additional alternatives or to determine which alternatives to eliminate.

The alternative is financed through the city's ordinary public transport budget and is a part of the traffic plan developed by the Traffic Board.

5.1.7 Evaluation method

This is another area where there is considerable discrepancies among the answers obtained. The Traffic Board says that no CBAs have been performed to evaluate the project due to the limited amount of time. Therefore, the only thing to do is to satisfy the increased demand for public transport rapidly. One representative of the Traffic Board said that he had no idea of what evaluation method had been used, but was confident that the appropriate calculations were performed. Västtrafik said a CBA was made and it showed a surplus of 14 million SEK. Västtrafik also said a corporate financial analysis was made and also showed a positive result. This calculation can be found in the study on Stombusslinjer conducted by the Traffic Office and Västtrafik. The Traffic Office had no idea of what evaluation methods had been used despite being the co-authors of the study above where both a CBA and a corporate financial calculation are performed.

Whether CBAs or other evaluation methods are important or not is hard to determine based upon the answers received. The Chairman of the Traffic Board believes the CBA is important when the investment is considerable and therefore not applicable to this project. He says that CBAs are used when several similar projects are evaluated and when seeking state subsidies for which they are required. The Vice Chairman thinks they are incredibly important to be able to use the taxpayers' money correctly. Further, he thinks both CBAs and corporate financial calculations should be performed. Västtrafik thinks CBAs are both important and unimportant. CBAs represent many costs and benefits that are not real monetary flows, which render them unimportant from a corporate perspective. However, they are important if the result can generate a surplus. On the contrary, corporate financial calculations

only include real monetary flows that make them more important. The Traffic Office believes evaluations to be important but has mixed feelings about CBAs. They are relevant tools to separate between alternatives, but less relevant when evaluating only one. The Traffic Office is of the opinion that political will and personal feelings and values determine the outcome of the evaluation of the alternatives.

According to the Traffic Board and the Traffic Office, the project of Stombusslinjer was evaluated in steps and it was considered to have several options in later stages of its useful life. By implementing new bus routes, the option to abandon, expand and defer are kept alive, as the bus routes are relatively flexible. The routes can theoretically be rerouted and changed based upon passenger prognoses. The new bus routes create freedom of action, and options as mentioned above. Both the Traffic Office and the Traffic Board expressed that the option to expand and the option to defer by putting in additional buses or tram in the future and the option to abandon by putting in the buses somewhere else in the city should the passenger prognoses be incorrect, were considered. The flexibility of the bus in this context was considered to be important. Had tracks for trams been built, it would have been an irreversible investment. Hence, it could not have been changed should the passenger prognoses prove not be high enough. Västtrafik, however, believes that the only reason why the bus alternative was chosen was due to the fact that the city could not afford to build tracks for trams at this point in time.

Passenger prognoses are the most important piece of information in the evaluation of alternatives. All respondents agreed on this point. Passenger prognoses are always used and in this case the traffic office and Västtrafik have performed them. Norra Älvstrandens Utvecklings AB supplied a lot of the information to the Traffic Office and Västtrafik.

5.1.8 Personal values

Only the President of Public Transport of the Traffic Office expressed that personal values were important in the process of evaluating alternatives. He said that his own personal values were important as he had a leading role as a consultant of a similar project in Stockholm and that he was personally interested in selling the same concept to Gothenburg. He called the new bus system “a smart man’s tram, not a poor man’s tram”. All other respondents said only professional values, not personal values, were important.

5.1.9 Important information to the DMP

The information that is important to the people involved in the DMP is the passenger prognoses of future travel as described above. Additionally, field trips seem to be important as they represent reality and examples of how a similar bus system could be implemented. Executives at Västtrafik and the Traffic Office made field trips to Stockholm and Jönköping in Sweden, and to Curitiba in Brazil where similar advanced bus systems exist.

5.1.10 Decisions during the process

Both the Chairman and the Vice Chairman of the Traffic Board had no idea whether external services of consultants have been used or not. The Chairman did say that consultants normally comment on public transport projects of this nature. Västtrafik, on the other hand, said that consultants have been used throughout the various steps of the project. The consultants were used for route structure, technical equipment and the system itself. The technique that will be used for the bus system is still in the testing phase and the project will therefore serve as a guinea pig. Västtrafik believes that the project would have been more successful had the technique been fully developed at the commencement of the new bus routes. The Traffic Office confirmed the fact that external consultants had been used and said one of the premier consultants in the area had authored the first study on Stombusslinjer from 1999.

5.1.11 External demands and interests

According to the Traffic Board, the DMP were not subjected to external demands. The Chairman of the Traffic Board did say that they had a dialogue with relevant and affected commercial real estate companies, but Norra Älvstranden Utvecklings AB were in charge of running the projects with these real estate companies. Västtrafik said that there were no external demands at all. Conversely, the Traffic Office said that Volvo Buses represented external demands. The demands related to bus terminals, equipment and bus stops. Demands also came from Norra Älvstranden Utvecklings AB since they own some of the property on which the bus route will operate. Other external demands came from construction companies, and both from existing as well as future businesses. According to the Traffic Office, the DMP was affected by the demands from Volvo Buses with regard to terminals, entry and exit points, bus density, etc.

Stakeholders that were considered in the DMP were mainly:

- Passengers, both existing and prospective passengers. The Traffic Board and Västtrafik said they are very sensitive to the desires of passengers that are measured yearly through traffic barometers.
- Operators are not considered in the DMP until a decision has been made with respect to alternative and routes. The operators cannot be considered until very late in the process since the bus routes are procured under competition. A dialogue with the operators is needed during the DMP to ensure that the operators are capable of fulfilling the demands of traffic planners such as Västtrafik. The operators can only affect minor details of the DMP.
- Entrepreneurs, in this case Volvo Buses, were considered in the DMP since they wanted to introduce the system. Volvo Buses was more interested in the system than in their own specific buses.

Special interest groups were thought to have been considered, but none of the respondents knew of any specific such groups.

Västtrafik did not believe that the interests of stakeholders affected the DMP, while the Traffic Office said that they absolutely did. They referred to the dialogue with Volvo Buses. The Traffic Board, again, had no idea whether the interests of stakeholders had any affect on the DMP.

5.1.12 Critical points

The Traffic Board expressed that there were no confrontations or critical points in the process and that the decision was uncontroversial amongst the decision-makers. They did say that there is a controversy over whether to see the new bus system as a finished product or a step towards building tracks for trams. The Traffic Office said that the decision was conscious and the parties involved were attuned. Västtrafik, on the other hand, explained that the project was dormant for several months due to a conflict with the decision-makers in Mölndal over costs associated with including Mölndal in one of the routes. Consequently, Mölndal opted not to be a part of the new bus system.

5.1.13 Activities of specific individuals of the organization

Most of the information was gathered by individuals themselves. However, the Traffic Office provided the participants in the DMP with a substantial amount

of material they acquired through own research, external consultants and field trips.

The amount of time the individuals involved had was according to the Traffic Board not enough. The Traffic Board further said that the individuals did put in enough time on the project considering the time that was allotted to them and due to the proximity of the due date. Both Västtrafik and the Traffic Office believed the time that was put in by individuals involved in the DMP to be sufficient. There were no additional demands for further research or investigations in the DMP.

5.1.14 The decision and the result

The decision and the result of the DMP is a bus route from Högsbohöjd to Eriksberg via Norra Älvstranden. All parties involved but Västtrafik said that the defined goals would be met by the chosen alternative. Västtrafik feels that the infrastructure will not be completed as desired. They also said the priority of the bus will be slightly neglected initially.

The media and public have not really commented on it since the new bus system is not operational as of this date. The few comments received though have been of a positive nature. Västtrafik believes that the individuals involved in the group made the right decision of what alternative to use and stated that the decision was unanimous.

The Traffic Board and the Traffic Office did not believe that this problem could have been solved in any other way given the time and financial constraints. Moreover, they believe that this alternative is proper given the passenger prognosis. Västtrafik did believe that there possibly could be solved in another way but they are not sure whether it would be a better or worse alternative.

5.2 Tvärbanan

During the 1970s a “bus philosophy” was developed at SL (Storstockholms Lokaltrafik), the region’s traffic planner, and most investments and expansions were made with respect to the bus. In 1986, however, politicians in Stockholm ordered an investigation that would look into the possible improvement and expansion of public transport on rail. The purpose was to investigate whether the already existing rail for conveyance of goods would be suitable for public transport. The investigation concluded that a horseshoe like light rail route

around the city centre that would facilitate transverse travel across the city was desirable. The city had developed a public transport system that facilitated radial trips through the city's centre, the central station, but lacked transverse trips across the city centre. The outcome of this investigation led to a decision to build a crossway of light rail between the large traffic points Gullmarsplan, Liljeholmen and Alvik.

Although several antagonists proclaimed that the new crossway of rail would blacken the surrounding area, Tvärbanan was finally inaugurated in the autumn of 2000. Scepticism was still present after the initiation but the antagonists have lessened in number due to the popularity and the 20 000 plus trips per day that Tvärbanan posted during its first year of operation between Gullmarsplan and Alvik. Moreover, Tvärbanan's popularity is growing substantially and the trips per day ratio is increasing and the surrounding areas around the 11.5 kilometres long rail has experienced an upswing in both the housing as well as in the retail industry. The pictures below represent the design of the light rail vehicles as well as the route. The route Alvik to Gullmarsplan is operational and the route from Gullmarsplan and eastbound is under construction.

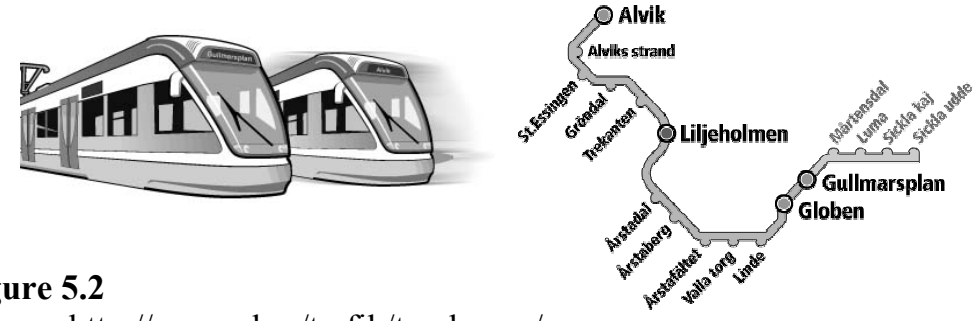

Figure 5.2
Source: http://www.sl.se/trafik/tvarbanan/

Tvärbanan will be expanded in stages. The extension from Gullmarsplan to the new apartment and business complex in Hammarby Sjöstad was completed in August of 2002. Further, an additional expansion to Sickla Udde is already in the process, which can be seen from the figure above.

The methodology of ***Tvärbanan*** as a case was conducted in the following manner. Interviews were made with representatives of the Office of Regional Planning and Urban Transportation, Stockholms Läns Landsting and SL (Storstockholms Lokaltrafik). Interviews were made with the following individuals:

- the Managing Director of the Office of Regional Planning and Urban Transportation,
- the Secretary for Tvärbanan and the Project Manager of the rail investigation from 1986 who also is an official of that office,
- the former Director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL (Storstockholms Lokaltrafik),
- the Chairman of the Tvärbanan project called "Snabbspårvägen", and
- the Project Manager for Tvärbanan at SL (Storstockholms Lokaltrafik).

5.2.1 The participants and their responsibility

The following matrix is a description of what organizations that directly and indirectly were a part of the DMP. The arrows indicate from what organizations the representatives in the management for Tvärbanan came from.

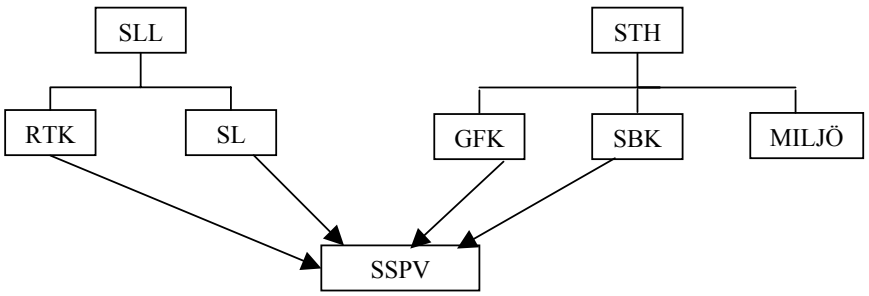

Figure 5.3
Source: Own (2002) based on interview with Bo E. Peterson

SLL: Stockholm Läns Landsting (The County Council of Stockholm). The main task of the County Council is to ensure that the inhabitants have access to health and medical care services and public transport. The County Council Assembly, with its 149 members who are elected every four years, takes the overall decisions. It also appoints committees and boards that are responsible for running the different activities such as public transport.[139] These organizations include:

- **RTK:** Regionplane- och Trafik Kontoret (Office of Regional Planning and Urban Transportation). The Office of Regional Planning and Urban Transportation coordinates the regional spatial planning and development of the Stockholm region. It is responsible for surveys and investigations that need to be performed for all the county's 26

[139] http://www.sll.se/

municipalities concerning the land and water use, the environment and the archipelago. The Board is politically appointed by the County Council, but other workers are officials.[140]

- **SL:** AB Storstockholms Lokaltrafik. (Stockholm Transport). It provides the residents of the County of Stockholm with attractive means of public transport. This ensures easy access to all forms of public transport, provides a healthy environment and guarantees the positive development of the Stockholm region. Workers at SL are not politically affiliated officials but the board is. The Chairman of SL is also the Director of the Traffic Committee of the County Council.[141]

STH: Stockholms Stad (the City of Stockholm). It is a popularly elected council, which collects income tax and operates such public services as schools, child and elder care, utilities, housing, and cultural and leisure activities.[142] These organizations include:

- **GFK:** Gatu- och Fastighets Kontoret (The Road and Property Administration) It is responsible for the use of public land, the exploitation of land and surveillance of traffic. It also maintains parks, streets, public recreational areas and a majority of the facilities used in the city's projects and activities.[143]
- **SBK:** Stads Byggnads Kontoret (The Stockholm City Planning Committee). Under the Committee's direction, the City Planning Committee is responsible for the city planning in Stockholm - in general and in detail - and for granting building permits, providing maps, and making housing accessible to the handicapped. It is appointed by the city council.[144]
- **MILJÖ:** Miljöförvaltningen (the Environmental Administration). It supervises the city's handling of food products, housing hygiene, public facilities, environmentally hazardous organizations, e.g. industries, and the use of chemicals. Air pollutions and noise levels are checked constantly.[145]

[140] http://www.rtk.sll.se/
[141] http://www.sl.se/
[142] http://www.stockholm.se/
[143] IBID
[144] IBID
[145] http://www.stockholm.se/

SSPV: Snabbspårvägen = Tvärbanan. This organization consisted of officials from RTK, SL, GFK and SBK. Every organization's managing director chose who his or her representatives would be. The officials from RTK were pro light rail as their perspective was a planning one since it could be used as a city-planning tool[146]. The Managing Director of RTK, who was a close friend of the former director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL, appointed staff according to their understanding on public transport. The Secretary of Tvärbanan, who is an official of RTK, was interviewed in the research. Initially, there was great resistance from SL. Thus, the officials from SL in the Tvärbanan project (SSPV) were appointed according to their beliefs. No official from SL who was against Tvärbanan was appointed to ensure the continuance of Tvärbanan. Officials from SBK were very much in favour of Tvärbanan since they saw Tvärbanan as a urban planning tool, and realized the potential structural effects the tracks would give to unexploited areas where housing and businesses were desirable. No information has been found on the officials of GFK. However, the Chairman of the Tvärbanan project said that one official at GFK was replaced because he was considered "difficult". This group of representatives investigated the possibility of Tvärbanan and put forward the foundation for a decision regarding Tvärbanan that would then be used for politicians who took the final decision.

5.2.2 The overall process

During the 1970s a "bus philosophy" was developed at SL (Storstockholms Lokaltrafik), the region's traffic planner, and most investments and expansions were made with respect to the bus. In 1986, however, politicians in Stockholm ordered an investigation that would look into the possible improvement and expansion of public transport on rail since it was known that rail attracted more passengers than the bus did. SL chose not to contribute to this investigation since they believed it to be uninteresting. Moreover, rail was believed to give the city structure from an urban planning perspective. The purpose was to investigate whether the already existing rail for conveyance of goods would be suitable for public transport. The investigation concluded that there was a potential for a horseshoe shaped light rail route around the city centre that would facilitate transverse travel across the city. This potential was already established in the 70's by SL but ignored by its upper management due to the "bus philosophy" that was present at SL. More explicitly, SL was against the

[146] This is supported by Ljungberg (2001) p.8

expansion of other rail dependent public transport alternatives other than the already existing underground and commuter trains. The city had developed a public transport system that facilitated radial trips through the city's centre, the central station, but lacked transverse trips across the city centre. Traffic planners realized that much of the trips in the future would be from suburb to suburb instead of from suburbs to the city centre and back. The outcome of the investigation led to a recommendation to build a crossway of light rail between the large traffic points Gullmarsplan, Liljeholmen and Alvik. The investigation was headed by Stig Dingertz, the Director of the Traffic Committee of the County Council, who had a genuine interest and burning desire to expand the role of other rail dependent public transport alternatives such as light rail in the region of Stockholm. In addition to the resistance from SL, Stig Dingertz' political party, Moderata Samlingspartiet (the Conservative Party), also showed resistance to the proposal. However, he managed to achieve a political majority across party lines for the proposal. The majority had a peculiar constellation of representatives from Moderata Samlingspartiet, Vänsterpartiet (the Left Party) and Centerpartiet (the Centre Party). This enabled a proposition to be presented and was voted in favour for. At this time, the only thing missing was the funding of the light rail proposal, which was estimated at about SEK 1 billion.

In May of 1988, the government appointed a special committee with the assignment to analyse how health and environmental effects could be limited in the large city regions. The committee was called Storstadstrafikkommittén (STORK). It concluded in 1990 that the traffic and environmental problems had to be combated through various measures, including a strong expansion of the role of public transport.

In April of 1990, the government appointed three negotiators for the Stockholm, Gothenburg and Malmö regions. The Chairman of the Bank of Sweden, Bengt Dennis, was allotted Stockholm where his mission was to create a better environment, increase accessibility and to improve the conditions for the region's development. These negotiations were called the "Dennis Negotiations". All parties in the County Council were part of the initial negotiations. However, after two meetings the only parties who remained were Socialdemokraterna (the Social Democrats), Folkpartiet (the Liberal Party) and Moderata Samlingspartiet (the Conservative Party) due to their sizeable majority. The negotiations resulted in sizeable road investments. There was a political interest to invest the equal amount on public transport. The

investments on public transport, which included the upgrading of the city's underground system and a modernization of the commuter trains, did not amount to the investments made in the road related projects. The Tvärbanan project was therefore included in the public transport investments in the Dennis Negotiations.

