Green Parking Purchase
A Study of Policy, Implementation and Acceptance of Travel Demand Management
Acknowledgements

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Abstract
This study utilized both quantitative and qualitative methods to investigate different actors and layers of policy, implementation, and reception of pro-environmental Travel Demand Management policy and measures in Umeå. One initiative by Upab (Umeå Parkering AB) and Umeå municipality, Grönt parkeringköp, which means moving parking spaces from the central area of Umeå and replacing them with facilities that promote sustainable travel, was investigated more thoroughly. The data was collected through a manually distributed survey in three properties that have implemented Grönt parkeringköp, as well as through interviews with property owners. Utilizing discourse analysis, thematic analysis as well as OLS-regressions, the results have shown that the comprehensive plan of Umeå puts emphasis on sustainable growth to 200 000 inhabitants, as well as minimising car traffic in the central areas of town, mainly through densification of already built-up areas. The property owners stated several motives to implement such policies, including ecological, financial as well as brand-strengthening benefits. Attitudes amongst survey respondents are generally positive towards measures that improve conditions for bicycle users, and more negative towards push-measures. There are different predictors for attitudes and perceived importance of Travel Demand Management measures, including altruism and self-interest. The use of the installed measures through Grönt parkeringköp however appear to be limited, possibly due to a lack of information.

Keywords: Travel Demand Management; Transportation Mode Choices; Sustainable Mobility; Grönt parkeringköp
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1. Introduction

1.1 Background

Urban development in the 21st century is strongly connected to the demand of a high degree of mobility and accessibility within an urban area (Banister, 2008). During the 20th century, the personal car has become the primary mode of transport and cities have become shaped by the preference of their inhabitants to travel by car (Lundin, 2008). The car in today’s society is strongly associated with personal freedom, masculinity and in some cases even national identity (Dowling & Simpson, 2013), as well as being considered as comfortable and the fastest mode of travel. The demand for travel has increased in modern society (Banister, 2008), which may also be one of the contributing factors to the emergence of the car as the undisputed favourite of travel mode choices (Lundin, 2008). Country after country are developing a traffic system adapted to the personal car with congestion, traffic jams and deteriorating environments in metropolitan areas as consequences (Urry, 2008). As passenger transport continues to increase, most of the passenger-kilometres travelled are by car (Moriarty & Honnery, 2008). In the Organisation for Economic Co-operation and Development, or OECD-countries, more than 90 percent of the increase of passenger travel in the last decades has been by car and airplane travel (Holden, 2007). In the EU-28 countries, personal cars accounted for 83,4 percent of road transport in 2014 (EC, 2017), and around 65 percent of all work trips in Sweden in 2015 and 2016 were travelled by car (Trafikanalys, 2017:13). Literature on the future of global transport demand suggests that travel demand has a massive capacity to increase to a large degree, and that alternative fuel sources to the now very oil-dependent transport system can be found (Moriarty & Honnery, 2008). Out of the total carbon dioxide emissions, the transport sector is accountable for roughly 20 percent. Out of these 20 percent, road transport is accountable for 75 percent, for which travel by personal car generates by far the most emissions (Graham-Rowe et al., 2011). These emissions need to be addressed as the global temperatures rise, partly as a result of CO₂-emissions. As technical solutions to the emission problem seem to be the preferred method by car manufacturers, there is significant process made in this area. However, besides CO₂ emissions, CO₂ accumulation in the atmosphere also plays a big part in global warming, and there is evidence that technical solutions to the amount of emissions are too late and too slow in order to change the development (Graham-Rowe et al., 2011). Therefore, there is a need for different approach: reducing the number of trips taken and reducing the number of kilometres travelled by personal cars.

As a result of the realization that the current transport system is deteriorating the global, regional, and local environments, many cities now adopt different measures in order to reduce the number of kilometres travelled by car and the number of trips undertaken with the personal car as a primary mode of transport (Graham-Rowe et al., 2011). These measures are generally referred to as Travel Demand Management measures (TDM measures) and have become an important tool for planners to reduce car usage in urban areas. In attempts to make urban travel more sustainable, TDM measures are the primary tools to promote alternative modes of transport such as walking, biking and public transportation by a number of means (Petrunoff et al., 2015). Implementation of these measures are often aimed at breaking habitual car use, which can be extremely difficult when faced with strong habitual users. This is because strong habitual car users often do not look for new alternatives (Aarts & Verplanken, 1999). Planning for sustainable transport is also facing problems of acceptability, as some TDM measures are not received well by the public (Schuitema et al., 2010). Combining measures and ensuring a widespread acceptance of sustainable transport is vital in order for TDM measures to work and the transportation system to become more sustainable.
Planning for environmentally sustainable mobility in a city requires taking many different aspects into account. Implementation of measures can be problematic if opinions, habits and attitudes of inhabitants are not taken into account, and acceptance of measures generally need to be high for them to have an effect (Schuitema et al., 2010). Understanding people’s response to TDM measures against the rationale and implementation of these measures is therefore the main focus of this study.

1.1.1 Travel Demand Management

One of the most debated TDM measures in Sweden is the ‘Trängselskatt’ or congestion tax applied in the city centre of Stockholm in 2006. The congestion tax had such a positive impact on travel time during its trial period that the opinion of the public shifted in favour of road tolls, and the congestion pricing was made permanent in 2007 (Eliasson et al., 2009). The Stockholm congestion taxing can be said to be a successful TDM measure, as emissions decreased, public transportation usage increased, and citizens of Stockholm experienced improvements in the urban environment (Eliasson et al., 2009). The congestion tax can be described as a successful ‘hard’ Travel Demand Management measure. Hard measures refer to structural changes to urban infrastructure, or changes in pricing and taxation (Bamberg et al., 2011). The alternative to hard measures are so-called ‘soft’ measures, which as opposed to hard measures use techniques of information dissemination to influence car users to switch to more sustainable travel modes. These measures are also referred to as voluntary change measures or mobility management tools. Soft measures include workplace travel plans, school travel plans, personalized travel plans, marketing of public transport, and travel awareness campaigns (Bamberg et al., 2011).

The term ‘soft’ measures as mentioned above often address psychological motivations for travel choice, as well as economic ones (Cairns et al., 2008). Rather than the physical intervention into infrastructure, the soft measures emphasize management and marketing. Cairns et al. (2008) study ten different types of soft measures, amongst others:

- Workplace travel plans—where employers implement a package of measures primarily aimed at encouraging and enabling their employees to travel to work more sustainably.
- Public transport information and marketing—which includes advertising campaigns, the provision of information in more accessible formats and simplified ticketing schemes.
- Travel awareness campaigns—which involve a wide range of media aimed at improving general public awareness of the problems resulting from transport choices, and what can be done to solve problems, including changing personal behaviour.
- Car sharing schemes—where individuals are encouraged to share their private vehicles for particular journeys (also known as ‘carpooling’ or ‘ride sharing’ in other countries). (Cairns et al., 2008, pp. 594 - 595).

Urban form has a great impact on what mode of transport is chosen, and measures of density in urban areas can explain up to 84 percent of variance in car travel (Kenworthy, 2006). De-emphasizing road infrastructure in favour of public transport, walking and biking is imperative for the environmentally sustainable development of a city in order to minimize car use. Given that the use of the car is very closely linked and dependent on that the driver of the car is provided with roads and parking. To continue planning in this manner is highly problematic, especially in already car-dependent cities. Therefore, getting away from the current paradigm of providing car users with more roads and more parking spaces, there needs to be a shift towards increasing public transport supply and encouraging walking and biking with the help of municipal planning (Kenworthy, 2006). Using TDM measures to replace road space with
sustainable alternatives is a trend that is appearing in an increasing number of cities, and urban form and infrastructure provided also has an effect on what TDM measures can be utilised efficiently (Kenworthy, 2006).

1.1.2 Workplace Travel Plans

Given the need to minimize the distances travelled by car, promotion of active travel and more sustainable options to the car are imperative (Petrunoff et al., 2015). The responsibility for this to happen can be put on many different instances, one of them is workplaces. Therefore, workplace travel plans have become a common way to promote sustainable mobility. Workplace travel plans are generally an assortment of measures, such as dedicating priority parking for car-shares, indoor bike parking, as well as providing information on local public transportation. This type of travel planning has been implemented in the United Kingdom since the 1990s as part of a shift towards managing travel demand (Roby, 2010). The reason for daily travel (workplaces in this case) were incorporated into travel planning in an effort to influence their employees travel behaviours. According to Cairns et al. (2008), previous research states that travel plans generally reduce car use by about 15 - 20 percent, and travel plans involving parking management and public transport subsidies can reduce car use by as much as 20 - 25 percent.

Vanoutrive (2014) argues that there are four principal workplace travel plan policies that have proved to be efficient for the implementation of TDM measures. The first of these is using planning policy to link the establishment of a workplace travel plan to land-use, for instance permitting a lower number of parking spaces for an employer. The second and third strategies are making travel plans mandatory and granting subsidies to employers who implement advanced mobility measures. The last measure is presenting awards to the employer with the most efficient travel plan to work as an incentive (Vanoutrive, 2014). There are of course several ways to implement a workplace travel plan and combining measures to make it as efficient as possible. Petrunoff et al. (2015) show that the combination of parking management strategies with encouraging measures for employees to choose sustainable modes of transport is more efficient than having solely encouraging strategies or only parking management strategies. The combination of this type of push and pull measures has been proven to be effective in other studies (Eriksson et al., 2006). The reason for combining push and pull measures is because push measures often are seen as an infringement on car user’s freedom and are therefore generally harder to accept for the public. When combined with pull measures designed to make car users voluntarily choose sustainable modes of transport, they seem to be more effective. The reason for this is probably that the car user sees new options and increased freedom of choice (Eriksson et al., 2006).