In June of 1993, a complementary principle agreement was made between the County Council of Stockholm and the City of Stockholm regarding Tvärbanan. In the agreement, it was determined that Tvärbanan was of mutual interest to both above parties to create an efficient crossway between the existing branches of the commuter trains and the underground. The project was finally allotted SEK 2.057 billion as a result of the Dennis Negotiations and this complimentary principle agreement.

5.2.3 Problem

The unanimous problem expressed in the interviews, and in the literature, was the fact that the city had poor transverse communication and public transport capabilities. The only available transverse public transport at the time were buses, but these twisted in and out of neighbourhoods and were not prioritised enough, which made them slow relative to the car. Therefore, people opted to use the car to a great extent. Further, businesses and housing projects were planned in areas with limited transverse travel capabilities. From an urban planning perspective, the load on the city centre would be reduced and it facilitated the construction work in the targeted areas through a structural effect of the rail.

The problem was defined in the mid 80's by the Office of Regional Planning and Urban Transportation and SL (Storstockholms Lokaltrafik), the region's traffic planner. Both of these organizations analysed traffic patterns and predicted the problem.

5.2.4 Goals

These are the goals expressed in the interviews and in the literature:

- improve transverse public transport capabilities,
- increase the attractiveness of public transport among the citizens,
- offer attractive public transport capabilities to areas under development,
- tie together the radial and transverse public transport networks,
- to prioritise environmental aspects in the public transport policy,

- to increase the amount of passengers for the public transport system and at the same time relieve the load on the core of the city.

The goals that were stated at the commencement of the DMP did not change during the course of the project, which was solidified by all respondents. An additional goal that was expressed by all respondents, and certainly not a pronounced official goal, was the goal of locating a public transport investment that was equal in size to the investments made on roads due to the political interest of balancing the two. According to the Chairman of the project, it is often the case that politicians want to invest in large-scale projects even though they might not be the most interesting ones. The reason is to get their hands on government funds (subsidies) that the projects are entitled to and that are set aside for huge investments.

5.2.5 Restrictions

Relevant regulatory restrictions were adhered to. These were relative to the laying of tracks and urban planning. There were also the regular plan and build code that had to be taken into consideration in the establishment of the route. Environmental restrictions also had to be abided by. These were noise restrictions and strict standards for building bridges. Both were taken into account, and in the case of noise restrictions several measurements had to be made in nearby housing complexes to make sure the noise was kept down to meet the standards. In some cases triple glass windows had to be installed to bring the noise down to legal levels. SL expressed explicitly that all environmental policies and restrictions were followed.

There were also financial restrictions on the project. As a result of the Dennis Negotiations, the project was allocated SEK 2,057 billion that could not be surpassed. Budgets are very important in public transport investments whereas in road investments they are less important. Additional money can be allocated to road investments if the budget proves to be understated whereas for public transport investments it is hard to get additional money without lengthy negotiations. People involved did everything possible to stick to the initial budget to avoid these negotiations that could potentially result in no additional money. The budget was exceeded, but only marginally. This was due to the project being prolonged and due to petite shifts in the geographic laying of the rail.

A majority of the tracks for Tvärbanan were government owned industrial tracks. This lessened the expropriation and thus the territorial restrictions. There were, however, some territorial problems with a few apartment complexes and houses in Gröndal and on the island of Essingen, but theses situations were solved by the tracks being moved slightly compared to the initial plans or the affected property being expropriated.

There were also strong political restrictions on Tvärbanan. Officials at SL were against the project and thought it was too expensive and contrary to the "bus philosophy" that was present. However, Stig Dingertz, the Chairman of the Board at SL, was for it and put all of his effort into it and made it happen.

5.2.6 Alternatives

In the larger picture, the bus is always considered as a means of public transport, but in this case it was not seriously evaluated. There were no reports of the bus being evaluated against light rail on the planned route between Gullmarsplan and Alvik. The bus was evaluated in the city centre but not for a route consisting of transverse travel between suburbs. All of the respondents said that the bus was taken out of the equation since bridges had to be built between islands and the main land on the planned route. They said it was politically impossible to justify building bridges for buses that cars would be prohibited from using. According to Stig Dingertz, former Chairman of the Board at SL and the Director of the Traffic Committee of the County Council, if the bus was chosen, the bridges would not have been built and the bus would have been implemented in the existing road network. This would have meant no further improvements due to the hesitation of implementing significant priority measures; "the flexibility of the bus is also its curse".

Another reason the bus was eliminated, as an alternative was the fact that the planned route would connect two other rail systems, namely Nockebybanan in the west and Saltsjöbanan in the east. It would be unnatural to connect two rail systems with a completely different alternative such as the bus. Respondents also said it was natural to evaluate light rail alone as old, existing industrial tracks would be used. Industrial tracks were used for Tvärbanan, but not to the extent that was originally planned.

There was also a great political will that argued in favour for light rail. The political will mainly came from Stig Dingertz who was the initiating politician

and the former Director of the Traffic Committee of the County Council and the Chairman of the Board of SL. Further, there were no distinct directives from the Board of SL to evaluate alternatives other than light rail.

The factors of importance when the alternative, light rail, was chosen were quality, an attractive means of public transport, the existing light rail movement in the world, the political interest for light rail, capacity and the level of priority of the alternative and environmental aspects. At the time, people believed light rail to be more qualitative and attractive than the bus. Also, politicians picked up on the light rail movement during field trips throughout Europe, which induced further interest and assured them that light rail would be the best alternative. Further, the capacity required based upon the passenger prognosis showed that light rail was most suitable. The level of priority desired would only be achieved by a light rail alternative. Again, politicians were very hesitant to give the bus perfect priority that was needed. Lastly, light rail was considered a more environmentally friendly alternative than the bus.

Last, but not least, the cost of the alternative was important. Due to the desire of politicians to equal the investments on road and public transport in the Dennis Negotiations, the light rail was a much better alternative solely based upon costs. Implementing bus on the planned route would not have resulted in high enough costs, which was desired. Light rail did. As odd as it may seam, the bus was too tiny of an investment. Therefore, the financing of the alternative was very important for choosing the alternative. Tvärbanan was financed through subsidies received as a result of the Dennis Negotiations. All respondents proclaimed that they thought that Tvärbanan never would have been built without the financing received through the Dennis Negotiations. Traditional financing would have been too burdensome to the city with the poor economic conditions at the time.

The decision not to officially evaluate any other alternatives than light rail was taken by the politicians in the Dennis Negotiations. Normally, if unconditional investigations are conducted it is common to look at several alternatives and it is the responsibility of officials to do so. However, when politicians are initiating projects, as in this case, decisions regarding what alternatives to evaluate are already taken.

According to all respondents, there were no additional alternatives of interest other than light rail that ought to have been evaluated. The politicians made it clear that light rail was the only alternative to consider.

5.2.7 Evaluation method

The information gathered through interviews and by surveying in secondary data implies that the method used to evaluate the light rail alternative was a CBA, where RTK and SL brought the analysis forward to the politicians. The former Director of the Traffic Committee of the County Council, Stig Dingertz, proclaims that CBAs have been used over the decades while he has been active. During this time, the CBAs were improved to better show the cost-benefit relationship in a more constructive way. However, the concept is still not defined enough and there is no good CBA that could effectively compare the bus with that of light rail. The Project Manager for Tvärbanan at SL, Björn Dahlborg, admitted that the CBA that SL brought forward for Tvärbanan was rather optimistic and that it is the responsibility of the officials that are conducting the CBA to decide what costs and benefits to include. Thus, these officials can implicitly determine the cost-benefit for the society by including or excluding different posts. The CBA he was referring to yielded a result of 0,8 and was conducted by RTK & SL. However, in this calculation they did not for some reason include VAT[147].

However, in 1990, an additional CBA was conducted by RTK & SL, which indicated net benefits of 1,04. This is the last CBA that was made with respect to Tvärbanan. Several researchers have debated the issue of CBA for Tvärbanan, and one of these is Ingemar Ahlstrand. He argues that the principles for CBAs developed by the Department of Communication were not adhered. Moreover, he argues that some costs such as light rail vehicles and other infrastructure related costs of 290 million were not identified and included. After including all costs and following the principles developed by the Department of Communication, Ingemar Ahlstrand redid the calculation and obtained a result of 0,51.[148]

The importance of CBAs differs depending on the respondents. The Chairman of the Tvärbanan project thought that CBAs are of great importance when comparing “apples to apples” but not when comparing different alternatives.

[147] Ahlstrand (1998)
[148] IBID

However, even though the result were around 0.8, the decision to implement Tvärbanan was made since the politicians in the DMP thought it would fulfil other factors such as the ones mentioned in the previous paragraphs. The Secretary for Tvärbanan on the contrary felt that CBAs are not needed since they often show a negative result, they are complex and they do not include all the necessary factors. The Managing Director of the Office of Regional Planning and Urban Transportation had mixed feelings about CBAs. Normally they are used as a base for a decision but if a decision will be made solely on a CBA, most projects would never be implemented. Take road investments for an example, they are often never beneficial from an economical standpoint but yet implemented since roads are needed. This goes to show that all investments cannot be economically beneficial. He did mentioned that Bengt Dennis, the leader of the Dennis negotiation, said that if politicians feel that they will be economically beneficial for society, well, then they are economically beneficial for society. The Project Manager for Tvärbanan at SL felt that CBAs are very important since they are the basis for decision-making and the measuring stick for projects. If decisions were solely based upon CBAs then politicians would be excessive. The reason for this is the fact that politicians take into consideration other factors that are not of an economical nature. This could for example be the structural effect that a project would have on the city and rail does have that effect on any city.

No information gathered implies that any organization within the DMP has conducted a corporate CBA.

According to all the respondents, Tvärbanan was evaluated in three steps that were to be built in a horseshoe shape, but each step was independent of each other i.e. the first step could operate even though the next two steps would not be built. The financing for all the steps already existed. However, it was never a question of only trying one step but rather an overall picture was established where all three steps would be implemented. The hope was that the first step would have a domino effect and that proved to be right. The former Director of the Traffic Committee of the County Council said that the politicians never had to think in terms of option to defer since the they felt that the decision made would be a success.

Flexibility was obviously not an important factor since rail was implemented. The structural advantage was considered as well as the advantage of the

capacity that it could obtain, that it is environmentally friendly and that rail could compete with other means of transportation. The most important part was however the passenger prognosis.

5.2.8 Personal values

All respondents, except Stig Dingertz, claim that Stig Dingertz' personal values were very important in the DMP. Some believe that Tvärbanan would not been a reality without his presence. Not only was he very interested in light rail, but also extremely knowledgeable about public transport and light rail. Even though his party was against the proposal of Tvärbanan, he still worked hard to persuade fellow party members that light rail was superior to any other alternative. Knut Nilsson of the Center Party is also a person whose name was mentioned by the respondents. He allied with Stig Dingertz in the Tvärbanan project.

The Managing Director of the Office of Regional Planning and Urban Transportation also said that his personal views were important in the DMP. He said that if his personal values had been contrary to the politicians' values, he would have had to stop the proposal. However, his values were aligned with the values of the politicians and therefore the project gained approval. He also mentioned that the Chairman of the Tvärbanan project, Bo Peterson, was important to the process. Other officials mentioned were the manager for Tvärbanan at SL, Björn Dahlborg and the Secretary, Ann-Charlotte Alvehag, for the Tvärbanan project (SSPV). Noteworthy is that all of these officials were all per definition pro rail and included in the Tvärbanan project.

5.2.9 Important information to the DMP

The most important information to base the decision upon was passenger prognoses, CBAs and the costs of the alternative. Respondents said that they wanted to choose the correct alternative with respect to capacity for the passenger prognoses, use CBAs to make sure the project was economically sufficient from a societal point of view and carefully analyse the costs associated with the alternative. The former Director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL showed the researchers a document that was produced by the office of Regional Planning and Urban Transportation outlining the proper public transport alternative to use given certain amounts of passengers per hour. The document shows that standard buses can be used until the amount of passengers reaches

1500 per hour and direction. The articulated bus can handle passengers amounting to 2500 per hour and direction. Both the standard bus and the articulated bus were assumed to operate in two minute intervals, which according to the person who showed us the document, was excessive given the physical size of the buses.

The Office of Regional Planning and Urban Transportation said that the most important piece of information was the goals to be obtained in the project. Thereafter, an alternative should be chosen that is believed to best achieve these goals. Costs are less important.

Additionally, in the case of Tvärbanan, several field trips were conducted to cities in Europe that have light rail. The trips confirmed the views of the people who were in favour of light rail, but also convinced the doubters that light rail could and did work. People were aware of the difficulties involved with laying tracks for light rail in the city centre, but the field trips proved that it indeed was possible. According to the former Director of the Traffic Committee of the County Council, without the field trips, Tvärbanan would not have been a reality since they represented the reality that was not present in Stockholm at the time.

5.2.10 Decisions during the process

All respondents proclaimed that several external consultants were hired and used during the different steps of the DMP. The Chairman of the Tvärbanan project mentioned that each and every organization hired its own consultants with respect to what needed to be investigated and analysed. However, initially the traffic committee was the instance that hired the consultants, but SL progressively was given more responsibility in the process and took over the task. Moreover, another important issue to mention is that the consultants and their respective tasks were guided by the officials. The result of the consultants indirectly impacted the DMP but the results served more as a guide rather than a deciding factor. It was always in the hands of the politicians in the DMP to eliminate an alternative even though a consultant would proclaim that another alternative would be economically beneficial from a societal point of view.

5.2.11 External demands and interests

The external demands and interests were several for this project. A book was actually written about the political game and demands that the Dennis

Negotiations, were Tvärbanan was included in, were subjected to. One of the complaints that were up for debate was the fact that Tvärbanan was not economically beneficial from a societal point of view. Since Miljöpartiet (The Environmental Party) was not a part of the coalition that was in majority, demands that came from them have to be considered as external. Their view was that the money that came from the Dennis Negotiations ought to have been used for other projects.

The DMP was also exposed to private demands. House owners were concerned that the value of their property would be negatively influenced by where Tvärbanan would be operating. The demands came from an organisation called "Rädda Innerstaden" (Save the City Centre). It was later shown that this organization was made up of house owners who were mostly looking out for their own interests as opposed to the interests of all affected people, which the name of their organization implies. Contrary to the beliefs of this organization, the prices of real estate instead increased as a result of Tvärbanan and SL suspected it all along. Once an official at SL offered a house owner along the planned route of Tvärbanan 2 million for his house because the official thought that the house would be worth 3 million in a few years. The house owner did not sell the house and according to the SL official it was probably because he actually also suspected that the value of his property would increase as a result of Tvärbanan and the associated improved public transport.

In another area, Gröndal, the people and existing business were reluctant to be excited about the project because they were not sure that it would improve the area as a whole. Tvärbanan was actually rerouted due to these demands; no big changes were made but rather small adjustments. Essingen is another area where the rerouting of Tvärbanan was needed due to external demands, and the rerouting affected the project to be delayed further.

Environmental organizations always have an interest in new projects associated with public transport, and they are per definition for rail, since they feel that it is a better alternative then that of the bus. However, environmental organizations were against everything associated with the Dennis Negotiations, and thus also against Tvärbanan.

Handelskammaren (The Chamber of Commerce) was also against the project since they were of the opinion that it was just a politically imposed project

without any benefits associated with it. They were of the opinion that this public transport project would not benefit the commerce of businesses in the area.

The mentioned external demands and personal interests were presented in media, especially through opinion and editorial sections of newspapers. What should be noticed is that since Tvärbanan was a part of the Dennis Negotiations, the media attention was not as substantial as it might have been should it have been a stand-alone project. The Dennis Negotiations were very much focused on road investments whose impacts were widely debated and discussed. The public transport investments were thus somewhat neglected and received less attention.

The DMP was definitely affected by the external demands and interests since several groups made a habit of protesting every decision that was made in the DMP. Due to this, the DMP was delayed, and therefore Tvärbanan could not start to operate as soon as the politicians initially thought. Even though there was a lot of useless critique from a lot of groups, there was also a lot of constructive critique that was used to improve the project.

Stakeholders that were considered in the DMP were mainly:

- Environmental groups. These were not really considered but the environmental groups will always contact officials that are a part of the DMP to try to impact the process one way or the other. This also occurred in this case.
- Passengers. They were considered very important since they would be the end users of Tvärbanan. Initially there was a lot of resistance from potential passengers, but through information sessions, colourful pamphlets describing the benefits of Tvärbanan and other PR, this resistance was lessened and finally almost eliminated.
- Operators. They had to be considered when the DMP had reached the stage of looking at what operators to use. Initially the route was operated by SL but would later be procured by a private company. An official from SL was then used to find out the possible operators on the route and Connex was finally chosen. The operators were not considered until rather late in the process and were definitely not a part of the planning process.

- Entrepreneurs. These were the builders of light rail vehicles and were also considered in the DMP since they were needed rather early for possible cost calculations and how well they could satisfy the capacity needs. These numbers are then the base for the CBA, and therefore needed at a very early stage of the DMP. Another reason for considering the entrepreneurs was the fact that the light rail cars were going to be owned by SL, the traffic planner and operator, due to the capital intensiveness of the vehicles. This ownership situation called for an early and good relationship with the entrepreneur. There were a lot of people that asserted that the bus should be considered for the project. One of the builders of buses, Volvo Buses, was obviously one of these groups and lobbied for the use of bus on the route. The Managing Director of the Office of Regional Planning and Urban Transportation was invited to Gothenburg to look at the bus as a possible alternative for the project. He had to pay for the trip and accommodation himself, which he thought was rather odd although he did not mind doing it. During his Gothenburg visit, he was proclaimed to be an idiot for deciding upon building a light rail alternative instead of using the bus. Additionally, he was also accused of being an idiot for supporting the building of Arlandabanan[149]. He did not feel that Volvo Buses was considering the environmental aspects of the rail, and that they were ignoring the fact that the bus would take twice the amount of time to go to the same route.
- Special interest groups. People on Essingen and in Gröndal formed special interest groups that tried to influence the DMP. The result was that the route was slightly modified to the initial plans.
- Stadsbyggnadskontoret (The Stockholm City Planning Committee) and Gatukontoret (The Road and Property Administration) were also considered as they worked closely with the Office of Regional Planning and Urban Transportation with city planning aspects of the project.

5.2.12 Critical points

No specific critical points were reported nor have been found. One should mention though that the project was slightly changed and delayed by almost two years as a result of numerous constant appeals by affected stakeholders.

[149] Arlandabanan is a modern high speed train that operates between Stockholm central station and Arlanda airport

Among the highest officials at SL, there was great antagonism and resistance for a light rail project due to the sheer costs of it and the bus philosophy present at SL at the time. According to the Project Manager for Tvärbanan at SL, if Volvo Buses would have been aware of the resistance, they could possibly have influenced the DMP by lobbying for the use of a less costly bus alternative.

5.2.13 Activities of specific individuals of the organizations

Most of the information was present since the participants in the project group (SSPV) were very knowledgeable. It was a rail project and thus the people chosen for the project knew very much about rail. Additional expertise and information was obtained by individual research, consultants and through field trips to cities in Europe where light rail had recently been implemented. The amount of time that the project group was given was enough and some even thought the process was too lengthy and too much time was given.

Additional investigations and information were not demanded by anyone according to the respondents. Some antagonists did demand for diminutive complementary information, but none of these delayed or changed the outcome of the project.

5.2.14 The decision and the result

The politicians decided, based upon the foundations for the decision put forward by the project group (SSPV), to build a horseshoe shaped light rail route from Allvik in the west to Gullmarsplan in the east. As mentioned before, the Dennis Negotiations funded the project and allocated the SEK 2.057 billion. However, the Dennis Negotiations collapsed in 1997, just three days after the commencement of the construction. This essentially saved Tvärbanan.

The initial goals of the project, mainly to improve transverse public transport capabilities, were reached according to all respondents. Some even said the goals were surpassed since the amount of passengers compared to the prognoses was exceeded. In fact, Tvärbanan has become a yardstick in Stockholm for determining customer satisfaction with means of public transport.

All respondents were in consensus that Tvärbanan was met positively by the general public and it has received a lot of media attention. Further, Tvärbanan also converted some of the antagonists to become advocates of light rail.

Currently there are several neighbouring municipalities that are eager to make sure Tvärbanan is expanded there. Nacka, for example, said initially that they were completely against it while they currently do everything in their power to promote it.

As far as if the problem could have been solved differently is concerned, the Chairman of the Tvärbanan project said he believed an advanced bus system like the one employed in Curitiba, Brazil could have been implemented. However, he is not convinced that the bus would be able to handle the capacity demands. Currently, 25,000 passengers are travelling on Tvärbanan daily. Another difficulty mentioned associated with implementing the bus on the route was the problem of creating priority for the bus in public areas. Moreover, the bus would create a problem from a continuance standpoint if the bus would be used to connect rail in the west and in the east.

The Secretary of Tvärbanan said that there were different alternatives that could have been used. Underground would have served the same needs, but would have been too costly. The bus would most likely have been a good alternative, but it never would have gained the positive identity as light rail. Theoretically the bus would have been able to handle it, but practically, it would have been rather difficult. Separate bus ways could have been built, but the opinion is that they take up too much space. Additionally, they are regarded as “infringements” on car drivers as they feel that they too should be able to drive on these bus-dedicated ways. Rail, on the other hand, is perceived differently since it is not possible to drive on (mostly). Lastly, the Secretary of Tvärbanan felt that rail had a structural and enduring effect on society since shifts in the political regime usually do not result in the abolishment of rail dependent public transport alternatives.

The former Director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL said he did not think the situation could have been solved differently since he per definition is pro rail. The Project Manager for Tvärbanan at SL agreed, and said, that practically no other alternative would have fulfilled the capacity demands. Further, he said other additional transverse light rail routes are needed due to the expansion of the city centre.

5.3 Croydon Tramlink

The City of London has a very diverse public transport system with light rail, buses, underground and suburban rail services. There are two light rail systems in London, namely the Docklands Light Railway (DLR) and Croydon Tramlink. Both systems have connections to the underground and to the suburban rail services. Croydon Tramlink opened in May 2000 and covers 28 km with its three lines. The lines are operated by Tramtrack Croydon / FirstGroup. It has 38 stations that are all wheelchair accessible. It is partly segregated with on-street running in Croydon, and has plans to expand in the future subject to feasibility studies and funding.[150]

Below is the route network (map) of the Croydon Tramlink and a picture of the light rail during its on-street running.

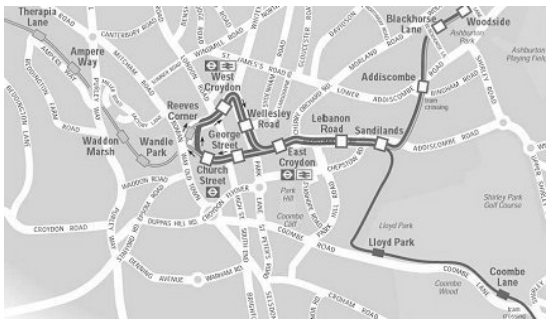

Figure 5.4
Source: http://www.tramlink.co.uk/

The methodology of the case differs from how the Swedish cases were conducted since the official decision-makers for the case were not available for interviews. The wisdom of First Group who is the operator of the Croydon Tramlink was instead relied upon. First Group is the largest operator of buses, and one of the largest rail and light rail operators, in the UK. A seminar was held with the two top executives of First Group at Croydon. Although their perspective on the Croydon Tramlink is a rather commercial one, they were also astonishingly well acquainted with the political perspective present at the Croydon Tramlink when it was planned and decided upon. Since many of the questions pertain to decision-makers in particular, it was not possible to ask these questions. Therefore, all aspects of the study could not be covered, which was achieved in the Swedish cases. In addition to the seminar with the

[150] http://www.tramlink.co.uk/

executives of First Group, some written information about the case was also relied upon such as the Tramlink official handbook[151].

5.3.1 The participants and their responsibility

The Croydon Tramlink was promoted by the London Borough of Croydon (the Croydon Council) and London Transport, who obtained the necessary Act of Parliament (Croydon Tramlink Act) in 1994. A special "light rail" multi party subcommittee was formed in the Croydon Council that always strived to promote the light rail scheme regardless of the political climate. It was unanimous in its promotion of the light rail scheme.

London Transport has changed names to Transport for London (TfL) and is the integrated body responsible for the capitol's transport system. Its role is to implement the mayor's transport strategy for London and manage the transport services across the capital for which the mayor has responsibility. TfL is directed by a Management Board whose members are chosen for their understanding of transport matters and appointed by Ken Livingstone, Mayor of London, who chairs the TfL Board.[152]

5.3.2 The overall process

The town of Croydon had an extensive tram network during the first half of the 20th century that was entirely abolished in 1951 for trolley buses. The conversion started in 1936 and by 1951 all trams were replaced by trolley buses. The reasons for the conversion were that the tram network used single tracks with passing loops that proved difficult for expansion. Moreover, there was no funding available for renewing the tracks as well as for purchasing new trams for a proposed route to London.

The idea of bringing back trams to Croydon was undertaken by London Transport and British Rail who published a report called "Light Rail for London?" in 1986. It discussed the possible conversion of about 40 existing rail lines into light rail lines to increase patronage. The report recommended a more comprehensive study of a Croydon light rail network. This study was commissioned in 1987 and the London Borough of Croydon officers participated. The recommendation of this study was that an initial network of three lines radiating from central Croydon to Wimbledon, Elmers End and New

[151] Steward et Al. (2000)
[152] http://www.londontransport.co.uk/tfl/

Addington would be technically and economically feasible. Yet another study was conducted by the neighbouring boroughs and London Transport concluded that light rail would help Croydon to sustain its successful development as an alternative to costly and environmentally damaging road schemes. The purpose of this light rail was different since urban regeneration was not the major issue, but instead to try to facilitate east-west transverse public transport that would break the trend of radial routes to and from London. The study pointed out the adverse environmental effects of relying on car usage and on reliance of bus services. This led to a political consensus that public transport had to play a more vital role in satisfying the mobility demands of the public. In June in 1990, a final study was made that became the basis of the scheme jointly promoted by London Transport and the Croydon Borough, leading to the Croydon Tramlink Parliamentary Bill deposited in 1991.

Before the Bill could be deposited, an extensive public consultation programme was conducted to seek the views of the people on possible routes for the scheme. There was considerable public support (>80%), and it led to the promotion of the Bill in Parliament to develop and operate the scheme. The Bill went through the House of Lords with little difficulty but was challenged in the Commons in 1993 due to the compensation level planned for affected houses along some of the routes. The compensation was increased and the houses were expropriated, which paved the way for the clearance of the Bill that was granted Royal Assent in 1994.

The light rail would be built by one of the franchises in the bidding process. The winning franchise, The Tramtrack Croydon Limited consortium (TCL), was awarded a 99-year concession in 1996 and was awarded the responsibility to design, build, operate and maintain the system in accordance with the performance specifications.

Although the planning phase of the Croydon Tramlink was quite extensive, about 14 years from the first thoughts on it until the completion of it, the project still survived. It survived even though it saw two changes of political control. One of the reasons it did survive was the fact that a special subcommittee was formed to promote the light rail scheme, regardless of political windfall. It was a multi party subcommittee that decided not to make the light rail an election issue.

5.3.3 Problem

The problems were several:

- Traffic congestion was getting out of hand on major transportation routes.
- The existing bus services were not reliable and took a significant amount of time during peak hours. Buses were also seen as low image modes of transport, and it took considerable time to load and unload due to the presence of only one door in the bus.
- Some of the existing railway on the planned routes was heavy-rail routes with very few passengers and no intermediate stops that did not cater to people living between stops.
- Some of the existing multinational corporations in the area considered relocating due to the area's bad transport solutions and its reliance on road usage that made the roads congested.

5.3.4 Goals

The main goals of the Croydon Tramlink were to link up strategic towns and suburbs of London that were situated apart from each other. There are several satellite towns that were not wisely connected, but the light rail scheme was designed to counter that. The link that would be established was desired to have an environmentally friendly image as it would go through some recreational areas, which was thought would encourage the use of public transport. Moreover, the goal was to use some of the old existing rail lines that at the time were used rather infrequently by heavy rail. Further, goals were also to implement a modern efficient light rail that would induce the businesses to stay and to enhance the area's image that had developed into a rather poor one. Additionally, the improvement in image the light rail would bring was going to be long lasting and add to the structure of the area. Lastly, a goal was to provide the less socio economically developed area New Addington with a modern public transport alternative that was believed to enhance its image and to become included in the overall transport system. Not enough information was obtained that verifies these specific goals or whether they changed or not during the planning process.

5.3.5 Restrictions

No restrictions were found to the project during the research. In any project there are restrictions, but they were not found in this case.

5.3.6 Alternatives

Many alternatives were considered initially, but it was soon determined that a light rail scheme was most desirable and thought to be able to solve the problems and achieve the goals better than any other alternative. Moreover, the alternatives that were considered were all different rail dependent modes. However, the bus was also considered. Light rail was specifically chosen since it was believed to be able to efficiently link up satellite towns and suburbs in the area. Moreover, the existing rail, disused or not efficiently used, created a perfect platform for an additional rail dependent alternative as the rail could be used. Further, at the time, light rail was considered much more environmentally friendly than alternatives using fossil fuels. Politicians also realized that the alternative of choice had to be completely segregated from other traffic in order to be reliable and expedient.

Where the light rail would utilize in-street running, the issue of signal priority was a very easy sell to politicians whereas it was considered almost impossible to achieve the proper signal priority for buses. The First Group executives attested to the fact that politicians had no problems giving light rail all the priority measures it needed, but were hesitant to give them to the bus. The priority measures that could be achieved were often not continuous and often short lived. Light rail is virtually permanent while some bus priority measures can easily be abolished should the political climate change. The issue of priority, or lack thereof, was the main reason the bus was not evaluated and light rail was chosen.

In order for the light rail to be built it had to cross some parks and other recreational areas that would essentially destroy them in the views of the executives. Nevertheless, this was not a problem at all since the light rail was considered environmentally friendly and could therefore virtually ruin parks and green areas. Executives testified that almost anything can be done when implementing light rail for the reason of superior environmental image.

Another reason light rail was chosen was the issue of capacity of the route network. The system currently has 20 million users per year with about 20 light rail cars. That is translated into 1 million passengers per vehicle per year. The First Group executives said they believed the bus could not handle such a capacity demand. They also said that they did not believe it to be possible, in general, to use articulated buses with less then 3-minute intervals, and the

current system would need articulated buses with even shorter intervals. They were aware of the modern bus system employed in Curitiba, Brazil, but said that the buses must be worn down very quickly and there must be huge strains on the management and operating system. The current system utilizing light rail cars only demands 10 minute intervals, which is easier to manage since the flow becomes more even and distances between vehicles are greater.

The reasons why a rail dependent alternative was evaluated were several. Firstly, the area's existing bus services were poor and took long time due to the congested roads due to the dependence of car usage. Further, the bus services took a long time since the buses used only one door for loading and unloading purposes. The bus service market in some parts of England is both privatised and deregulated, which essentially means that the bus operator gets his hands on the ticket revenue under incentive schemes. Therefore there is no incentive to increase the number of doors on the bus that could potentially reduce the ticket sales by the threat of free riders. The Croydon Tramlink was planned to use, and does use, prepaid tickets only. The executives also said that they thought politicians did not perceive buses as sexy or glamorous enough modes of transportation.

The alternative was financed partly from public funds and partly from private funds. The Croydon Tramlink was planned under the Private Finance Initiative (PFI) where private money went into public projects. The PFI was instigated by the former conservative political regime in the UK. The government put in £125 (50%) million and the rest was financed by the winning bid, in this case TCL. So, even though the interests of the consortium TCL are completely commercial and runs the Croydon Tramlink as a company, a hefty 50% subsidy from the government certainly helps.

There were some implications for the area's bus services after the implementation of the light rail network. A diminutive portion of the existing bus routes was taken away, and some bus routes were rerouted to fit the new light rail network. The First Group executives, who both operate buses and light rail, said it had worked out well for both alternatives. Specifically, some bus routes had been turned into feeder traffic for the light rail. However, there still exist bus routes along the newly established light rail routes.

5.3.7 Evaluation method

First Group knew that some CBAs were made with respect to Croydon Tramlink, but said they were not transport economists and did not have access to them. The literature states that the initial studies found that the Croydon Tramlink would be economically feasible, but the actual evaluations were not shown. Any CBAs pertaining to the Croydon Tramlink were not found. The executives said, however, that the Croydon Tramlink was a completely commercial venture including profitability and return on investment goals of the shareholders. TLC, the consortium that won the bid for the Croydon Tramlink, is largely owned by Amey plc, a business support services specialist, that in turn is a listed company on the London Stock Exchange (LSE).

The First Group executives did not think the Croydon Tramlink was at all evaluated in steps where it was considered to have options to expand, delay and abandon. They said it would be a disaster if it turned out that it had to be abandoned and that was never even thought of given the rigorous analyses conducted in the studies leading up to the decision to build it. The flexibility of the alternative was not important. On the contrary, the inflexibility of light rail was important since it gives the system structure and implies that it will not be changed or taken away, which was one of the goals.

5.3.8 Personal values

No people whose personal values were especially important in the DMP were found in the research. This is probably because no interviews or meetings with politicians and decision-makers could be made.

5.3.9 Important information in the DMP

Since no interviews and meetings could be scheduled with the actual decision-makers, exactly what information they thought was important to the decision of implementing a light rail scheme could not be found.

5.3.10 Decisions during the process

Specific important decisions that were made during the planning process that might have altered it were not found in the research.

5.3.11 External demands and interests

Before the Bill proposing the light rail scheme could be deposited to the government, the public had to be consulted. The project had to get at least 80% approval. The respondents thought the Croydon Tramlink was a good idea and

the Bill could be deposited. However, the First Group executives did say that the consultation was not very fair and was merely designed to achieve the hurdle rate of 80% and not really designed to get the honest views of the public. This is the only external demand or interest that was found.

5.3.12 Critical points

No specific critical points in the DMP were found in the research.

5.3.13 Activities of specific individuals of the organizations

The amount of knowledge and information the Croydon Council and Transport for London had at the time and whether any consultants were hired or not to gain further information and expertise is not known. The First Group executives did say that local politicians from Croydon did go to French and German cities that had recently implemented light rail in suburban areas. TfL also went on several field trips, including Manchester. First Group, who today manages and operates the Croydon Tramlink, went on field trips to Swiss and German cities to learn how to operate and manage a light rail scheme. First Group executives also said that cities and consortia that today want to build and manage light rail schemes often come to the operations of Croydon Tramlink, and they often bring local politicians to gain support for light rail promotions.

5.3.14 The decision and the result

In July of 1994, the decision was taken to pave way for the implementation of the Croydon Tramlink. In December of the same year, the Secretary of State for Transport announced the public funding for the Croydon Tramlink. The competition to finance, develop, build, operate and maintain the system was set in motion by the Transport Minister in May of 1995. Bids were submitted through the competitive tendering process in January of 1996 and TCL was announced as the winning bidder in April of 1996.

The goals of the project: to reduce the reliance of cars and poor bus services, to promote public transport using an environmentally friendly vehicle, link remote suburbs and towns and use existing rail to reduce infrastructure costs were reached according to the operator First Group. In fact, they expressed that the goals were more than reached and it has been more successful than expected. Their euphoria must be taken with a pinch of salt since they are the operator with financial interests in the scheme. They also expressed additional goals that had been reached that were not necessarily formulated;

- Appreciation of real estate prices along the routes.
- Urban regeneration of the suburbs and towns serviced.
- Reduction in the vandalism and violence in New Addington in particular.

The Croydon Tramlink has been met very positively by the public. In the initial phases there were neighbouring boroughs that were very hesitant to the Croydon Tramlink. Now they want it and consider it valuable. Some of these boroughs now try to promote the expansion of the Tramlink into their area. According to the First Group executives, the only doubters today are the uninformed parties.

It is not known whether the decision-makers believe that the problem could have been solved in any other way since no interviews could be scheduled with any of them. First Group executives, however, said they did not think the problem could have been solved differently due to the capacity demands and the need for a fast, reliable alternative that is segregated and that is given perfect priority where in street running is needed.

5.4 Leeds Superbus

The Superbus in Leeds has been operating since 1995. The state-of-the-art bus-based rapid transit system is running in a corridor network that is connecting Leeds City Centre with the northern suburbs along the Scott Hall Road. The system is called guided bus[153]. This means that during streaks of Scott Hall Road, the bus is driving in a purpose built corridor. This corridor is exactly 2.6 metres wide, approximately 10 centimetres wider than the bus, depending of course on the make of the bus. The bus is equipped with two guide arms and guide wheels, one on each side, which is attached in the hub of the front wheels. The entry and exit points of the guide way have a shape of a funnel. Upon entering the guide way the driver aligns the right guide wheel with the curb and is thereafter funnelled into the guide way. When the bus is in the guide way, the driver only has to worry about accelerating and breaking since the bus cannot weir to either side. The driver can actually let go of the steering wheel when driving. This is where the guided bus is comparable to that of a tram. Upon exiting the guide way, the driver again must take the wheels and traditionally drive the bus. The pictures on the next page show a bus driving in the guided bus way (guided mode) and the guide arm and guide wheel

[153] See definition of guided bus way in chapter 1, section 1.9

necessary to drive in it. Public transport in Leeds is completely privatised and deregulated; meaning operators are private companies operating wherever they want as long as the Leeds City Council recognizes them as operators. A bus operator can for example commence driving on any route that it sees fit, including the guided bus ways.

Figure 5.5
Source: http://www.elite-eastleeds.com/

The methodology of the Leeds Superbus case is similar to the case of Croydon Tramlink since the main source is the operator (First Group) and not the decision-makers and politicians. A meeting was scheduled with the rapid transit director at First Group in Leeds who also is considered the "guided bus man" in England. The rapid transit director was quite informed about the DMP leading up to the implementation of the guided bus way since he himself was the sole initiator of bringing the system to Leeds. Further, since First Group also was involved in the negotiations with the City Council of Leeds, First Group proved to have valuable information to the research.