1.2 Problem Statement

In western society, awareness of climate change and its causes are reasonably high (Hiselius & Rosqvist, 2016). However, the behaviour of the public indicates that there is a gap between awareness of problems associated with climate change and the willingness to change behaviours. Since there is no real translation of concern and awareness into action, this implies that changing behaviour is considered to be too tedious. In order to change this conception of the tediousness of more sustainable travel modes, one way is to implement Travel Demand Management (TDM) measures (Eriksson et al., 2010). Policy can be formulated in order to try to influence travel mode choices, yet the participation of the public cannot be forced, and travel mode choice is still highly individual. Implementing policies without public acceptance therefore is not very likely to succeed. Policy and policy implementation can be problematic.
for these types of measures as there are many different factors, opinions and contexts to consider. For instance, strong habitual car users are likely to object to anything that feels like a restriction of their car use. Having these opinions in mind whilst trying to formulate policy that will be accepted or even well received by the public is a major challenge, especially when faced with sensitive subjects, such as reducing private car use. The city of Umeå in northern Sweden is facing the problem of population growth together with a high level of car use, which also is a problem in many European cities. More than 50 percent of trips made into the city centre of Umeå are made by car, which has worsened the air quality to such a degree that the municipal planning agency calls it one of their biggest challenges for the future (Umeå Kommun, 2011a). Because successful implementation of TDM measures require the involvement of different levels in society, it is important to investigate the process from policy, to implementation, as well as attitudes and responses to the measures that are a consequence of these policies and implementations.

In order to challenge the current development of increasing car use and deteriorating air quality, Umeå municipality along with the municipal parking company Umeå Parkering AB (Upab) have implemented a workplace travel plan, Green parking purchase (Grönt parkeringsköp).

1.3 Aim and Research Questions

The aim of this paper is to analyse the strivings to reduce car use in Umeå Municipality by considering policy, implementation and responses. The study includes analyses of different TDM measures but with an emphasis on a workplace travel plan combining push and pull measures – Green parking purchase (Grönt parkeringsköp) – which has recently been implemented in Umeå Municipality. The research questions to be answered to fulfil this aim are as follows:

- What are Umeå Municipality’s policies concerning Travel Demand Management and car usage reduction, and how are they implemented?
- What incentives and motives do property owners have when implementing measures connected to Green parking purchase?
- How do employees affected by the measures implemented through Green parking purchase respond to these, and what attitudes are there towards these measures?
- How do attitudes and response of people affected by TDM measures correspond with the traffic development planned in Umeå’s comprehensive plan?

1.4 Delimitation

Policy, implementation and attitudes are studied exclusively in Umeå. The workplace travel plan Green parking purchase has been implemented in a few properties, and the study will be aimed at these properties. The main study area is therefore the central parts of Umeå, with a focus on implementation of the workplace travel plan in the properties described in the method-section.
2. Literature Review

This chapter reviews some of the literature that is related to the topic of traffic planning. Amongst others, the environmental aspects of transport as well as the importance of reducing car traffic will be touched upon. Sustainable Mobility is a new, emerging paradigm within traffic planning that is relevant to this study. The purpose of this section is to give the reader some background knowledge on the problems discussed in this study, more specifically the high share of car trips taken in urban centres.

2.1 Traffic and the Environment

Concerning the impacts on the environment of traffic, there are several levels to be considered, such as local, regional and global (Ericsson & Ahlström, 2008). The impacts on traffic can be divided into eight different categories:

- Energy usage
- Air pollution
- Noise pollution
- Vibrations
- Barrier effects
- Soil and water pollution
- Impact on the landscape
- Impact on natural and cultural landscapes

Motorised transportation uses more than 80 percent of all oil used within the transportation sector (Szyliowicz, 2003). As this sector can be considered to be heavily reliant on oil consumption, it also leads to environmental implications through pollution. Locally, the effect of pollution can have serious health implications for the individual, but also damage buildings and the local environment. The global effects, manifested mainly through greenhouse gas emissions, are produced locally all over the globe, yet the effects are seen globally through global warming. Passenger transport in the European Union alone account for 15 percent of global greenhouse gas emissions (Cools et al., 2011), which shows the severity of passenger transports impact on pollution. Noise pollution caused by motorised traffic is another factor that has a negative impact on people’s health and is one of the most common causes of disturbed sleep in urban areas (Ericsson & Ahlström, 2008). Further, vibrations can be damaging for buildings that are placed on the sides of roads, which in the long term also can prove to be endangering for humans if proper maintenance is not conducted. The pollution of soil and water is another serious aspect of motorised transport that needs to be considered. Winter maintenance of roads (salting), the transport of dangerous goods and the increase of impervious surfaces are the main contributors to added pollution to soils and water. Building infrastructure for car transport has a major effect on the natural and cultural landscapes, as they can impair their ability to function in a natural manner (Ericsson & Ahlström, 2008).

2.2 Travel behaviour and the built environment

One point of view in the debate of how today’s traffic problems can be solved is that the built environment has a significant effect on personal travel behaviour. According to Naess (2006), urban structure can promote certain types of travel modes by creating proximity or distance between destinations. Of course, this is not the only determinant of travel behaviour, as travel have different characteristics such as age, gender, income and professional status that have an effect. Values, norms and lifestyle also have an effect in addition to the characteristics. These
characteristics and traits of individuals can be seen as resources, needs and wishes of mobility that can be modified by the structure of the urban environment (Naess, 2006).

There are several studies showing that the urban density of a city has a large impact on its inhabitant’s travel patterns. Choi et al. (2013) argue that the current trends of increased motorization and suburbanization increase the range of personal travel behaviour. The increased range of travel modes is closely connected to large increases in transportation energy in urban areas, which is a problem that is only expected to become worse. Suburbanization and increasing personal mobility are two processes that fuel each other, as increasing suburbanization increases the need for higher mobility, and a higher mobility enables suburbanization (Choi et al., 2013). There is therefore a strong negative correlation between population density and transportation energy consumption, indicating that suburbanization can be described as directly unsustainable urban development. Souche (2010) argues that there are two structural factors of urban travel demand that stand out amongst others: urban density and user cost of trips, both for personal cars and public transport. The richer the city is, and the more roads are supplied to car users (reducing the user cost of car trips), the higher the car travel demand will be (Souche, 2010). Population density has some vital consequences for travel behaviour (Choi et al., 2013). Firstly, it tends to increase the proportion of non-motorized modes of transport and public transit. Also, it leads to shorter distances of travel, greater viability of transit and generally less need for a car. Lower densities have the opposite effect, as low density increases physical separation, diffuses the dispersal of activities and makes an adequate supply of mass transit more difficult to achieve (Steemers, 2003).

Furthermore, Aditjandra et al. (2012) argue that changes in socioeconomic coefficients are main determinants to changes in car ownership, but other important factors to reduce car use include neighbourhood characteristics, such as safety and accessibility. These factors bring about changes in travel behaviour that are of comparable size to those caused by changes in car ownership or changes in attitude on an aggregate level. Given the effect of these factors on travel behaviour, Aditjandra et al. (2012) suggest their findings provide foundations for directions for future planning policies. Interactions between neighbours should be increased to increase safety, which can be achieved by more compact housing. More compact urban structure can have the consequence of bringing destinations closer, which increases accessibility for all modes of transport, and not just the car. The shorter distances and increased safety brings the ‘compact city’-movement to mind, which Aditjandra et al. (2013) argue is associated with countering the alleged effects of urban sprawl on the increasing levels of car dependence within modern cities. Sustainable urban development therefore needs to mitigate these effects by focusing more on different aspects of mobility and transport by promoting walking, biking and use of public transport. The compact city would bring the activities people travel to closer together, which would make sustainable modes of traffic more attractive. Aditjandra et al. (2013) find that residential layout by itself is not enough to explain travel behaviour, however there is a complex relationship between residential layout and resident attitudes, preferences and perceptions that affect travel behaviour. Given that the appropriate infrastructure and supporting facilities are put in place, future planning policies that work with attitudes in relation to neighbourhood design can have success in increasing the use of more sustainable transport (Aditjandra et al., 2013).

2.3 Policy and Implementation
Policy can be regarded as an important tool for the promotion of environmentally sustainable behaviour of the public. However, the implementation of pro-environmental policy tends to be rather problematic in some respects (Matti, 2006). The success of environmental policy often
tends to rely on the collective participation of the public, as institutions cannot force the public to partake in certain behaviours. Therefore, it is of importance that the institutions formulating the policies is viewed as legitimate by the public. The goals of the policy need to be acceptable to the public, with acceptable reasons and motivations, and accessible through acceptable means (Matti, 2006).

There are several dimensions in Swedish environmental policy. The national policies act more like outer boundaries for the more local environmental policies, as municipalities have a large degree of freedom in this area (Matti, 2006). These national policies are therefore often a bit blurry and unspecified, whereas the municipal goals often are more specific. The municipal responsibility is often translated into providing possibilities and information to citizens to take more environmentally sustainable actions in their daily lives. Local policy therefore is rather aimed at actively steering peoples’ choices in a sustainable direction, providing possibilities without infringing on the individual freedom and the perception of self-choice (Matti, 2006).

2.4 Sustainable Mobility - A New Paradigm
Sustainable development is the basis for this review of sustainable mobility. The Brundtland commission’s definition is as follows: ‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’ (IISD, 2018). There are several dimensions to be considered within sustainable development, and these are environmental sustainability, social sustainability as well as economic sustainability. Sustainable mobility touches upon all three of these aspects.

Travel, in this case within an urban area, is considered to have two major defining principles (Banister, 2008). The first principle is that travel is a derived demand, meaning that it is not an activity that people willingly choose to spend more time on than necessary. The second principle stated that people minimise their generalized costs of travel, which is expressed through the costs of the trip taken and the time the trip consumes. These two principles combined is one of the main contributors to the increase of car usage and the ever-increasing speed at which commuting is happening. As these are the principles of conventional traffic planning, they are an essential part in most analysis and evaluation studies. As they also are the ground to most transport solutions, travel time has remained constant as distances and speeds have increased, which in turn has enabled cities to grow (Banister, 2008). However, there are now arguments that transportation itself has to be viewed through a new paradigm, as the current system does not correspond with future needs (Szyliowicz, 2003).