Since many of the questions pertain to politicians, it was not possible to ask these questions. Therefore, all aspects of the study could not be covered, which was achieved in the Swedish cases.

5.4.1 The participants and their responsibilities

First Group is, together with Arriva, one of the two operators in the system. Both operators were involved in negotiations with Leeds City Council regarding the joint promotion of the guided bus way scheme. The other instances involved were the Leeds City Council and West Yorkshire METRO. The Leeds City Council is primarily an instance that is trying to provide quality service for all citizens of Leeds within different areas. They are also a ruling body for what public transport projects will gain approval and funding. West

Yorkshire METRO on the other hand is the professional transport co-ordinating body. Its responsibility is to try to implement the mission statement that West Yorkshire Public transport Authority (WYPTA) has decided upon. The WYPTA is the public body that is in charge of meeting the public transport needs in West Yorkshire.

5.4.2 The overall process

In the 1920's, Leeds abolished a lot of inner city slum, and people were moved out to the suburbs. Moreover, tramway reservations were implemented during this time to be able to handle the public transport patronage in the suburbs. In the 70's, there were many transport strategies that changed according to political majority and nothing constructive came out of them.

In the late 1980s, Leeds became the first city in Britain to create an integrated transport strategy, which was later adopted in 1991. What the strategy first did was put a stop to radial roads and transport routes, and implemented an orbital loop around the city centre. The strategy also realized that neither bus, tram nor rail alone was the answer. Each road corridor leading into the city had to get its own solution depending on the circumstances. The best aspect with this integrated strategy was the fact that it was not a *public* transport strategy, but a *transport* strategy that included all transport modes and was able to see the relationship and the interdependencies between them. The strategy made politicians understand that something had to be done to constrain the growth of the land used for roads and to increase the patronage of public transport. The politicians also realized that the public transport had to be prioritised to become more attractive to gain further ground.

During this time, the management at the West Yorkshire Passenger Transport Executive (METRO) were looking to reintroduce trolley buses in Bradford, a suburb of Leeds, within this new strategy. Members of METRO conducted several field trips in Europe to look at trolley bus alternatives. One of these places was Essen where they were supposed to look at the newly implemented articulated duo bus system. What they found was something different than trolley buses, namely guided buses. During a trip in the City of Essen, the driver of a guided bus took a left turn and went for about 4 kilometres in 80kph with his hands behind his head. The METRO members were astonished and thought that was far more interesting than trolley buses. Therefore, conversations started with Mercedes in Radstadt so that they could go and look

at some guided bus system configurations. The members of METRO then went back to England and realized that it was possible to implement a guided bus system in Bradford, Leeds. This system has now been operating since 1995.

5.4.3 Problem

The ever-rising congestion in Leeds, and the road saturation, were two big problems that needed to be solved. Moreover, bus journey time was increasing tremendously, and in only one year some bus routes doubled in amount of time needed to go from one place to another. Further, car traffic eventually saturated parallel roads as well as the main roads. This in turn led to an increasing problem of even slower buses in the area. Another problem was the fact that the existing bus lanes were ignored and misused by car drivers and the police did not enforce the rules satisfactorily.

5.4.4 Goals

These are the goals stated for the Leeds Superbus:

- increase the attractiveness of public transport by creating a brand new product with proper priority measures where needed,
- to decrease the energy use and the air pollution by increasing patronage in public transport, and
- to increase the amount of passengers for the public transport system to relieve the load on the already congested roads.

5.4.5 Restrictions

The only restriction found and mentioned was a financial restriction of £10 million, which was the budget of the project. The costs were divided up among the participants in the following way: £2.5 million from First Group, £2.5 million from Arriva, and the remaining £5 million from the City Council of Leeds. This set-up of private investments in a public project arose since both First Group and Arriva thought that they would be able to get their invested money back from the predicted increase in patronage. First Group said they would get their invested money back, but not as fast as they initially thought.

5.4.6 Alternatives

There were already buses running on these routes prior to the introduction of the guided bus system, the Superbus. However, they did not serve the need due the congested roads. One alternative that was in fact considered, however not fully evaluated, was the trolley bus. These buses were far superseded by the guided bus system since it could provide a smoother ride and be given the

proper priority measures. They were also more expensive since they did not require expensive over head electrical wiring. Another beneficial aspect of the guided bus way to that of the trolley bus is that guided buses can be given priority where it is needed whereas the trolley buses always need priority.

Light rail was also considered in the process since the guided bus ways were to be built on tram track reservations. First Group, however, who was the driving force of the guided bus ways, thought this scheme was useless since it would not bring anything into the equation that that the guided bus system could not.

The alternative was financed by the following three parties: First Group, Arriva and City Council of Leeds. First Group and Arriva are the two operators that have guided buses that can drive in the guided bus ways.

5.4.7 Evaluation method

No evaluation methods such as CBAs or corporate profitability analyses were mentioned in neither the written material nor during the interview with the rapid transit director. Nevertheless, he did express that First Group did believe that they would get the money invested back due to increase in patronage.

He also expressed that the guided bus ways were thought of in a step-by-step context where other parts of the bus route will be expanded with a guided bus way in the future.

5.4.8 Personal values

The local politicians wanted a light rail scheme all the time and that was recognized by the rapid transit director at First Group. His view about the public transport system is one of the biggest reasons why there is a guided bus way system in Leeds. He never challenged the politicians who were arguing for a super tram by saying the guided buses ought to be the main transport alternative or strategy in the city. Instead, he realized that there was a need for both and was also aware of the disadvantages associated with the light rail scheme. One was that the light rail could not satisfy the low-density housing areas alone and therefore the need for feeder buses would be significant. He was also of the opinion that light rail schemes would benefit public transport on the whole and therefore it should also benefit bus patronage. The rapid transit director is also considered the “guided bus man” in England and is deeply committed to this alternative. He also mentioned that it is important to look

beyond the scope of immediate competition to try to further the image, attractiveness, and growth of public transport.

5.4.9 Important information in the DMP

The most vital thing to the DMP was the field trips. Initially, the management of METRO, the deciding organ, thought of introducing trolley buses. However, the field trip to Essen changed their views of what public transport alternative to implement.

5.4.10 Decisions during the process

Specific important decisions that were made during the planning process that might have altered it have not been found in the research.

5.4.11 External demands and interests

The only external demand that was found was the one that politicians had on the operators. They required that the operators had to fund 50% of the investment, i.e. £5 million. If not, the Leeds County Council would not put up their 50% of the £10 million investment.

5.4.12 Critical points

No specific critical points in the DMP were found.

5.4.13 Activities of specific individuals of the organizations

Again, it cannot be stressed enough the impact that Bob Tebb, the Rapid Transit Director, had on this project. He was the sole initiator of the guided bus project but it should be mentioned that he did have the support of his company (First Group). Further, he was the one that tried to educate the politicians as well as the public of the benefits associated with a guided bus way. As mentioned before, he also organized field trips to cities that had guided bus ways that were of importance in the process to attract interest among the ruling politicians. He also started negotiations with Arriva, First Group's main competitor, to jointly promote the guided bus way scheme to the authorities.

5.4.14 The decision and the result

The decision was taken by Leeds City Council that a guided bus way scheme was to be implemented. This became a reality in 1995. However, any operators that are recognized by the Leeds City Council can drive in the guided bus ways. The appropriate adjustments must then be made to the bus, i.e. the guide arms and wheels must be assembled.

6. Analysis

The following chapter will include the analysis of the thesis. Where the analysis is case specific, there will be considerably more analysis on Stombusslinjer and Tvärbanan than on Croydon Tramlink and Leeds Superbus as more respondents, more written material and more time was available for the two first cases.

6.1 Research problem I

How is the local decision making process (DMP) regarding the choice of a public transport alternative structured?

Since Volvo Buses is concerned with light rail becoming more popular and wide spread in Western Europe, Volvo Buses is interested in finding out more about the structure of the DMPs that facilitate such decisions. The factors that are most important in choosing a public transport alternative will be left out from this analysis and treated in the analysis of research problem II and III. The analysis here will simply deal with the DMP itself.

According to theory, a DMP can be described as: "the decision-maker identifies the problem, clarifies the particular goals which are desired to be achieved, examines the various possibilities for achieving the determined goals, and completes or terminates the process by a definitive choice of action"[154]. The above statement does not capture the description of the DMPs in the selected cases of this research since the "examination of various possibilities" is not present as is explained in research problem III. Hence, the above description cannot be used.

The linear model illustrated on the following page, which assumes that the DMP is well defined and characterized by a detailed step-by-step predetermined course of action, can be used to explain the DMPs in the cases of Stombusslinjer and Leeds Superbus.

[154] Bostedt & Larsson (2000)

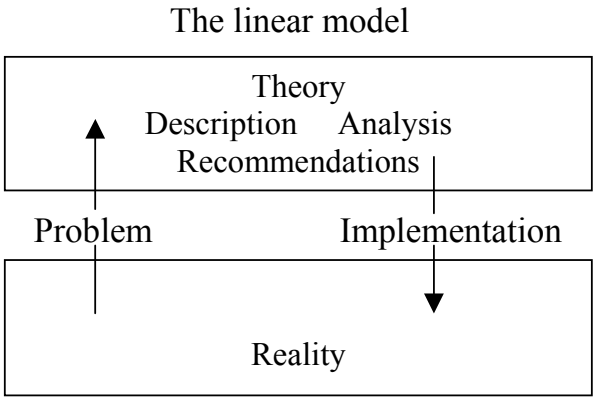

Figure 6.1
Source: Bostedt & Larsson (2000)

The dynamic model, on the other hand, can be used to better describe the DMPs in the cases of Tvärbanan and Croydon Tramlink since they took unexpected turns, went back and fourth from reality to theory and did not follow any predetermined course of action. Below is the dynamic model.

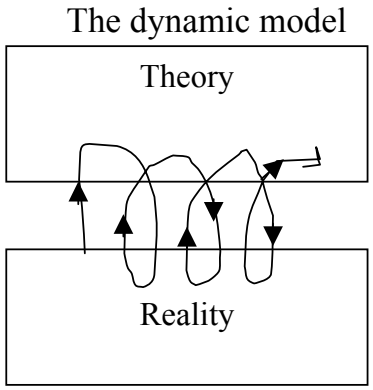

Figure 6.2
Source: Bostedt & Larsson (2000)

Given the dissimilarity of the cases, it would not be prudent to describe the DMPs collectively according to one specific theory or model. Therefore, they will be analysed separately to highlight the most important aspects of them, i.e. case-by-case.

6.1.1 Stombusslinjer

In the case of Stombusslinjer, the DMP was straightforward and the Traffic Board, the political instance that takes specific public transport related decisions, took the decision unanimously. What was interesting about the process, however, was how little the politicians in the Traffic Board knew

about Stombusslinjer compared to the officials involved. This supports the listening theory where officials adopt a strategy to make sure their suggestions and alternatives are considered yet politicians thinking they are taking the decisions. The politicians did not know whether any CBAs had been carried out, what interest groups were considered, etc. The officials, on the other hand, knew all about these issues.

The officials also said that the relationship with Volvo Buses was quite important to the development of the project and the choosing of a bus system. On the contrary, the politicians hardly knew of a relationship with Volvo Buses, and had only heard about the fact that some discussions had been held. This goes to show how influential the officials were, and how uninvolved the politicians were in the DMP. It seems as if the politicians merely took the specific decision.

The issue of only evaluating one alternative is not against the regulations of the Traffic Board or the Traffic Office. The Municipal Executive Board takes the overall public transport decisions and would be the instance that would require more than one alternative to be evaluated. Since such a decision was not taken in this case, the bus was the only alternative that was evaluated. This decision goes against the rational DMP and is violating the cost-benefit theory that states that the best project or alternative should be chosen from a societal perspective. Without a comparison or evaluation between two or more alternatives, it is impossible to know whether the alternative is superior from a societal perspective.

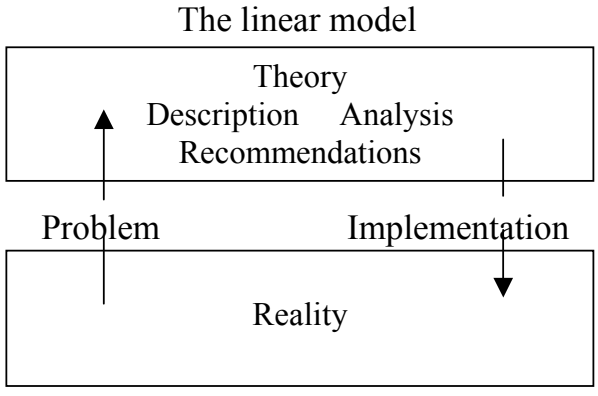

Figure 6.3
Source: Bostedt & Larsson (2000)

The linear model can be used to explain this case. The Traffic Office raised concerns over the city's poor existing bus services and the image of the bus in the case of Stombusslinjer (**reality & problem**). A decision was taken to investigate the structure of the bus services in the city (**analysis**). The analysis illustrated the problem and an attempt was made to find a solution (**description**). Both theoretical and practical models were used to solve the problem (**theory**). After the analysis, the Traffic Office developed a proposal to the Traffic Board of how to solve the problem (**recommendation**). The Traffic Board then took the decision to combat the problem of poor bus services and the low image using the recommendations from the Traffic Office (**implementation**).

6.1.2 Tvärbanan

Tvärbanan on the other hand was not as straight forward as the Stombusslinjer project. Several instances were involved in the DMP and therefore the structure of the DMP for this case was rather complicated. The instances included in SSPV were: SL, RTK, GFK and SBK. The DMP model that best represents this case is illustrated below.

The dynamic model

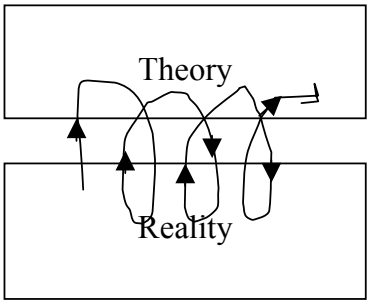

Figure 6.4
Source: Bostedt & Larsson (2000)

This model assumes that is impossible to define all the decision steps in advance, which was definitely the case for Tvärbanan. The budget for example was initially thought to be SEK 1 billion but was later upwardly adjusted. Tvärbanan became included in the Dennis Negotiations and the budget finally set-aside for it was SEK 2.057 billion. The structure of the route system also changed during the process, which indicates that the dynamic model is the appropriate model to use when describing the DMP for this project. The initial route was established in theory, but faced resistance in reality. Hence, politicians had to go back to the drawing board (theory) to revise the route

structure to comply with the wishes of people in reality. Further, officials who complicated the DMP, or at least one, who were involved in the SSPV project group were exchanged for someone else. This person did not approve of the project and was an obstacle that forced the project to take unexpected turns. Finally he had to be exchanged for the project to function in reality. However, the structure of the DMP for Tvärbanan did work since there were so many strong individuals involved with political wills in the project.

In the case of Tvärbanan, the DMP was quite complex. However, the decision to implement Tvärbanan once the financing had been solved was taken by SLL and STH, the political bodies in Stockholm at the county and municipal level respectively. Even though the officials in the sub organizations, such as RTK, SL, GFK and SBK, mainly carried out all of the work, the politicians were the ones who gave them directives. Opposition from officials was quieted down to ensure the continuance of the project. This supports the traditional view of the politicians being senders and officials being receivers in the communication model, and contradicts the listening theory developed by Brunsson & Jönsson. It is quite interesting how little authority the officials had compared to the politicians involved, and this testifies to the significant political will involved.

The issue of only evaluating one alternative is not against the regulations of any political body. In fact, the two political bodies involved in Stockholm, SLL & STH, gave directives to only evaluate one alternative. This decision contradicts the theory of the rational DMP and is violating the cost-benefit theory that states that the most beneficial, or least costly, alternative should be chosen from a societal view.

6.1.3 Croydon Tramlink

As far as the DMP for Croydon Tramlink is concerned, a general description can be made after surveying literature and conducting interviews. This was achieved in the empirical chapter. However, given the role of the respondents in this case, it would not be scientific to analyse and to draw any significant conclusions about the DMP. However, the research made indicates that the model that can be used to describe the DMP is the dynamic model given the DMP's length of time, and how it had to overcome obstacles by being revised. One of these obstacles was the issue of compensation for people along the routes whose houses would be expropriated. The Commons challenged the compensation levels and the bill could have been abolished had it not been for

the revisions that politicians made in theory and then implemented in reality. This is just one issue, but the information obtained through the research indicates that a dynamic model can be used to describe the DMP.

The dynamic model

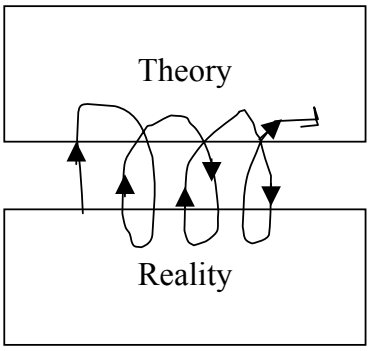

Figure 6.5
Source: Bostedt & Larsson (2000)

6.1.4 Leeds Superbus

The DMP for the Leeds Superbus project has not been found in the surveyed literature and was not a topic during the meeting with First Group. However, since First Group was involved in the DMP by virtue of being an investor in the project, they did speak briefly about it. The process is described in the empirical section. Although a thorough, scientific analysis cannot be made with respect to the DMP, the research and the interviews indicate that the model that can be used to describe the DMP is the rational model.

The linear model

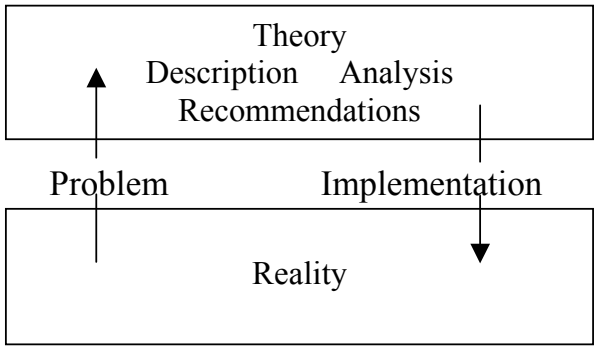

Figure 6.6
Source: Bostedt & Larsson (2000)

The City of Leeds identified a problem with the city's transport structure and formed an integrated transport strategy using the theories of complimentarity and interdependency. The city realized that the public transport could only flourish if it is regarded in the city's overall transport strategy since road transport and public transport have to work together to achieve the stated goals of lowering road congestion and reducing the reliance on car traffic. In light of the joint transport strategy, a guided bus way alternative was recommended and finally implemented in reality. What seems to the best model to describe the DMP in the Leeds Superbus case is therefore the linear model.

6.2 Research problem II

What are the significant factors for a choice of one public transport alternative over another?

The following analysis will address what factors were most important in the selection of the chosen public transport alternative in each case. Since each case differs from the others, a joint analysis for the problem for all cases cannot be made. The cases must be treated separately. However, where similarities do exist they will be highlighted. The analysis of the factors of importance of the favoured alternative will also include the factors that were important for not choosing the other considered alternative(s). The analysis and implications of evaluating one or several alternatives with respect to rationality and other theoretical issues will be treated in research problem III.