Sustainable mobility provides such an alternative paradigm, as the conventional measures to deal with urban problems can in fact be replaced by looking at the problems differently (Banister, 2008). For instance, instead of trying to enable travel to be as fast as possible to cover greater distances, the accessibility could be addressed through distance reduction and building the sustainable mobility into the urban form. The sustainable mobility paradigm requires four factors in order to succeed. The key elements as suggested by Banister (2008) are technology, regulation and pricing, land-use development and clearly targeted personal information. The first point of technology is to enable the public to use transport that does not negatively impact their current transportation behaviours. This would however require behavioural change, such as increasing occupancy levels (for instance, more filled seats on a bus or in a car), in order to avoid so called ‘rebound effects’, such as people driving more as vehicles become more efficient. In terms of regulation, Banister (2008) argues that the external costs should be reflected in the actual costs of traveling, for instance through road user charging or higher fuel prices. The third point is that planning and regulations need to be integrated into land-use
development in order to shape urban areas thus supporting more sustainable transport. Lastly, Banister (2008) states that targeted personal information is an essential part of sustainable mobility, as there needs to be a high level of acceptability within the public for more sustainable travel measures.

A way of implementation of the Sustainable Mobility Paradigm in the European Union (EU) is through Sustainable Urban Mobility Plans (SUMP), which has been proposed by the European Commission as a policy tool (Arsenio et al., 2016). A SUMP is applied on a local level and calls for sustainable plans for a long time period for a city to meet the mobility needs of its citizens. A plan of actions has been proposed by the European Commission (EC) for the implementation of a SUMP under six specific themes being:

- Promoting integrated policies
- Focusing on citizens
- Greening urban transport
- Strengthening funding
- Sharing experience and knowledge
- Optimising urban mobility (Arsenio et al., 2016, pp. 30-31).

Given these six themes, SUMP aim to be a new way of urban planning that include accessibility, sustainability, economic and environmental viability, social equity, health and quality of life (Arsenio et al., 2016). May (2014) however identifies several challenges to the implementation of these sustainable plans, especially in member nations of the European Union with strong pro-car and infrastructure lobbies and the lack of funds for the preparation of SUMPs. Cities asked to implement these plans considered the implementation of policies “easier said than done” and had problems with poor policy integration, unsupportive regulatory frameworks, weak financing and lack of public support (May, 2014). In order for the SUMP-project to gain ground, these issues have to be resolved, especially in the less wealthy member nations of the EU.

Even though the SUMPs are carried out with good intentions, there may be some unwanted effects of their implementation. Arsenio et al. (2016) identify these challenges as lying in the balancing between the different goals of sustainable development. In applying a SUMP, there will be a need for a trade-off between environmental sustainability efforts and those that will ensure social sustainability. Normally, environmental sustainability is often balanced against economic interests, meaning that research of environmental sustainable transport measures effect on social aspects is rather scarce (Arsenio et al., 2016). The problem lies in that there is a lack of attention for equity consequences of proposed policy measures. Therefore, there is a risk that climate change policies have an unwanted effect on equity, potentially spurring on pre-existing inequalities and socioeconomic imbalances. Such effects could be that socioeconomically weaker households are hit harder by increases in fuel prices or receive less gains from the sustainable mobility measures (Arsenio et al., 2016). This can be expressed through social exclusion through lower accessibility, which is not in line with social sustainability.

A sustainable way of ensuring both mobility and equity is increasing access to public transit for low-income households. There is a significant relationship between rising incomes and increase in vehicle ownership, as well as the opposite of lower incomes and decreases in vehicle ownership (Welch, 2013). Without a public transport supply in place to ensure some degree of mobility to low-income areas where levels of car ownership are low, mobility becomes a question of social class. For instance, areas with low-income households without high quality
public transport have lower access to employment opportunities when compared to areas with high provision of public transport (Welch, 2013). According to Feitelson (2002), this issue of equity in the sustainability paradigm is best approached by defining three Meta goals (Growth, inter-generational equity and intra-generational equity) and embed environmental equity into the sustainable mobility discourse further. The problem, according to Feitelson (2002), is that there is too much focus on the trade-offs between economic and environmental sustainability as well as the trade-offs between social and economic sustainability. Moving emphasis from these two trade-offs, focus should be put on formulating and implementing comprehensive policy packages that address all three meta-goals of sustainable transport strategies (Feitelson, 2002).
3. Theoretical Background

In this chapter, the theoretical framework that provides the basis of this paper is described. These theories have been of importance in order to understand peoples’ attitudes towards TDM measures. The term accessibility is of importance to traffic planning and understanding the impact of transport policies. Altruism and self-interest are two value orientations that can motivate behaviours with an impact on the environment and affect travel mode choices. The Theory of Planned Behaviour (TPB) is used in order to get a comprehensive picture of psychological predictors of behaviours, whereas the Attitude-Behaviour-Context-theory (ABC) uses attitudes and context to explain pro-environmental behaviour. Acceptability of the public is needed for these policies to be politically feasible, and the perceived effectivity of measures to change an individual’s context has an impact on this.

3.1 Accessibility

The term ‘accessibility’ is frequently used in several areas of urban studies, especially in transport planning, urban planning and geography (Geurs, 2006). There is however some confusion to what the term actually refers to, making it misunderstood, poorly defined and hard to measure. Therefore, the conceptualization of accessibility is problematic and complex. Given these difficulties of definition and application of a clear description of what accessibility actually means, policy documents concerning accessibility often have easily interpreted measures of accessibility (Geurs, 2006). Geurs and van Wee (2004) define accessibility measures ‘as indicators of the impact of land-use and transport developments and policy plans on the functioning of the society in general’ (p. 128). Accessibility should therefore relate to the role of urban and transport planning, giving individuals the means to access to participate in activities in different locations (Geurs, van Wee, 2004). There are four types of accessibility components that are of importance from a transportation perspective:

- The land use component refers to the land use system and the quality, amount and spatial distribution of opportunities provided at different target destinations. The demand for these locations is also of importance to the land use component.
- The transportation component is the ability for an individual to utilize the transportation system in terms of disutility. The factors for this disutility are time, cost and effort expended for transportation. In this way, the transportation component is a reflection of the supply (infrastructure and characteristics) and demand (passenger and freight travel) of transportation.
- The temporal component is the availability of travel opportunities to any individual at different times of the day, as well as the availability of time for participating in activities (work, recreation).
- The individual component reflects the needs, abilities and opportunities of individuals. These three factors determine the level of access needed to areas and influence the total result of accessibility.

3.2 Altruism vs Self-interest

Individual behaviours that have an impact on the environment can be motivated by different perceptions and values. Stern et al. (1993) identify different value orientations important for pro-environmental behaviour that are most frequently noted in Western literature on environmental concern. One of these value orientations is that of altruism. This means that an individual acts pro-environmentally despite personal costs, yet only when their actions would protect other human beings. As an example, a person with a strong social value orientation
might become an environmentalist when hearing about other people being in harm’s way for environmental reasons. Another value orientation is biospheric values, meaning that an individual acts on moral principles for the benefit of the planet as a whole. The last value orientation is that of self-interest, meaning that an individual only act pro-environmentally when the gain of the behaviour exceeds the costs of exerting this behaviour (Stern et al., 1993). Behaviours based on self-interests and altruism can have very different outcomes, as altruism can often lead to more sustainable travel mode choices. Nordlund and Garvill (2003) argue that the immediate gain by acting in your self-interest is greater, however noncooperative choices have negative consequences for the collective. These negative consequences tend to stack up until all individuals find themselves in a situation where they would have been better off if they had acted altruistically from the very beginning.

3.3 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB), which is grounded in the Theory of Reasoned Action (TRA), is a common model used to predict commuter’s behaviour when it comes to the commuter’s choice of travel-modes. The theory of planned behaviour was sprung from the idea that general attitudes, even though there has been a lot of studies done on attitudes and behaviour, had low empirical evidence of being a strong indicator for predicting behaviour in specific situations (Ajzen, 1991). Also, another relation that was frequently used was that relating general personality traits and behaviour in specific situations. However, the empirical relations between the two were also seemingly low. Therefore, the difficulty of predicting behaviour called for a new method, and the aggregation of traits, attitudes and behaviours is where the TPB had its starting point. The aggregation of specific behaviours across occasions, situations and forms of actions was argued to represent a more valid measure of the underlying behavioural disposition than any single behaviour (Ajzen, 1991).

The central element in the TPB is the intention of an individual to exert a certain behaviour (Ajzen, 1991). The intentions of an individual are meant to capture the motivational factors that influence a person's behaviour. Also, they indicate how much effort people are willing to put into the practicing of the examined behaviour, or how hard they try. This means that if the intention of an individual to perform a certain behaviour is strong, the more likely is the performance of the behaviour. However, the importance of the intention decreases if the behaviour is under volitional control (Ajzen, 1991). Intentions are affected by three predictors in the theory of planned behaviour. These are attitude towards the behaviour, the subjective norm, and the perceived behavioural control, which can be boiled down to motivation and ability. The attitude towards a behaviour reflects the degree of favourable or unfavourable appraisal an individual has towards a behaviour, and the subjective norm reflects the perceived social pressure to perform or not to perform the behaviour. Lastly, the perceived behavioural control is the ease or difficulty of performing a certain behaviour. This measure is assumed to reflect past experiences as well as the expected impediments or obstacles in the performance of a behaviour (Ajzen, 1991). These predictors are based on beliefs divided into three categories: Behavioural, which is assumed to influence the attitudes towards the behaviour, normative beliefs, which are the determinants of subjective norm, and control beliefs, which provide the basis for perceptions of behavioural control (Ajzen, 1991).