6.2.1 Stombusslinjer

The main reason the bus was chosen was the issue of capacity. The capacity of modern articulated buses running in five-minute intervals was deemed to best mirror the capacity requirements developed in the passenger prognoses. However, some passenger prognoses indicate that these buses will not be able to handle the capacity requirements in 2005 should the area of Norra Älvstranden grow accordingly. The respondents said they could not relieve this problem, should it occur, by putting in additional buses due to the physical constraints of the bus. According to the respondents, the physical constraints would hinder the buses from operating with less than five-minute intervals. Additional buses would cramp up the system and cause negative effects on other modes of transportation. The inability of the system to handle buses in less than five-minute intervals seemed to be speculations of the respondents. It seemed as if the respondents did not have extensive knowledge about the issue

of intervals and capacity of the modern articulated buses and the surrounding system. This suggests that the information is missing and should effectively be communicated to the respondents (decision-makers) by Volvo Buses who is the company supplying the buses.

The second reason the bus was chosen was the fact that the bus was already operating on the routes where Stombusslinjer will be implemented. Respondents said it was natural to replace buses with buses, and not buses with light rail. This type of thinking is treacherous since it eliminates any chances of thorough evaluations that determine what alternative is most desirable, or least undesirable, from the society's point of view. In addition, this type of thinking goes against rationality.

A third reason was the affordability of the bus. Respondents said they did not believe the city to be able to afford the maintenance and operating costs of implementing light rail on the routes. Further, respondents said the infrastructure costs of Stombusslinjer were quite low compared to light rail, and the capital costs of owning the buses would be taken care of by the operator and not the city.

A fourth reason the bus was chosen was the issue of time, or lack thereof. Respondents said they were doubtful the bus could handle the capacity demands the prognoses had developed for 2007. Respondents indicated that light rail had to be built to handle these capacity demands, but there was not enough time and expertise available to do that in time for the planned commencement in January 2003.

A fifth reason expressed by respondents was the issue of priority. The city's existing bus services were not prioritised enough, which caused them to be unreliable in terms of existing timetables. The Stombusslinjer concept demands considerable priority measures to be successful.

A reason that was mentioned by nearly all respondents, but in a different section of the questionnaire, was the reason of inspiration. Respondents said they had studied the cases of Stockholm and Jönköping were the concept exists, and said they were inspired by it. This falls right in line with the other cases where real life experience achieved through field trips was both important and inspirational for choosing an alternative.

6.2.2 Tvärbanan

The most important factor for choosing light rail in Stockholm was the political will associated with the former Director of the Traffic Committee of the County Council, who also was the Chairman of the Board of SL, and his allied politicians. All respondents said he was instrumental in the process and further said the light rail scheme never would have been implemented had he not been present. This shows how important political will is and what can be achieved if it is present and strong enough. The former Director of the Traffic Committee of the County Council never himself testified to being the critical factor in the process, but instead pointed at the issue of capacity as the determining factor for choosing light rail. He showed a document developed by SL, the traffic planner, that showed the capacity of each alternative and how the passenger prognoses mirrored light rail more than any other alternative. The document indicated that normal buses in two minute intervals could handle 2500 passengers per direction and hour, the articulated buses could handle up to 3500 passengers per direction and hour, but light rail could handle all the way up to about 8000 passengers per direction and hour. The belief was that the bus could not handle the capacity demands of the patronage. However, the entire system does not carry more than about 22-23 million passengers, which indicate that the bus could well have taken care of the patronage. The issue of capacity is believed to be mentioned to serve as an excuse since it has been established that awarding the bus the priority it requires to flourish is difficult and even undesirable.

Moreover, the politicians initially claimed that existing rail (old industrial tracks) would be used that would lower the infrastructure costs of light rail. The actual use of existing rail was considerably lower than the planned use of existing rail and probably a reason developed to facilitate more support for it.

A very important reason for choosing light rail was the issue of priority. Respondents said it was crucial for the success of any alternative. They also said that it was a political nightmare to award significant priority to the bus since that was considered intrusive to individuals who drive cars. Awarding priority to light rail, on the other hand, was not a problem since it is not being thought of as too intrusive to car drivers. This is due to the fact that it is a completely different mode of transport.

Tvärbanan would also go along a route that required two bridges to be built and respondents said the bridges would never have been built for the bus since car drivers would be very upset if buses, and not cars, could travel on the bridges. Politicians always think about becoming re-elected and to irritate car drivers, who are substantial in numbers, is not a politically smart move. To award priority, however, to an alternative that is not deemed intrusive to the general car driving public, and that is considered modern and inventive mode of transport, is far smarter from a political standpoint.

Respondents also said that it was natural to implement light rail in Stockholm on the chosen route since it would connect two other rail routes: Saltsjöbanan in the east and Nockebybanan in the west. Respondents said it would be unnatural to implement bus as a connection and also said that people do not like interchanging transport modes during trips.

The people who were interviewed also said the issue of quality & attractiveness was important in the selection of alternative. Respondents knew that light rail was more qualitative and attractive in the eyes of the passengers. They also knew that light rail was considered more environmentally friendly, which contributed to a positive picture of the city of Stockholm. The respondents also said that they were highly influenced and inspired by field trips conducted in several cities in Europe that had recently implemented modern light rail schemes. Some respondents even said that Tvärbanan never would have been a reality had various field trips not been conducted: they confirmed the proponents and converted the opponents.

The last reason why light rail was chosen, and the most controversial one, was the issue of cost. During the Dennis Negotiations a political will was developed to equally balance the public transport investments to the road investments. Since a sizeable portion was already devoted to road investments, politicians had to find something quite expensive in public transport. The underground and commuter train cars were renovated and modernized, but the costs associated with these measures were simply not high enough. They had to find another costly project that would fill the gap between the already amount invested in public transport and the amount in road investments. Tvärbanan was identified as an expensive enough alternative and received financing. This political will to balance the investments that facilitated the financing of the expensive light rail alternative goes against all relevant theories used in this thesis; rationality,

choosing an alternative that is most beneficial from a societal perspective (CBA), etc. No evaluation whatsoever between alternatives was carried out.

6.2.3 Croydon Tramlink

The reasons for choosing a light rail alternative were several. Firstly, the area had poor bus services before the implementation of light rail that were exposed to the congested traffic situation. The existing bus services were not segregated from regular road traffic and were not awarded enough priority measures. Politicians were not willing to give the bus the priority it needed to make it an attractive alternative. Buses also took forever to load and unload due to the presence of only one door on the vehicle. This was a result of privatisation since the operators were private companies that had to eliminate free riders and collect as much revenue as possible under incentive schemes. This problem would not be applicable to light rail since it was completely segregated on its own rail with several entry and exit points and politicians were willing to award it complete priority where it would utilize on-street running.

Secondly, light rail was also considered environmentally friendly, which was necessary since the planned route would go through some recreational areas. Since that was the case, the route could cross the recreational area, and respondents said that it would be completely impossible to achieve with the bus due to its dirty image.

Thirdly, there was great consideration given to the existing rail on the planned routes. The planned use of existing rail became a reality and lowered the infrastructure costs substantially according to the respondents. The light rail had the same exact dimensions as the trains that used to operate on the tracks.

Fourthly, the issue of capacity was also important for the choice of light rail since the bus was not believed to be able to handle the capacity constraints of the area's public transport patronage. The respondents claimed that the bus could not handle 20 million passengers per year in the system due to the wearing down of them and the strain it would expose the system to. Their belief that a modern bus system cannot handle 20 million passengers per year is questioned and probably a reason developed to favour light rail over bus. The respondents said modern articulated buses could be operated in three-minute intervals under good conditions. This corresponds to about 3000 passengers per hour and direction. Since there are three main radial routes there are at least 6

directions. That should correspond to about 18000 passengers in the entire system per hour. And if it assumed that the year has 365 days with about 12 hours of public transport per day, the system, using bus, should be able to handle about close to 80 million passengers per year. This is four times the amount of passengers experienced today. However, this system would need many more buses than light rail vehicles due to the higher capacity of light rail, which in turn would be more difficult to manage. The example simply illustrates that capacity was not as important a factor as the respondents proclaimed it to be.

Lastly, light rail was considered a grand and sexy investment according to the respondents who said that the politicians were looking at a majestic project that would lift the spirit of the area that had gradually decreased during the previous decades.

6.2.4 Leeds Superbus

The main reason for choosing a guided bus way alternative in Leeds was the issue of priority. The roads were heavily congested and the bus services were poor. Fortunately the city had significant tram reservations that could be used. Guided bus ways were chosen since they could use the tram reservations and improve the bus services by segregating them from regular road traffic. Light rail and trolley buses were considered too, but not evaluated. These alternatives were also thought to be able to solve the situation, but they were too expensive and would not offer anything to the public transport patronage that the guided bus ways could not. Hence, the costs associated with each alternative were also a very important reason. The politicians in Leeds did not have problems with awarding the bus enough priority to flourish.

6.3 Research problem III

Research problem III

Are several public transport alternatives evaluated in the DMP or is it merely a question of evaluating one alternative?

The belief of the researchers, and the belief of Volvo Buses, that two or more public transport alternatives are always constructively evaluated and compared to each other in the context of public transport investments was quite naïve. In neither of the cases were two or more alternatives thoroughly evaluated based upon a CBA or another type of evaluation method that yielded an alternative

that was either most efficient from a societal perspective or from a corporate perspective. The habit of only thoroughly evaluating one alternative has serious implications for the society. Everyone wants the government's funds to be used wisely and for the greater good of society regardless if it is the local, regional or national government's money that is being spent. In the absence of constructive analyses between different public transport alternatives in public transport investments, there is no way to find out whether the money indeed is wisely put to use.

Although the decisions in the cases follow along the traditional view of the DMP, they fall short of some of its components. For example, the practice of thoroughly evaluating only one alternative in the DMP violates the rationality of the traditional DMP. Since there is criticism towards the principle or rule of including all possible alternatives as rationality demands, that rule is often relaxed and it is enough that a few as opposed to all possible alternatives are evaluated. Not even this criterion has been followed in any of the cases. Individual rationality states that the rational "human being" is thought to possess a complete overview of the situation and considers all different alternatives. This requirement is not met either since the decision-makers do not have a complete overview of the situation as a result of only evaluating one alternative. A rational human is also assumed to choose the most logical decision, which is impossible when decision-makers are faced with only one alternative. Interestingly enough, most respondents believed the DMP to be rational and that a rational decision was made.

Opponents of the strict rationality requirement to include all possible alternatives argue that the evaluation of several alternatives evokes uncertainty, which in turn reduces motivation and commitment.[155] Many alternatives are time consuming and often costly to evaluate. The theory of bounded rationality supports this since the cost of acquiring all relevant information is unacceptably high. Further, the costs can be higher than the benefits of achieving the optimal set of alternatives for evaluation. Moreover, they argue that decision-makers should try to eradicate as many alternatives as possible that have diminutive chances of being chosen to stay motivated and committed. According to these arguments, the decision-makers in the chosen cases did just that; they eliminated alternatives they did not think would be possible to implement and

[155] For example, see Salaman (2002)

costly to evaluate, and which could potentially reduce commitment and motivation to the chosen alternative. However, the inclusion of several weak alternatives can sometimes have positive effects since their weak aspects are highlighted and further sheds light on the positive aspects of the strong alternatives.

Another issue that will be dealt with is the issue of evaluation method of the alternative. As stated, in no cases were CBAs or any other methods used to choose among alternatives. However, methods were performed in the cases to establish economic attractiveness. These methods will also be analysed. The following analysis will go through each case with respect to alternatives evaluated and how, if known, they were evaluated.

6.3.1 Stombusslinjer

In the case of Gothenburg, it was never officially evaluated whether the City's existing light rail network could be extended instead of implementing Stombusslinjer. The respondents said they knew that the existing budget did not allow for the light rail network to be extended, and that there was not enough time to seek and raise the money for it. Respondents also said that the capacity demands predicted from developed passenger prognoses indicated that modern articulated buses were the accurate alternative. Still, it was never officially evaluated if an extension of the existing light rail route network would have been a better investment from a societal perspective than the bus. Respondents said that since the city's light rail network had been established as the city's public transport core by the municipal executive board, it was always in the back of everyone's mind and therefore considered, but not evaluated.

In addition to the issues of financing, time and capacity that determined what alternatives to evaluate, it should be noted that the respondents were not unanimous in their answers why only one alternative was officially evaluated. Västtrafik did not know who made the decision and said it had to have been unconsciously made by someone they could not name. Both the Traffic Board and the Traffic Office said they themselves made the decision to only evaluate one alternative, which is contradictory and does evoke thoughts as to what instance is in charge. The listening theory regarding reversed roles of the sender and receiver in the communication model illustrates this phenomenon of vague responsibilities. In their model, the confusion of who is determining what alternatives to evaluate is quite evident as in the case for Stombusslinjer.

In this case, it seems as if the roles indeed are reversed, where the officials are the senders and the politicians are the receivers, since the respondents at the traffic office were more knowledgeable about the whole process of choosing alternatives than any other instance.

The decision itself to implement Stombusslinjer was officially taken by the Traffic Board. Respondents said it was completely unanimous and the Board did not have to vote. This implies that the decision was collectively rational according to theory. Even though an irrational decision was taken by someone not to evaluate several alternatives, the decision to implement the irrational alternative was rational. However, since irrationality is present in the DMP the conclusion is that the final outcome of the DMP is irrational.

The project Stombusslinjer was evaluated using both a CBA from the society's perspective and a corporate profitability calculation from Västtrafik's, the traffic planner's, perspective. The CBA, which has not been obtained despite several attempts, indicates that net benefits, or a consumer surplus, of SEK 14 million will be achieved. The benefits will mainly accrue by production gains achieved by shortening the time people spend travelling with public transport and must thus be greatly valued. The net benefits, or consumer surplus, meet the Kaldor-Hicks Criterion and not the Pareto Criterion since the benefits accrue to society on the whole, and not to all individuals in the society. The surplus for the net gainers outweigh the costs of the net losers, but the net gainers do not have to compensate the losers by transferring portions of their gains, thus satisfying the Kaldor-Hicks Criterion.

Västtrafik mentioned that they forgot to include the costs incurred of other travellers being adversely affected by the highly prioritised Stombusslinjer in the CBA. Time lost for other travellers must be costly since the time saved by public transport patronage is beneficial. This is a problem of identification and will adversely affect the net benefits, or total surplus, and increase the costs since the time saved for the public transport patronage is a main benefit and the main reason the CBA is positive.

Stombusslinjer is also prognosticated to be profitable from a corporate perspective. Although there are costs associated with implementing the new bus system with its complementary infrastructure and with its relatively significant priority measures, the increase in patronage will more than make up

for them according to the calculation. The calculation in the official report[156] on Stombusslinjer yields a positive result of SEK 1,5 million. The arithmetic, however, is not correct, but Västtrafik said the result was correct despite the erroneous mathematics. The corporate profit also arises mainly from an increase in patronage, which in turn will be a result of marketing efforts of the new bus system.

Stombusslinjer was also thought of in steps where the decision-makers had options to abandon, expand and defer should the patronage (underlying asset) change unexpectedly. The flexibility of the bus was considered important since it effectively provided the decision-makers and traffic planners with options. Respondents said should the new bus system be superfluous, the buses can always be put in somewhere elsewhere needed, i.e., **the option to abandon**. Further, should the buses prove not to be able to handle the capacity demands, respondents said there are back-up plans to implement the city's light rail network on the routes, i.e., **the option to expand**. Lastly, should the patronage be consistent with the capacity of the new buses, but should it increase dramatically in a few years, the buses can be kept and the light rail can be delayed until the patronage does increase; **the option to defer**.

6.3.2 Tvärbanan

In the case of Stockholm, the chosen alternative, light rail, was never evaluated against the bus on the existing route from Gullmarsplan to Alvik although the city had a significant bus route network. In an earlier light rail investigation[157] from 1989 by RTK & SL, the two alternatives were evaluated and compared to each other, and showed that buses would yield significant economic benefits from a societal perspective whereas light rail would not. Respondents were not influenced enough by this former comparison and evaluation to do it again on the current route. The belief is that it was not made again since it might show that the bus would be superior again, from a societal cost-benefit perspective. Respondents in Stockholm said the bus "was never on the table" for many reasons explained in the empirical section.

The directors and some officials at SL, the traffic planner, were initially against the light rail scheme and supportive of an implementation of bus on the route

[156] Trafikkontoret & Västtrafik (1999)
[157] Office of Regional Planning and Urban Transportation (RTK) & AB Stockholms Lokaltrafik (SL) (1989)

due to the costs involved. They wanted an official, comparative evaluation of the two alternatives, but were never in a position, or were never given the opportunity, to influence the process enough for it to happen. The politicians and other influential officials in the project group of Tvärbanan (SSPV) made it clear that it was light rail that was desirable and did not let the discussion to be steered towards buses.

The idea of using old industrial rail was also so dominant that it was natural to look at a modern rail dependent public transport alternative above all other alternatives.

The people who decided upon the alternatives are also interesting to pinpoint here. The initiator of Tvärbanan, the former Director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL, issued a political directive to only evaluate the feasibility of a light rail scheme. No political direction was ever given to evaluate the bus on the route. This political directive implies that the traditional view of senders and receiver is upheld with respect to the communication model in political DMPs. The politicians, the senders, gave the officials, the receivers, a directive to evaluate only one alternative; light rail.

The project group that would develop the foundations for the decision was also largely made up of light rail friendly individuals, regardless whether they came from SL, RTK or STH. The practice of only appointing light rail friendly representatives to a project group has to be considered smart since the chances of a favourable outcome is greater than if bus friendly individuals were appointed.

Moreover, the highly influential Managing Director of the Office of Regional Planning and Urban Transportation at the time, who was a close friend and allied with the former Director of the Traffic Committee of the County Council, said that he did not want the bus to be evaluated since it did not have the structural effects of light rail and could not therefore be used as a city planning device. The Secretary for Tvärbanan, who also is an official of the Office of Regional Planning and Urban Transportation, confirmed this and testified to the city planning effects of Tvärbanan since it is a rail dependent alternative.

In addition, the former Director of the Traffic Committee of the County Council who also was the Chairman of the Board of SL was also very influential. He testified to his ability to only include proposals for alternatives that he favoured. He also expressed his ability to educate and convert people into his way of thinking. This goes to show how influential specific individuals were in the process and concludes that decision to evaluate only one alternative was collectively irrational considering the significant amount of individuals opposing the bus.

Tvärbanan was evaluated using several cost benefits along the planning process. The first one yielded a result of 0,8, i.e., the net costs outweigh the net benefits. This result does not meet the neither the Pareto Criterion nor the Kaldor-Hicks Criterion since the costs outweigh the benefits. Despite the negative consumer surplus, some officials expressed that the calculation was probably a little too optimistic implying that the result was even worse than it appeared. The last calculation made before the decision to implement Tvärbanan yielded a result of 1,04, but several researchers have contested this result and argue that several costs were not identified, such as light rail vehicles and VAT and further criticizes the CBA for not correctly valuing some costs and benefits[158]. The issue of cost savings associated with the elimination of certain bus routes is questionable.