The perceived behavioural control is important, as resources and opportunities that are available to a person to some extent dictate the likelihood of performing a certain behaviour (Ajzen, 1991). In this way, the perception of behavioural control and its impact on intentions and actions play a big role in the TPB. The behaviour of interest is evaluated on an individual level by the perception of ease or perception of difficulty to perform the behaviour and, can when combined
with behavioural intention be used directly to predict behavioural achievement (Ajzen, 1991). With increased perceived behavioural control, which can be used as a substitute for actual control if the perception is accurate, the effort expended to a successful conclusion is likely to increase. Another aspect of the relations between these predictors is that the importance of the measures intention and perceived behavioural control is relative across situations and behaviours. Given that a person has total control over a situation and therefore also total control over behavioural performance, intention will become the sole predictor for behavioural performance. As behavioural control decreases for an individual, the importance of perceived behavioural control increases, and the importance of intention decreases. So, in differing situations, these two predictors are of different importance (Ajzen, 1991).

3.4 Attitude Behaviour Context Theory of Pro-Environmental Behaviour (ABC)

The theory of Attitude, Behaviour and Context (ABC) is the work of Guagnano et al. (1995) and divides the determinants of a certain pro-environmental behaviour into three major domains: the personal, behavioural and contextual. These three variables constitute two domains that interact and influence each other, thus creating conditions for predicting and affecting behaviours.

The personal domain can be translated to the ‘A’ (attitude) of the ABC theory and is constituted by a variety of basic values of an individual (Stern, 1999). In addition, the personal values of the individual, the personal domain also includes social pressures that the individual experiences to partake or not to partake in a specific behaviour. These values and pressures, as formulated by Stern (1999), deal with how the biophysical environment functions and how human action affects it, amongst others. In order to affect behaviour, the values of an individual depend on the acceptance of key values shared by pro-environmental movements and that particular conditions of environmental degradation threaten their personal values. Behaviour then is predicted by attitude in terms of the belief of the individual that their personal behaviour can do something to ameliorate the effects of environmental degradation and preserve personal values (Stern, 1999).

The contextual domain is constituted by structural factors or influences on environmentally significant behaviour, and these factors and influences can be diverse (Stern, 1999). These can include traits that an individual carries from birth, such as their ethnic background or religion, but also their immediate situation, such as their place of residence or vehicle ownership. Further, constraints or possibilities from public policy such as energy taxes or other regulations, as well as economic variables such as income, prices and availability of goods play a role in the contextual domain (Stern, 1999). In short, the contextual domain is constituted by all the constraints and possibilities that affect the chance of an individual to participate in a behaviour. If there are significant constraints, these can act as a barrier to the behaviour. For instance, an individual might want to use public transit for environmental reasons but has a rural residence without access to public transit, forcing the individual to use the personal car. On the flip side, an individual might also use public transit because of constraints such as lack of monetary means to purchase a personal car (Stern, 1999). This means that the constraints and possibilities are to a large extent personal, and different individual are constrained in different ways.

These two factors together lead to the behavioural domain, which is made up of four major classes of pro-environmental behaviour: Committed activism, citizenship behaviours, support for environmental policy and private-sphere behaviours (Stern, 1999). The latter includes consumer behaviours. The likelihood of any of these behaviours depends on the personal and
contextual forces that are at work, making the participation of any behaviour very situational. The main challenges to policy according to this theory therefore is to what extent behaviour can be changed in a positive manner by intervening into the personal domains and identifying the times and places when these interventions have the greatest effect (Stern, 1999).

3.5 Acceptability
Given the willingness to implement certain TDM measures, these are received by travellers in very different ways (Schuitema et al., 2010). Oftentimes, policies that could potentially have a major impact on travel patterns of daily commuters are not implemented because of a lack of public support or acceptability of a specific TDM measure. The term acceptability is defined by Schuitema et al. (2010) as the attitude toward certain measures, whereas attitudes evaluate a particular entity with some degree of favour or disfavour. The attitudes themselves are determined by a set of accessible beliefs and the subjective probability that an attitude object has certain outcomes. These can be described as personal outcome expectations and reflect the evaluation of the expected outcomes of the policies (Schuitema et al., 2010). There are some indications in literature that there are differences in how individual and collective outcomes are assessed, and how acceptability is affected. For instance, if frequent car users expect a policy to cause a reduction in their own car use, this could potentially be viewed as an infringement of freedom, and acceptability will be lower. Another factor that is of importance when it comes to acceptability is the effect policies are expected to have on problems that society experience, such as congestion and environmental degradation (Schuitema et al., 2010).