As can be seen, CBAs are limited and do not take all factors into consideration, which makes it a rather complex method. Further, individuals have different views on what costs and benefits to include, how to include them and so on. CBAs are good tools in trying to determine the implementation of one alternative if two or more are evaluated, but rather unimportant if only one is evaluated. The political will to implement one specific alternative, regardless if the CBA yields a negative result, is greater than anything else. This is since there seems to be no requirement that the chosen alternative must yield a positive result from a cost-benefit perspective. Further, the CBA does not take into account the localisation and development of new business centres and housing complexes around the planned route, which in many cases is desired since the alternative is used a city planning device. The benefit of people being able to choose the schools they could not before travel to, using the new public transport route, is not included either, which is one limitation of CBAs.

[158] For example, see Ahlstrand (1998)

It is not known whether SL, the traffic planner, who is the only instance with a corporate perspective, performed any corporate calculations.

Options to expand, defer and abandon were never issues with Tvärbanan since an overall picture was established where all three steps would be implemented, regardless of the fortunes of the first. Flexibility was obviously not a factor since rail was implemented.

6.3.3 Croydon Tramlink

In the case of Croydon, no other alternative than the light rail was officially evaluated in the process. Respondents said that the existing bus services were poor and plagued with bad services and the main reason for not being evaluated. Further, the respondents said that light rail was only evaluated since it was believed to achieve the goals of the project and relieve the area of its public transport problems. Although several alternatives were considered, only one was thoroughly evaluated. Respondents also testified to the issue of capacity and said they did not believe the bus could handle the capacity requirements.

Again, just like in Tvärbanan and in Stombusslinjer, only one alternative was evaluated which goes against the theory of rationality. It even goes against the relaxed concept of rationality that states that a few alternatives should be evaluated. It is not possible from the information gathered to determine whether this case followed along the lines of the traditional communication model with respect to senders and receivers or if a listening strategy was present. It cannot be determined whether the politicians or officials were senders or receivers.

What kind of evaluation methods that were used is difficult to know given the responsibility and role of the respondents in the research. However, the assumption is that the consortium must have performed some kind of a corporate profitability calculation to make sure that the project was economically attractive to its owners. It should be mentioned that the consortium did not invest the entire amount of the project; the government subsidized it by 50%.

The Croydon Tramlink was not at all considered to have options of any kind as the respondents said it would be absolutely a disaster should they have to close

down the light rail network. However, the respondents said they had options to expand the operations, but that was established long after the implementation of the first route network, as neighbouring boroughs were initially quite sceptic.

6.3.4 Leeds Superbus

In the case of Leeds Superbus, some alternatives were considered in addition to the guided bus ways, but these were not thoroughly evaluated. The intention was to evaluate the trolley bus, but prior to doing so, the decision-makers became more interested in the guided bus way system and elected not to proceed with the trolley bus alternative. The city also gave consideration to implementing light rail, but fell short of evaluating this alternative too since it, according to the Rapid Transit Director, did not provide the city with anything the guided bus ways did not. The trolley bus alternative was considered since it by nature required significant priority measures that were desired, but not evaluated since it was more costly with the electricity infrastructure than the guided bus ways.

The fact that the Rapid Transit Director was very much included in the DMP implies that either the officials, or the Rapid Transit Director himself, acted as senders and communicated the final suggestions to the politicians that most likely were the receivers. The Rapid Transit Director also stated that he was the sole initiator of the alternative (guided bus ways), which gives merit to him being the sender and the politicians or decision-makers being the receiver. This relationship of sender and receiver in the communication model framework suggests that a listening strategy was adopted to get the politicians to choose an alternative that was favourable in the eyes of the officials or the Rapid Transit Director. Relative to rationality, the decision to evaluate only one alternative falls very short of it just as the other cases do, even though the decision in itself to implement the alternative might have been rational.

As in the Croydon Tramlink case, what kind of evaluation methods that were used is in the Leeds Superbus case is impossible to know since no such information was obtained. However, the Rapid Transit Director did say that the £2,5 million that First Group had invested in the scheme was thought to be repatriated within a short period of time. He did not define how long that time period was. The fact that First Group invested money into a public transport project indicates that some corporate profitability was used as an evaluation method. The Rapid Transit Director said the increase in patronage as a result of

the guided bus way scheme would make up for the costs involved. This goes to show how confident First Group is that the change of normal bus routes into guided bus ways will dramatically increase the patronage.

Whether the Leeds Superbus was considered to have options of any kind is impossible to establish in the research, given the role of the respondent.

6.4 Research problem IV

Research problem IV

What stakeholders are considered in the DMP?

There was no doubt prior to the commencement of this thesis that the preferences of politicians and local government officials would have a rather large impact on the DMP. The question was only how large of an impact they would have and whether other stakeholders were considered in the DMP and whether they affected the DMP. Each case will be analysed with the respect to the stakeholders.

However, the impact the stakeholders had on the DMP was rather diminutive. This was also found to be true for a Swedish study that determined that the stakeholders that favour a certain alternative often has great resources and are considered important whereas stakeholders that are against a certain alternative often have lesser resources and are therefore deemed to be less important. Thus, they are not considered.[159]

6.4.1 Stombusslinjer

In the case of Stombusslinjer, the views of existing and prospective **passengers** were found to have been considered, and represented a vital and sensitive group to listen to. The final decision was in the hands of the politicians, and even if the passengers had said that light rail would have been the most preferred alternative, bus would still have been implemented on this route due to time and financial restrictions. This implies that even though the respondents proclaimed that they were sensitive to the desires of the passengers, a bus-operated alternative would still have been implemented.

A dialogue was held with the **operator** since it is needed to ensure that the operator can fulfil the requirements that will be asked of it. In this case, the

[159] Ahlstrand (1983)

operator was already determined since the existing operator on the routes will simply take over the new routes. Apart from the dialogue, they were not included in the DMP. It can be determined that the operator did not have a great impact on the DMP since the operator for this alternative was already predetermined.

The only **entrepreneur** considered in the DMP for Stombusslinjer was Volvo Buses. The reason being is that Volvo Buses wanted to introduce a new system with all the priority measures, which stressed the importance for how the bus terminals, equipment and stops were to be constructed. Volvo Buses also had specific requirements on how entry and exit points would look like as well as what the bus density would be. They did not stress the use of Volvo buses (vehicles) as much as they stressed the new system. This system is based on the same system that is implemented in Curitiba, Brazil. A concluding remark to the consideration of entrepreneurs is that since they were a part of the DMP by showing the new system to the officials and politicians, they were probably also able to sell their buses to the operator Göteborgs Spårvägar that is owned by the City of Gothenburg. The relationship Volvo Buses had with some officials in the traffic office are believed to be crucial for the city choosing bus and the system promoted by Volvo Buses. Officials in the traffic office said Volvo educated them with respect to the new system, which absolutely affected the officials.

Special interests groups such as environmental groups were thought to have been considered by the respondents, but none of them could for sure pinpoint one such group. This shows how little importance special interest groups have on the DMP. The politicians and officials can evaluate and decide on alternatives without being affected by pressures exerted by special interest groups.

However, there were some **other groups** that were considered. One company that had to be considered according to several respondents were Norra Älvstranden Utvecklings AB since they own the property on which some of the route will operate. This fact that this stakeholder was considered did not affect the decision of what alternative to choose, but rather, it affected the layout of the route.

6.4.2 Tvärbanan

In the case of Tvärbanan, the **passengers** were considered to be very important since they were the end users of the system. Although Tvärbanan met a lot of resistance prior to its inception, the general consensus was extremely positive post the inception of Tvärbanan. This was done by providing information sessions and by sending colourful pamphlets describing the benefits and advantages of Tvärbanan. This technique was successful and very smart since so many individuals were converted to advocates of Tvärbanan as a result. Passengers were also considered since respondents said passengers preferred light rail and though it was a more attractive alternative than bus.

The **operators** were not considered until very late in the DMP and had no impact on it. The decision about a light rail system would be made regardless of what bus and light rail operators would say. Moreover, SL, the traffic planner, would operate Tvärbanan for an amount of time before it would be tendered in a competitive process.

The **entrepreneurs** on the other hand were definitely considered, actually very early, in the DMP. The reason for that was due to the substantial costs associated with a light rail alternative. These costs were needed to conduct CBAs and other forms of analysis for the project. SL was to own the light rail cars so it was extremely vital for them to obtain information with regard to costs associated with them. Light rail vehicles are so costly that they are considered capital or infrastructure costs in Stockholm and the city thus owns them. Operators of Tvärbanan do not own the light rail cars.

The **special interest groups** considered were the individuals living in Essingen and Gröndal. These individuals formed different groups that tried to influence the DMP with respect to the lay out since the planned route would affect them. This did not impact the outcome of the result but rather only brought on some modifications to how Tvärbanan would be routed. Further, this was one of the reasons why the project was delayed by approximately two years.

Other stakeholders that were considered for this project were many. The *Stockholm City Planning Committee* were considered in the project since they are one of the organizations that deal with the city planning aspects of the project. The degree of how much they impacted the project is nevertheless hard to establish, but respondents said they favoured the light rail since it had some

city planning features due to the structural effects of the rail. Another stakeholder considered were *house owners*, who themselves started an organization called "Rädda innerstaden" (Save the City Centre) where the focus was to try to stop Tvärbanan since it was believed that Tvärbanan would decrease the value of real estate along it.

6.4.3 Croydon Tramlink

The information here is rather limited compared to that of the Swedish cases. However, there was one stakeholder that had to be considered according to the respondents. The project had to attain an 80% approval rate from the public before the bill could be sent to the government. This was accomplished, but the approach used to obtain these 80% was not very fair since it was only designed to achieve the 80% and not really designed to get the honest view of the public. Thus, both existing and future passengers were definitely considered in this project and their preferences absolutely affected it. Other stakeholders and interest groups were possibly considered, and might have affected the DMP, but no information with regard to that has been obtained during the research for this thesis. This shows how important the support of the public is for public transport investments, but more importantly, shows what political will can achieve.

6.4.4 Leeds Superbus

As in any major public transport investment, there are stakeholders and interest groups that are considered and whose views often affect the DMP. Nevertheless, given the time spent on this project and the role of the respondent in the interview, it was not possible to pinpoint such stakeholders. First Group did, however imply, that they were sensitive to the preferences of the public transport patronage since they are the end consumers.

6.5 Research problem V

Research problem V

How is the chosen public transport alternative financed, and is the financing solution of the alternative a fundamental factor why the alternative was chosen?

The financing of the alternatives is of great importance since many European countries government subsidize investments of rail dependent public transport systems, which in turn automatically would help a more expensive light rail alternative and essentially gives it an unfair comparative advantage over other

alternatives. Thus, the financing and possible state subsidies could be large factors why one alternative is chosen in front of another and could supersede evaluation tools that are used to sort out the best possible alternative from society's perspective. The cases differ greatly when it comes to the financing which can better be seen in this section.

6.5.1 Stombusslinjer

As mentioned in the empirical part of the thesis, the alternative was financed through the city's ordinary public transport budget, which is part of the traffic plan developed by the Traffic Board. The city has a very high credit rating so it could afford the infrastructure investments applicable to a light rail alternative. However, the high operating and maintenance costs associated with light rail could not be covered and therefore light rail could not be implemented. Implicitly, this indicates that the alternative was chosen because the financing did not support a more expensive alternative. However, the financing was crucial for implementing Stombusslinjer but not for implementing buses. This indicates that the financing was not a fundamental factor for why the city chose bus. The habit of choosing alternative based upon financing arrangement rather than a CBA or other evaluation method is not in the best interest of taxpayers. The money used in public transport investments are tax money coming from the taxpayers and should be beneficial from a societal point of view.

6.5.2 Tvärbanan

This project was a part of the Dennis Negotiations and thus financed through state subsidies received during the Dennis Negotiations. A main idea of the Dennis Negotiations was to invest an equal amount of money in public transport projects as they did in road projects. It was picked since a light rail investment incurred greater costs than that of a bus alternative. The idea of investing the same amount of money in road projects as in public transport projects is very burdensome on the economy for a city and therefore Tvärbanan would not have been operational today if the project would not have been a part of the Dennis Negotiations. Therefore, the financing and the costs associated with this alternative were the determining factors of why it was chosen. Again, rather than relying on CBAs when determining public transport alternatives, the alternative was chosen for its financing solution. Once more, this habit does not facilitate the most beneficial alternative being chosen from a societal standpoint.

6.5.3 Croydon Tramlink

The financing of this alternative was distributed between a private consortium and the government. The government formed a programme called Private Finance Initiative (PFI) where private money was invested in public projects. The government put in 50% (£125 million) of the investment and the consortium, Tramtrack Croydon Limited (TCL), put in the additional £125 million. The interest of the TCL is commercial since it is a private consortium that runs the Croydon Tramlink as an individual company. However, the 50% subsidy from the government was a key factor why this project was inaugurated. It should also be mentioned that bus projects are not subsidized by PFIs, and therefore rail dependent projects do have an unfair competitive advantage since they are subsidized by the PFI. Without the financing solution facilitated by the subsidies, the Croydon Tramlink would not likely have been built considering its high costs and the privatised public transport industry. First Group expressed that the venture was commercially successful, yet not overly so. Therefore, had First Group had to invest the entire amount £250 million, the venture would not have been commercially successful and operational. Consequently, the financing arrangement of the light rail was a very important factor why it was chosen. Yet again, the financing solution proved to be what determined the alternative and not a CBA or any other evaluation method.

6.5.4 Leeds Superbus

There were three different instances involved in the financing of the Superbus; First Group and Arriva (operators), and the City Council of Leeds. The investment was divided up in the following way: £2.5 million from First Group, £2.5 million from Arriva, and the remaining £5 million from the City Council of Leeds. The financing of the alternative were once again a determining factor since the project would not have been inaugurated would it not have been for the £5 million that the city council of Leeds contributed. The total cost of £10 million would never have been funded by one operator alone and would never have been recuperated by one operator alone. Again, the important factor for choosing the alternative is the financing and not CBAs or other evaluation methods. It should be noted though that the financing was important for implementing guided bus ways but not for the implementation of buses i.e. buses would have been the public transport alternative of choice regardless of the financing since a rail alternative would have required a substantial amount of funds.

6.5.5 Concluding table

The table on the following page was constructed in order to provide an overview of the most important aspects and traits for all cases in all research problems.

	STOMBUSSLINJER	TVÄRBANAN	CROYDON TRAMLINK	LEEDS SUPERBUS
Research problem I *How is the local decision making process (DMP) regarding the choice of a public transport alternative structured?*	Linear model, listening theory, CBAs were made, officials important, one alternative evaluated, violating the cost-benefit theory	Dynamic model, traditional theory, CBAs were made, political important (will), one alternative evaluated, violating the cost-benefit theory	Dynamic model, traditional theory, CBAs were made, political important (will), one alternative evaluated, violating the cost-benefit theory	Linear model, listening theory, CBAs were made, officials important, one alternative evaluated, violating the cost-benefit theory
Research problem II *What are the significant factors for a choice of one public transport alternative over another?*	Issue of capacity, bus was already operating, affordability of the bus, issue of time, issue of priority, inspiration through field trips	Political will, issue of capacity, existing rail it would connect two other rail routes, issue of priority, issue of quality & attractiveness, considered more environmentally friendly, highly influenced and inspired by field trips, issue of cost	Poor bus services, not awarded enough priority measures, light-rail considered environmentally friendly, consideration of existing rail, issue of capacity, considered a grand and sexy investment that would lift the spirit of the city	Issue of priority, roads were heavily congested and the bus services were poor, the costs associated
Research problem III *Are several public transport alternatives evaluated in the DMP or is it merely a question of evaluating one alternative?*	One alternative evaluated, CBA from the society's perspective and a corporate profitability calculation from Västtrafik's, thought of in steps,	Several cost benefits along, three steps would be implemented, regardless of the fortunes of the first,	Assumption is that the consortium must have performed some kind of a corporate profitability calculation, not at all considered to have options	Some corporate profitability was used as an evaluation method, options of any kind is impossible to establish
Research problem IV *What stakeholders are considered in the DMP?*	Existing and prospective passengers, entrepreneur (Volvo), special interests groups, Norra Älvstranden Utvecklings AB	Passengers, entrepreneurs, individuals living in Essingen and Gröndal, Stockholm city planning committee, "Rädda innerstaden"	Existing and prospective passengers	Sensitive to the preferences of the public transport patronage
Research problem V *How is the chosen public transport alternative financed, and is the financing solution of the alternative a fundamental factor why the alternative was chosen?*	Financed through the city's ordinary public transport budget, financing was not a fundamental factor	Financed through state subsidies received during the Dennis Negotiations, financing was a fundamental factor	The government put in 50% (£125 million) of the investment through the Private Finance Initiative (PFI) and the consortium, Tramtrack Croydon Limited (TCL), put in the additional £125 million, financing was a fundamental factor	The investment was divided up in the following way: £2.5 million from First Group, £2.5 million from Arriva, and the remaining £5 million from the city council of Leeds, financing was not a fundamental factor

7. Conclusions

The conclusions will follow the same structure as the analysis chapter and will be listed according to the research problem.

7.1 Research problem I

The model that can be used to describe the DMPs that chose a light rail alternative over a bus alternative is the dynamic model. The DMPs favouring light rail were quite extensive, went back and fourth from reality and theory, included more instances, and had to change directions due to external demands. This goes for both Tvärbanan and Croydon Tramlink.

On the other hand, the model that can be used to describe the DMPs that chose a bus dependent public transport alternative as opposed to a rail dependent alternative, is the rational model. These DMPs were quite straightforward where a problem was formulated and both a practical and theoretical analysis was made that put forward recommendations that were implemented in reality. The research indicates that this model can be used to explain the DMP in both Stombusslinjer and in Leeds Superbus.

In the DMPs that favoured light rail, the politicians were very much involved and were the initiators in the projects. The politicians gave political directives to only evaluate the feasibility of light rail. Even though there was opposition among officials, the light rail scheme was chosen anyway. This testifies to the importance of strong political will in significant public transport projects such as light rail. This finding is consistent with other researchers' findings[160]. The strong political will, and the refusal to give attention to opposing officials and private interests, concludes that the politicians were the senders in the communication model and contrary to the findings of Brunsson & Jönsson[161]. Instead, the politicians being the senders represent the traditional view of the communication model in political DMPs.

In the DMPs that favoured bus, on the other hand, the politicians were influenced by officials and private interests that determined the outcome. The insight that the politicians had in the DMPs that favoured bus was very limited thus implying that a listening theory adopted by officials and private interests

[160] Hass-Klau et Al (2000) and Hylén & Pharoah (2002)
[161] Brunsson & Jönsson (1981)

was present in this DMP. This conclusion is also in line with other researchers' findings[162]. It also shows how influential the officials and private interests were in the DMPs favoring bus.

In the case of **Stombusslinjer**, the conclusion is that the DMP was quite straightforward and followed the path of the rational model. Again, it is worth noting that even if the model (DMP) is rational when it comes to the decision itself, the outcome does not have to be rational as is argued in research problem III. The DMP is similar to the DMP for **Leeds Superbus**, and the linear model seems to be the best model to describe it.

For **Tvärbanan**, the conclusion is that given the complexity of the process, the length of time involved, the revisions that had to be made to gain approval, etc., indicates that the dynamic model can be used to describe the DMP. Again, it is worth noting that even if the decision to implement an alternative is rational due to collective or individual rationality, the outcome of the DMP does not necessarily have to be rational. This issue is, however, dealt with in research problem III. The same was found for **Croydon Tramlink**, where the conclusion is that the dynamic model seems to describe the DMP. Had more information through additional interviews been obtained, a more thorough and possibly different answer might have, however, been concluded.

7.2 Research problem II

There were a significant amount of factors involved in the DMPs with respect to choosing public transport alternative, and each case will be concluded separately to highlight the most important ones. What can be said for all cases is that there are two factors that were proven to be important for them all. First, the alternative is chosen on the basis that it is believed to solve the stated problem and to achieve the desired goals, and less based upon the case-specific factors. Second, field trips were conducted in all cases that converted the opponents and affirmed the proponents.

In the **Stombusslinjer** project, a combination of "hard" factors was at heart when the public transport alternative was chosen. Capacity, time, priority and economics superseded "soft" factors such as inspiration gained from field trips

[162] Brunsson & Jönsson (1981)

and cultural heritage. Capacity was so important that light rail has to be implemented should the patronage increase significantly in the future.

Since there are concerns of whether the system can handle the future capacity demands or not, and as there are different views on what the system can handle, the information is either missing or poorly communicated.

Priority was a major factor for choosing a modern bus system since the city's existing bus system is considered blurred and unstructured.

For **Tvärbanan**, the conclusion is that "soft" factors were more dominant than "hard" factors. The strong political will, the inspiration form other cities obtained through field trips, the attraction believed to be associated with light rail among passengers, the desire to find an alternative that was considerably expensive, the belief that passengers dislike interchanging modes, and the political unwillingness to award significant priority to the bus are all "soft" factors and important to the selection of light rail.

For **Croydon Tramlink**, the conclusion is that although the excuses (hard factors) of capacity problems of the bus and the unwillingness to award bus the priority it needed were expressed, soft factors were probably more dominant to determine the public transport alternative. The light rail movement in Europe and the inspiration from field trips to implement a grand, sexy alternative that would lift the spirit of the area and relieve the area of its transport problems were important factors.

For **Leeds Superbus**, the conclusion is that the major reasons (hard factors) for implementing the guided bus ways were the affordability of the bus, and the segregation and priority that could be and wanted to be awarded to the bus.

7.3 Research problem III

In neither of the cases were two or more alternatives comprehensively evaluated based upon a CBA or any other type of evaluation technique that provided an alternative that was either most efficient, or least inefficient, from a societal perspective or from a corporate perspective. Reasons for only thoroughly evaluating one alternative were listed in the analysis (Chapter 6). However, in all the cases, other public transport alternatives were considered but never thoroughly evaluated.

The conclusion is also that CBAs are used as evaluation tools, but the application has severe limitations. Firstly, CBAs are only valuable tools if several alternatives are evaluated. This is not the case. Secondly, since there seems to be no rule that the result has to be positive, the CBA becomes useless. Finally, the CBAs are differently structured with respect to what costs and benefits to include and how the valuation of costs and benefits is done. This prevents the CBAs from being objectively compared to each other.

The decisions in all of the cases seem to have been taken rationally according to rational DMP theory. However, since only one public transport alternative is thoroughly evaluated, which according to theory represents irrationality, the conclusion is therefore that the outcome in all of the cases is irrational, based on theory, since the component of irrationality is present. Considering but not evaluating other alternatives represents irrationality.

The political will to implement one specific alternative, regardless if the CBA yields a negative result, is greater than anything else. Rather than evaluating and choosing alternatives based upon their economic benefits to the society on the whole, the politicians choose alternatives based upon political will, the problem defined in the project and the goals to be achieved. In the political DMPs, the desire to choose and implement a "monument" to the term in office is included. The economic benefits of various alternatives are subordinated to the above foundations.

In the case of **Stombusslinjen**, both a CBA and a corporate profitability calculation were used to evaluate the economic feasibility of the project after the choice of bus was made. Both were positive. The corporate profitability calculation is erroneous and is therefore questioned. The project was also thought of in steps where the decision-makers had options to abandon, expand and defer should the patronage (underlying asset) change unexpectedly. Real options could maybe therefore have been applied in the evaluation of the project, and can maybe be used in evaluation of other public transport projects. However, Stombusslinjer was not evaluated according to real options theory.

In the case of **Tvärbanan**, several CBAs were conducted, and only one showed a slightly positive result (1,04). However, the results of the CBAs are

questioned since results vary dramatically and since other scholars[163] have determined that the CBAs were not conducted using the existing guidelines from the department of communication. Further, the last CBA received only one page in a 60-page document. The conclusion is that the CBA was deliberately manipulated to yield a positive result and to be used as propaganda for the light rail scheme. Another researcher who has written reports on CBAs and their applications to Tvärbanan supports this[164].

Tvärbanan was not considered in steps where it had options to abandon, defer and grow should circumstances (patronage, etc.) change. Tvärbanan was at all times considered as a "complete product" where expansions would not be dependent on the success of the original route.

In the cases of **Croydon Tramlink** and **Leeds Superbus**, the private stakeholders attested to strongly believing that their investments would be repaid. Therefore, it is the conclusion that corporate profitability evaluations must have been conducted since the projects were funded through private funds, but the research has not revealed which ones were made. Both investments were not thought of in steps and were consequently not evaluated such.

7.4 Research problem IV

Interest groups and other stakeholders had a relatively diminutive impact upon the DMP, which is further supported by other researchers.[165] The only common denominator was the passengers. Further, it can be noted that the stakeholders did not affect the outcome of what public transport alternative to implement in neither of the cases.

For **Stombusslinjer**, passengers, both existing and prospective, were considered, but had no impact on the decision of what alternative to choose. The operator was considered since it was already the operator on the routes to be replaced by Stombusslinjer. The entrepreneur (Volvo Buses) was highly considered and it affected the DMP with respect to the system employed, but not with respect to public transport alternative. A bus alternative would have been chosen no matter what. The company Norra Älvstranden Utvecklings AB

[163] Ahlstrand (1988) and Ljungberg (2001)
[164] Ljungberg (2001)
[165] Ahlstrand (1983) and Falkemark (1999)

was also considered since it affected the layout of the route on Norra Älvstranden, but did not affect the choice of alternative.

Even though some stakeholders were considered in the DMP, the outcome of what alternative to implement was not affected. This is because the city could not bear the operating and maintenance costs of extending its light rail network and had to choose a bus alternative no matter what.

However, had the city been able to bear these operating and maintenance costs of light rail, the relationship Volvo Buses had with some traffic office officials would have been able to facilitate the choosing of the bus anyway. Volvo Buses has great support for its new system among the top officials at the traffic office.

For **Tvärbanan**, passengers were considered since they would be the end users of the alternative. Operators were considered very late in the DMP and incidentally not a determining factor to what alternative to chose. The entrepreneurs were definitely considered since they would provide the cost specifications for the light rail vehicles in the CBAs. Affected citizens and the Stockholm City Planning Committee were also considered but had no impact on what alternative to chose. It should be noted that the Stockholm City Planning Committee was proponents of light rail.

The DMP was definitely affected by the external demands and interests of stakeholders since several groups made a habit of protesting every decision that was made in the DMP. Due to this, the DMP was delayed and Tvärbanan could not start to operate as soon as the politicians initially thought. However, the stakeholders did not affect the choice of what alternative to implement. Nevertheless, the preferences of passengers likely made the choice easier since politicians knew they favoured light rail in front of a bus alternative.

For **Croydon Tramlink**, the only stakeholder considered during our research was the passengers. They were considered since the project would not have gained government support unless the 80% approval rate demanded by the government was met. The public consultation was, however, manipulated to suit the best interests of light rail proponents, thus testifying to the great political will involved to implement the light rail scheme.

For **Leeds Superbus**, no stakeholders were reported to have been considered. One official of the operators for Leeds Superbus, namely First Group, indicated that they were sensitive for the views of the passengers. However, they did not impact the decision of what public transport alternative to choose.

7.5 Research problem V

It will be seen that the financing of the alternative was very important factors in the cases where light rail was chosen and implemented, but not in the cases where bus was chosen. The financing in the bus cases only affected what bus system to implement, not whether to implement bus or a light rail alternative. The national government subsidies therefore indirectly give light rail an unfair comparative advantage.

For **Stombusslinjer**, the alternative was financed by the city's ordinary public transport budget, but the financing was not a fundamental factor for what alternative to choose. Buses would have been utilized anyway as they were prior to the new bus system. However, choosing an alternative for other reasons than using evaluation tools such as CBAs to compare several alternatives is not in the best interest of taxpayers.

For **Tvärbanan**, the alternative was financed from national government subsidies received from the Dennis Negotiations. The alternative would not have been chosen would it not have been for this financing arrangement, i.e., the financing was a fundamental factor for why the alternative was chosen. Had the financing not been available, it is likely that a bus alternative would have been chosen. Politicians decided upon alternative from a financing perspective rather than from an impartial evaluation perspective between alternatives, which again has adverse effects on taxpayers.

For **Croydon Tramlink**, the financing of the alternative was achieved by a 50% national government subsidy from the national government. The light rail scheme would otherwise never have been built given the fact that the private venture operating the highly subsidised light rail scheme barely is commercially successful. Moreover, had the state subsidies not been available, it is likely that a bus alternative would have been used, thus showing that the financing was a fundamental factor for the choice of alternatives.

For **Leeds Superbus**, the City Council of Leeds subsidized the project with 50%. The private operators (First Group and Arriva) contributed the remaining 50%. The guided bus ways would not have been built had it not been for the financing support from the city council. However, without local government subsidies it is likely that regular bus services would have been operating as they were prior to the guided bus way schemes. Nevertheless, choosing alternative based upon factors other than impartial evaluation methods among several public transport alternatives is not desirable.

8. Recommendations

These recommendations are based upon the research and will hopefully serve as a component of the future business strategy of Volvo Buses.

8.1 "Think tram – drive bus"

There is no need to work against light rail. It is a reality and very little can be done to stop it. Moreover, it is the view of the researchers that it should not be stopped due to the positive characteristics of it and the lack of any intermediate systems that can provide similar types of public transport. Moreover, it is the belief of the researchers that light rail will not be detrimental to bus manufacturers.

Instead of working *against* light rail, the researchers recommend working *with* light rail. Adopting as many characteristics as possible from light rail will be beneficial. The researchers do not believe that the "rail factor" exists and therefore many of the positive characteristics of light rail can be adopted. One area is design in which bus manufacturers trail light rail substantially.

Further, Volvo Buses must also realize that light rail is not always a competitor, but rather an opportunity for additional feeder bus routes. The threat should therefore be viewed as an opportunity.

8.2 Develop systems approach to business

One of the benefits of light rail is the systems approach to business that it facilitates. Light rail vehicles do not function if the infrastructure is not in place. The infrastructure associated with light rail is what does it so superb: structured and identifiable. Similar infrastructure needs to be associated with the bus too if it should be more successful and gain additional image and respect with public transport patronage.

Do not only market the bus itself. Market a package consisting of priority & segregation measures, bus stops, route system structure, real time information technology, etc.

8.3 *Market* and *inform* decision-makers

This research has established that politicians, city planning and traffic planning officials are significantly affected by field trips made during the DMPs.

Therefore, develop system that enables organized field trips to sites where Volvo Buses does have the systems approach to business; Curitiba, Brazil and Gothenburg, Sweden. Actively *market* the system.

The research has also shown that city planning officials value significant infrastructure projects like light rail as they can be used as city planning tools. These should be targeted and convinced that modern bus systems have many of the same structural advantages.

The importance of influencing politicians cannot be stressed enough. It was established in this research that the political will is significant. Therefore, Volvo Buses must continuously supply politicians with information about their products and services via pamphlets, information meetings, seminars, field trips and other communication channels.

The research has also established that politicians and officials have mixed opinions with regard to capacity of a modern bus system. They seem to often underestimate the capacity. Therefore, Volvo Buses needs to effectively *inform* these instances the actual capacity of a modern bus system in order to reduce, or even eliminate, the discrepancy of opinions.

Decision makers, traffic planner and citizens in general need to be informed about the environmental traits of modern buses. The bus is perceived to be the "dirty" alternative despite the environmental advances achieved. Individuals who hear that light rail is much more environmentally friendly should immediately be able to contest the argument.

A "push" strategy instead of a "pull" strategy is recommended since decision-makers and officials need to know that the concept, system and relevant technology is present and functional in real life cases. This research indicates that respondents were apprehensive to implement some of the new technologies since they were not fully developed and functional.

8.4 Be "pro-active" – "not reactive"

Volvo Buses must identify the decision-makers in cities where they believe that large public transport investments are to be made so that they can enlighten them about their products and services. In addition, more PR must be conducted that demonstrate what Volvo Buses' systems can do to improve the

public transport scheme for an entire city. This can be done by arranging field trips for politicians and officials that are partaking in the DMP in different cities. This should be done constantly as goodwill and not because a project is going to be determined upon. The politicians and officials need to know and see how a guided bus system operates to better be able to decide upon it should a project arise in the future. Being *reactive* and try to **persuade** some one is harder than being *proactive* and try to **influence** and **educate** some one.

8.5 Utilize advanced design

This research has also established that politicians are looking to implement "monuments" that reflect their term in office. Politicians have been proven to select daring projects with advanced and unique design. Therefore, Volvo Buses should consider these aspects and take advantage of them by utilizing uniquely designed vehicles that are considered "monuments" and that attract politicians.

8.6 Develop own guided bus way technology

If a serious attempt should be made to try to directly compete against light rail, a guided bus way alternative and technology should be developed, manufactured and marketed, potentially with a competitor, due to the high research and development costs. The guided bus way alternative should utilize significant infrastructure to facilitate structural effects that are proven to be valuable to passengers and city planners. There is a gap between bus and light rail and current research indicates that there is a need for the implementation of intermediary systems that have the benefits of light rail while at the same time has much lower costs.

Nevertheless, existing guided bus way technology, such as the U-Bahn used in Essen, Germany, Leeds, UK and Adelaide, Australia, should also be looked into whether it can be utilized in other countries.

9. Epilogue

This epilogue will treat the light rail movement referred to in the first chapter and contains the researchers' own thoughts about it based upon information acquired during the research.

There is very little that speaks against the fact that the tram or light rail is becoming a popular public transport alternative again after having been nearly extinct for several decades. The political will to introduce these large-scale investment projects is significant, as established in the research, and these schemes have been known to build political careers. However, not only is the political will promoting light rail. Other natural causes such as passenger preferences and the attractiveness of light rail is also contributing to the reintroduction of it. These topics are explored in detail in Appendix I.

Even though light rail is becoming popular and takes over market share of the public transport market, the researchers do not believe that it is detrimental to bus manufacturers. There is no way light rail will take over significant parts of the public transport market for many reasons. Firstly, light rail is an incredibly expensive and state subsidies that are hard to receive are usually involved. Secondly, the planning process of light rail schemes is quite lengthy, which probably deter politicians. Thirdly, the population density in Europe on the whole is not very high and light rail cannot take care of most individuals' transport needs. It is simply too inflexible. Further, the belief is that the trend of light rail in Europe will not adversely affect bus manufacturers to a great extent, since the implementation of light rail requires a significant amount of feeder traffic that cannot be taken care of by light rail alone, and which is very much suitable for bus routes. The lack of sideway movement of light rail is desirable, but for feeder traffic purposes it is not. Fourthly, even though some light rail schemes are being built, it is the opinion of some public transport experts that these will only change the structure of bus routes, not necessarily reduce or even deplete them. Finally, according to public transport experts, it is quite difficult to achieve a positive result from a CBA for light rail that justifies the building of it. Even though there seem to be no rules that prohibit public transport investments that do not yield a positive result of a CBA, it seems difficult to implement such without them.

In light of the information above, light rail should not be viewed upon as a competitor or threat, but rather upon as an opportunity. Light rail can, and does, function very well as a compliment to buses and vice versa. There is no need to work against light rail and try to distinguish from it, and there is no point in trying to see the differences between the two modes of transportation. Instead, the belief is that bus manufacturers in general can take advantage of light rail by trying to adapt to it and take on several of the traits it does possess; speed, sleek design, comfortability, high capacity, its own right away where applicable as well as other traits. The attractiveness of light rail in individuals' minds lies with its real traits and not due to a "rail factor" that some researchers argue, and can therefore be transferred to the bus.

Further, light rail schemes are put to use in rather different situations often with respect to capacity demands and when the bus is not believed to be able to handle such capacity demands.

The bus as a means of transportation is often compared to light rail and the costs of the two alternatives alone are stressed and therefore conclusions such as "the bus is a better choice from the taxpayers' perspective" are drawn. This research has shown that costs, or economic fundamentals, are not what matters most when politicians decide upon public transport alternatives. Therefore, it is useless to try to make arguments like the one above.

It all comes down to what a company is trying to achieve: how the market is defined for its products and how the products themselves are defined. If the products are defined as ***"modern, technologically advanced, qualitative and safe buses"***, then bus manufacturers are likely to see light rail as a competitor and try to shy away from it and eventually learn to hate it. If instead the product is defined in broader terms, say as ***"modern, technologically advanced, qualitative and safe vehicles travelling above ground being able to take on all public transport problems"***, it enables the organisations to look in broader terms at the product and realize that the product must be developed according to customer preferences and in response to expected or unexpected market changes. The latter product definition may not be the solution that enables a company to look in a broader sense at the product(s) it offers and its capabilities of adapting to trends in the market, but it exemplifies that a change in some aspects, such as market and product definition of the organization, is justified.

Regardless of what the outcome would have been, and what conclusions would have been drawn, there is one thing that the researchers would like to point out: ***bus and light rail should not compete, but instead cooperate. What seems a threat can be an opportunity. Bus manufacturers should work towards replacing the car and not light rail***.

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11. Appendix I

11.1 Considered stakeholders in the DMP

Since public transport experiences lower and lower market share and since the national governments explicitly demand that car traffic is reduced in major cities and that public transport is increased, it is obvious that the DMP must be focused on passengers since the ambition is, above all, to attract more passengers.

Additionally, one of the most important developments of public transport is the one concerning the commercialisation of it. The industry has been developed into a service with opportunities from having been considered a problem with obstacles. The turnaround represents a shift from a production-oriented engineering science to a market oriented service. Instead of measuring vehicle kilometres and travel time alone, traffic planners are measuring customer satisfaction and quality when evaluating public transport alternatives and systems.[166] The following figures represents how the traffic planners and decision-makers used to interpret the DMP regarding public transport and conversely how the process is interpreted today or at least in what direction the DMP is going.

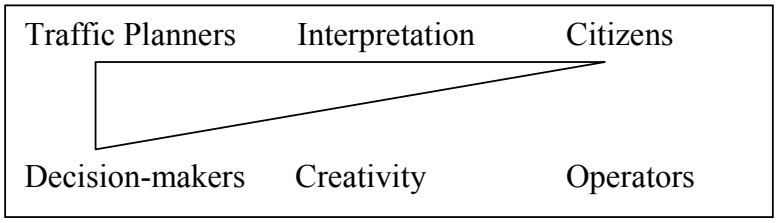

Figure 11.1 Description of a traffic authority through a production perspective
Source: Börjesson & Eriksson (2000)

The above figure represents the old DMP regarding public transport where the focus was on the production of public transport and where the traffic planners and decision-makers took all decisions with little or no focus on the entrepreneur(s) or the passengers themselves.

[166] Börjesson & Eriksson (2000)

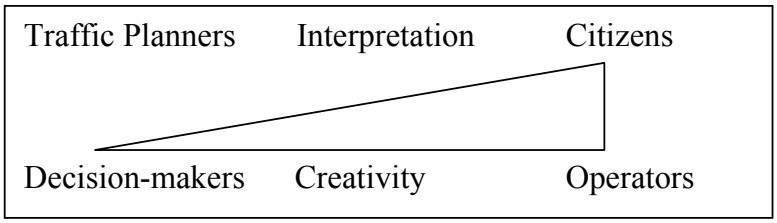

Figure 11.2 Description of a traffic authority through a service perspective
Source: Börjesson & Eriksson (2000)

The latter figure represents the customer or passenger oriented process where the value created is customer value and not production solutions. The entrepreneur is also focused on given the fact that the entrepreneur has valuable information about its vehicles and the passengers using them.

The traffic authority and decision-makers represent two processes: the first (older one) process is about the political democratic process that deems the production of public transport to be the most important issue. This process maintains the organization and adheres to the applicable rules and regulations. This process secures that the public transport is on the same course as the governing political system and that aspects of democracy and justice are protected. The traffic authority and *politicians* have a "*right of way*" in their role as representatives of the citizens.

The second process (newer one) is all about the customers (passengers) and creating value for them. The second process deems service to be the most important aspect in the process as it realizes that the passengers are the end consumers of the service and they need to be focused on in order to increase attractiveness and patronage with the mode of transport in question. The *customer* in this process has a "*right of way*" by its freedom of choosing offered alternatives or rejecting the service.

As opposed to Europe where the passengers' preferences to a much greater extent have been focused on in DMP, Sweden has had a problem with focusing on the passengers in the DMP. It has been, and still is, very difficult to put the end consumers or the passengers in the centre of the process. This despite the fact that everyone knowing that the end consumers or passengers being the ones who are using the public transport. Sweden has had problems with changing the perspective on the public transport issue from a production and

maintenance one to a marketing and service perspective despite being a genuinely commercial country.[167]

Moreover, in the 50's and 60's public transport was looked upon as a physical problem where as many people as possible had to be moved from one point to another at any cost. In the 70's and 80's the problem of public transport was looked upon from another perspective; using rationality and logics in the quest to move passengers. And lately (in the 90's and 00's), passengers' values and preferences are dominant aspects of how traffic planners look at the public transport problem. Lastly, public transport alternatives were evaluated differently now from how they were evaluated before. In the 50's and 60's, traffic planners used CBAs primarily, whereas the alternative chosen was evaluated on its own basis in the 70's and 80's. Lately, traffic planners are instead looking at different interest groups and stakeholders, primarily passengers, in their process of evaluating different alternatives.[168]

Another reason the passengers have to be focused on in the process is the fact that public transport in Sweden has been exposed to competition. Private operators that are profit maximizors currently operate a majority of bus routes in the public transport system and therefore have to put the passengers in the centre to attract them. More passengers directly correspond to more ticket sales and revenues through incentive schemes that are becoming more common to increase the quality and service[169].

11.2 Preferences of public transport alternatives

In this section, the analysis will be limited to passengers' preferences of buses and trams/light rail/rail, as the underground is not deemed to be a major threat or competitor to both the bus and the tram/light rail. The underground only applies to the absolute largest cities that can afford it and where traffic congestion is extremely high. The underground is often a geological question in addition to an economic one.

Since it is established through literature and this empirical study that the DMP is more and more focused on the preferences of passengers as opposed to the preferences of traffic planners and decision-makers, it is of great importance to

[167] Andersson et Al (1997)
[168] IBID
[169] Lorentzon, Magnus. Meeting. October, (2002)

try to identify these preferences to be able to forecast the results of the DMPs concerning the choice of public transport alternative to come. If passengers are considered important in DMPs in the future, their preferences will likely be judged important. Thus, their preferences are crucial in trying to determine what public transport alternatives will be favoured and selected in the future.

11.2.1 Tram/light rail is preferred

It has long since been known that if passengers can pick between bus and tram/light rail, they will choose the latter. This is because trams/light rail attract more people than the bus[170]. There have been several studies that show that passengers are willing to pay extra for travelling with tram/light rail instead of by bus.

In England, the effects of a deregulated regional bus market were studied where the train was exposed to competition by the bus. In the study, the researchers compared the bus and the train for regional trips and they concluded that the passengers were willing to pay up to £4 per hour to be able to exchange the bus trip for the same trip with the train.[171]

The issue of preferences was also addressed in England in the year 2000 where 1800 car drivers were interviewed about the attitude to public transport. Attitudes to light rail compared to the guided bus and regular bus alternative were more positive in all areas except in Sheffield where the buses were the most popular alternative. The study also concluded that light rail had a strong potential following among car users, even in cities with no experience of light rail or tram.[172]

Another study mentions the importance of network stability and overall design as very important reasons for passengers' preferences. Frequent changes of the network structure, outline and changes of the frequency with which the bus or tram/light rail travels are negatively affecting the preferences of the passengers. Passengers value stability, which enables the passengers to learn the system and timetables, which in turn keeps existing travellers but also attracts more travellers. The study further states that this phenomenon happens in bigger

[170] Andersson et Al (1997)
[171] White (1995)
[172] Hass-Klau et Al (2000)

cities as a result of bus lines and routes being deregulated.[173] This finding is supported by a German study that concludes that the disadvantage (inflexibility) of the tram/light rail becomes its main advantage (security) as the population values the stability and finds it comforting. The population gets confident that a shift of political power or a city's financial situation will not result in a new or old system taken away from them, and can therefore plan their lives knowing that the system will be there in the future[174]. This stability in the network structure also is seen as a tool for decision-makers, traffic planners and cities' politicians to signal to citizens that the city has invested in, and is committed to, the public transport system. The bus system, which is much harder to identify with due to its lack of infrastructure investments, and its frequent changes in routes, names and numbers numbers, is therefore believed to attract fewer passengers.

A Swedish study in 2001 confirms these conclusions and states that passengers often find bus systems and routes hard to understand as opposed to the tram/light rail, which is very easy to understand. This is attributed to the infrastructure surrounding the tram/light rail that indicates where the tram comes from and what direction it continues, but also due to the line maps of the bus systems that are found difficult to comprehend compared to the line maps of trams/light rail. The passengers in the study, however, said that the presence of a driver in the bus made it easy to ask questions about the trip, which lessened the negative aspects of the bus system.[175] This is supported by another study from 2000 that concludes that the line system of trams/light rail often are easy to understand and orient with due to its characteristics including the infrastructure around it. This benefit, according to the author, attracts new travellers and contributes to better structure of the city planning. The author also argues the tracks alone, or electrical lines for trolley buses, signals that the system can be trusted for the presumptive traveller as opposed to the casual bus line whose buses sometimes go on other streets than they were meant to go on. The author continues and argues that the tram/light rail system has a long history of being a frame for the city planning as it attracts housing as opposed to normal streets that buses travel on, which attracts people dependent on the car, and users of the bus that pollutes the environment[176].

[173] Harrison & Baughan (1995)
[174] Hass-Klau et Al (2000)
[175] Eliasson (2001)
[176] Svanfelt (2000)

When evaluating preferences of passengers, one first has to look at the passengers themselves. In Sweden, women use public transport to a greater extent than men do. And it is documented that women prefer tram/light rail to buses just as men do, but women's preferences of tram/light rail are greater than men's preferences for tram/light rail[177]. This is another reason why passengers in general tend to prefer tram/light rail to bus.

Another reason why passengers might prefer the tram/light rail to the bus might be the issue of travel time. Generally, the bus cannot achieve the same speed as the tram/light rail on a system wide basis. In congested cities the bus can achieve the same speed since the speed of the tram/light rail is limited due to frequent stops and traffic congestion during on street running. Often when travellers are asked by what criteria they choose mode of public transport they answer that that travel time is the most important criteria[178]. Travel time includes not only the time spent on the public transport mode, but also the time spent to and from the stop and the waiting time. Speed is proven to be a very important factor for increasing market share for public transport. Therefore, there is a debate concerning the possibility of increasing the speed of existing and future public transport modes. The rail dependent public transport alternatives are therefore looked closely upon as they often have exclusive right of way through their own tracks, separated from regular traffic. There are several attempts in trying to convert these aspects to bus dependent public transport[179]. The fact that time is a critical factor in increasing the market share for public transport is concluded in a study from Holland. It concluded that the market share of public transport is about 26% if the travel time factor[180] is 1.8 and 55% if the travel time factor is 1,2[181]. Since it is the goal of virtually every municipality to increase the market share of public transport due to traffic problems and environmental issues, this should result in that faster means of public transport including tram/light rail and advanced bus systems will be regularly implemented in larger cities in the future.

A Swedish study, conducted in 1993 and 1994, tried to measure the difference between the preferences of the train and the preferences of the bus. The modes

[177] Hass-Klau et Al (2000)
[178] Eliasson (2001)
[179] Bjerkemo (2000)
[180] Travel time factor. See section 1.9 (Definitions)
[181] Halfwordson & Möller (1999)

of transport in the study were the old buses (Kustbussen) that travelled between Karlskrona and Halmstad and the new train (Kustpilen) that travelled between Karlskrona and Malmö. The study shows that the willingness to pay was 30% higher for the trains over the buses. The differences in the willingness to pay could not be attributed to the classic issues such as time of travel and travel route, but could be attributed to what the author (Kottenhof) calls "interior decorating". Interior decorating refers to legroom, the width of isles, the number of chairs, etc. The study concluded that spacious buses with high standards of interior decorating, or buses with train-like decorating could reduce the difference in willingness to pay between the two modes.[182] This is evidence that the rail factor is not present and that real traits are what counts.

The issue of design and its importance to attracting passengers has also been studied. Design enables us identify for example manufacturers and understand the traits the product expresses. The design makes it easier to understand and use a product. Product design describes how the product should be used and triggers action[183]. The modern tram/light rail alternatives are clearly focusing on design in their quest to attract passengers. Bus manufacturers too, to a lesser extent though, are also focusing on design in the production of buses. It is quite clear the modern tram/light rail has outdone the buses when it comes to daring and advanced design and it might very well be one of the reasons the concept has been, and is, successful and seems to attract so much attention with traffic planners and decision-makers. Being a politician and making a statement by implementing a modern tram/light rail with advanced design features can be very effective and actually the case among strong mayors in large cities in continental Europe[184].

Another Swedish study from 2000 also concludes that the tram/light rail has better abilities to attract users of cars for commuting purposes due to the comfort and image of the tram/light rail compared to the bus. He also argues that a public transport system structured on rail dependent public transport alternatives will attract more travellers than a system structured around the bus, even if the travel time is identical.[185]

[182] Kottenhoff (1994)
[183] Börjesson & Eriksson (2000)
[184] Hylén & Pharaoh (2002)
[185] Svanfelt (2000)

11.2.2 Bus is preferred

In some studies it has been shown that the bus as a mode of public transport is favoured over the train. In 1993, Transek studied the passengers' preferences of the bus versus the preferences of the tram in Gothenburg, using the stated preference method. The results showed, among other things, that the citizens of Gothenburg had a slight negative view of the tram and they were willing to pay about 0,4 SEK per trip to be able to take the bus instead of the tram. It was shown, however, that the values of the passengers were strongly affected by the mode of public transport they were using; people who generally took the bus favoured the bus and people who generally took the tram favoured the tram[186].

Another study also mentions the existence of a slight preference of bus over train. The study was conducted in 1982 and compared the preferences of travellers between the cities of Malmö and Lund, a distance of bout 15 km. However, the people who had given up the car on the distance and who had changed to public transport said they valued the train over the bus. The author thinks that this result can be interpreted as train routes alone as opposed to bus routes alone can achieve an increase in public transport.[187] This is supported by a study from 1996 that discussed the problem of image not being included in models explaining passengers' preferences over different public transport alternatives. The study concluded that the image factor with the public transport alternative was very important in attracting passengers from having used the car in the past. This author ultimately concluded that the people who used to take the car when commuting were much more attracted to advanced bus systems that were very similar to tram/light rail than to old buses for image reasons in Adelaide, Australia[188].

In 1998, a Swedish study compared the preferences of bus passengers with that of the tram/light rail passengers and found no evidence that passengers preferred the rail dependent alternatives to the bus. What the study found was that passengers viewed the alternatives as compliments to each other and that the real traits of the different alternatives were what determined the preferences. For instance, a tram trip was favoured over a similar bus trip since the tram trip was, in the opinion of the passenger, faster, more convenient and

[186] Widlert (1993)
[187] Brundell et Al (1982)
[188] Case & White (1996)

better serviced and not because it happened to be on rail.[189] This statement captures the essence of buses being able to take on many of the positive traits of tram/light rail, and contradicts the rail factor.

11.3 Risk, worry and safety of transport modes

Another determinant for preferences of different public transport modes lies in the perceived risk and feelings of worry for each alternative. A study in 2000 tried to determine passengers' subjective perceptions of transport related risks (both accidents and violence), feelings of safety and worry associated with different modes. The study was conducted by questionnaires where respondents had to rate the perceived accident risk, risk of violence and a number of characteristics of risks associated with different transport modes. The study showed among other things that city buses, among other modes, received the highest ratings of risk of violence. It might have been so because of the media focusing on that particular type of violence. Men in the study rated the perceived risk to be lower and feelings of safety to be higher than did the same aged women.[190]

Another study from 1978 supports this conclusion in the previous study that respondents rated the bus to be more risky than the train. The latter study asked participants to judge if they considered the risks to be known or dreaded. The results showed that the railroad was a known mode of transport and a not so dreaded technology whereas motor vehicles among other modes of transport were thought to be less known and dreaded technologies.[191]

The amount of accidents is also an important determinant for passengers' preferences over an alternative. According to Vägverket (Road Administration) & Järnvägsinspektionen (Rail Inspection), the amount of deaths in Sweden per billion of person kilometres for buses far surpass that of the train. For each billion of kilometres travelled with the bus there are 0,1 deaths. For the train, the corresponding amount of deaths is 0,07.[192] It is not clear whether the tram/light rail is included in the train statistics, but since the tram/light rail shares many of the characteristics of the train the amount of deaths for tram/light rail is believed to be similar to the train and thus also less lethal than

[189] Loncar-Lucassi (1998)
[190] Alm & Lindberg (2000)
[191] Fischhoff et Al (1978)
[192] Svanfelt (2000)

the bus. The more accidents for the bus compared to the train might also be one of the reasons that people tend to favour rail dependent public transport alternatives to the bus.

The above studies indicate that passengers tend to rate the bus as more risky technology or mode of transport than the tram/light rail and can be another reason for why users of public transport tend to favour tram/light rail to bus.

11.4 The rail factor

The term "rail factor" has been found several times in the research. The rail the abstract phenomenon or factor that attracts people to the tram/light rail. The below study is the only concrete evidence found that a rail factor *could* be present in *some* situations.

In Stockholm in 1983 a study was made to try to identify whether there was a rail factor at play in deciding over the outcome of the old tramline "Nockebybanan". Passengers were asked if they were willing to keep and travel on the old tramline "Nockebybanan" and pay for it due to its massive operating costs, or travel with a new bus that was far less expensive, would go on the exact same route and would be just as fast. The alternatives would nearly be perfect substitutes. The study showed that the passengers were willing to pay between 100 and 300 SEK per year and household to be able to keep the old tramline despite the new bus route displaying the exact same characteristics at a substantially lower cost to the community. Further, it was even established that people who did not travel with the tramline were willing to pay to keep it. The author concluded that "soft" factors such as a rail factor explained the behaviour or willingness to pay for it. "Nockebybanan" was said to be of a great nostalgic value for the community that contributed to the comfortable atmosphere of the area in which it served.[193]

11.5 "Think tram, drive bus"

Since it is established that the tram/light rail has positive features that attract passengers and because passengers tend to favour tram/light rail over bus, and because it is established that the positive traits of the tram/light rail are real traits, and not a question of a "rail factor", it should be analysed whether the bus can take on any of the traits of the tram/light rail. Consequently, there are several studies that try to develop regular bus traffic into more advanced

[193] Ahlstrand (1983)

tram/light rail type of systems that take on the positive aspects of the tram/light rail[194]. The term "think tram – drive bus" is often used as a slogan and the concept has been implemented in Jönköping, Lund and in Stockholm and is about to be implemented in Gothenburg. The concept has also been introduced in Nagoya, Japan[195]. The buses in these modern systems operate on separate bus routes that enable the buses to move quickly through traffic congestions should they arise. The systems also often include signal priority that gives the bus priority in intersections by giving it a green light. The stops are also designed so that the bus shall not have to move sideways, which saves time, and there are often several entry/exit points enabling short stops with many passengers entering and exiting simultaneously. In some cases, the modern bus systems are even guided, which means that they are also driven like trams; the driver only accelerates and brakes as the bus turns using various techniques such mechanical, electronic or electro-magnetic track-guidance.

It should be noted, however, that these systems seem to be used as an intermediaries before tram/light rail takes over the route. The separate bus routes are seen as means to justify the end. It becomes much cheaper and easier to build tracks and electric lines on bus routes where the space is already there. This is evidenced in Gothenburg where Västtrafik & Trafikkontoret plan to introduce trams in the future on a newly planned bus route[196]. Moreover, this is also exemplified in Lund where "MaTs – Mlijöanpassat Transportsystem" represents an environmentally adjusted transport system that is planned to create separate bus lanes that will be converted into tracks for tram/light rail in the future[197].

[194] Börjesson & Eriksson (2000)
[195] Svanfelt (2000)
[196] Trafikkontoret & Västtrafik (1999)
[197] Svanfelt (2000)

12. Appendix II – search words

These are most of the search words but it was impossible to remember all of them.

"Rationality"
"Communication Theory"
"Listening Theory"
"Public Transport"
"Public Transport Alternative"
"Bus"
"Bus or Light Rail"
"Light Rail"
"Guided Bus Way"
"Bus Lane"
"Tram"
"Decision Process"
"Decision-Making Process"
"Political Will"
"State Subsidies"
"Tvärbanan"
"Stombusslinjer"
"Croydon Tramlink"
"Leeds Superbus"
"Cost-Benefit Analysis"
"Real Options Theory"
"Damodaran"
"Storstockholms Lokaltrafik"
"Stockholms Läns Landsting
"Region och trafikplanekontoret + stockholm"
"Gatu och fastighetskontoret + stockholm"
"Snabbspårväg"