3.6 Policy and Behavioural Change
To overcome contextual barriers, which is often the goal of public policy, theory suggests that an interaction between information and incentives is the most efficient way of changing behaviour (Stern, 1999). Information on its own has shown some slight positive effects, especially when the information can be easily validated by the target audience and comes from trusted sources. Despite information being able to provoke some change, it is most often not successful when there are contextual barriers. Incentives on the other hand are quite useful for overcoming such barriers and inducing pro-environmental behavioural changes, especially non-monetary incentives that deal with convenience can have a very significant effect. Combining information with incentives should then according to Stern (1999) prove to be useful in inducing pro-environmental behaviour. Gärling and Shuitema (2007) argue that non-coercive TDM measures generally are more acceptable to the public than coercive ones. This may be because of different reasons. As Schuitema et al. (2010) point out, coercive measures such as road tolls or congestion charges are experienced as a limitation to personal freedom, as they directly affect the individual’s own capacity to use their car, which can affect acceptability. Non-coercive measures on the other hand can increase the perceived individual freedom as they can provide the commuter with an extended set of options, which has a positive effect on acceptance. In short, Gärling and Schuitema (2007) conclude that the perceived effectivity of the policy measure to solve the most important problems such as congestion or environmental problems have a great effect on the publics’ acceptability towards the measure. Gärling and Schuitema (2007) conclude that a combination of coercive and non-coercive measures will most likely be the most effective, politically feasible and acceptable by the public, as it provides travel alternatives to the car.
4. Study area

4.1 Umeå Municipality

Since the middle of the last century, the municipality has grown significantly in terms of population size. From 46,000 inhabitants in 1950 to 123,000 inhabitants in 2017 (NE.se, 2018), Umeå is one of the fastest growing municipalities in Sweden (Umeå Kommun, 2011a). The municipality identifies the diminishing air quality and noise pollution in the city centre following emissions from motorised transportation as one of the main challenges in the pursuit of reaching 200,000 inhabitants. Given this, the planning for the future of Umeå is, as it should, grounded in the ideas of sustainable development and aims for reduced car usage. This is motivated not only from a health perspective but is also viewed as contributing to the accessibility and liveability of the city in the long term (Umeå Kommun, 2011a).

As this study is focused around Travel Demand Management and Sustainable Mobility, and their practical implications in planning, the current development in Umeå is of interest. The comprehensive plan which was accepted in 2011 puts emphasis on sustainable growth, liveability and the development of travel systems in order to reduce the high car usage in the municipality (Umeå Kommun, 2011a). The traffic plan of the city has been developed in accordance to the European Commission's (EC) guidelines for Sustainable Urban Transport Plan (SUMP), which will be explained more thoroughly in the literature review. This combination of high car usage, a goal of high population growth, problems with traffic in the central areas and high ambitions of sustainable growth make Umeå a relevant case to study. Umeå also faces a geographical challenge, in terms of how the city is built up, as well as its position in Sweden. The city’s geographical position exposes the commuters to a rather cold climate during the wintertime, which can be daunting for cyclists and pedestrian commuters. Together with the rather widespread structure of Umeå and its suburbs, this proves a challenge to implementation of TDM measures such as Green parking purchase. For all these reasons, Umeå finds itself in an interesting situation from a planning perspective and was therefore selected specifically for this study.

4.2 Grönt Parkeringsköp (Green parking purchase)

Green parking purchase is a parking management strategy deployed by Umeå Parkering AB (Upab, Umeås municipal parking company), Umeå Kommun (Umeå municipality), and a number of property owners in the central parts of Umeå. The strategy is a combination between hard and soft measures and is constituted by a contract between the different parties: The municipal institutions help the property owners by reducing the number of parking spaces the property owner is required to construct according to planning policy. In return, the property owners enable their employees and residents to take part in programs that promote more sustainable modes of transport (Umeå Kommun, 2013). The property owners have a number of measures that need to be implemented in order for the reduction of the parking quota to be valid: The property owners are obligated to provide memberships in car pools for their employees, construct changing rooms with shower access and heated indoor parking spaces for bicyclists, as well as establishing a workplace travel plan for their employees. A further measure that was planned to be implemented was funding a discount on bus tickets of 20 percent for employees in these properties for 25 years. This was however not implemented for tax reasons. The contract is valid for 25 years, and if the property owners do not hold up their end of the deal, they lose the right to the reduction of the parking quota (Umeå Kommun, 2013). So far, there are three properties in central Umeå that have implemented Green parking purchase. These are the property ‘Forsete 5’ owned by Balticgruppen AB, which contains the shopping mall Utopia. ‘Embla 5’ is owned by UmeHem and contains office spaces and some parking...
possibilities. The last property is ‘Fabriken 8’, owned by Länsförsäkringar (Frida Sandén, personal communication, 2018-02-07). All three properties are marked out in Map 1 below.

Map 1: Properties that have implemented Green parking purchase in central Umeå.
5. Methodology

5.1 Case study

As the aim of this study was to investigate the policies, implementation, as well as attitudes surrounding TDM measures in Umeå, a variety of methods were used to fulfil this aim and answer the research questions. The research in this study can be described as a case study of TDM measures in Umeå. In case studies, empirical materials are gathered in order to either fill gaps in existing knowledge or for the investigation of complex cases and try to generalize the results. A case study allows for a large freedom of choice of methods of data collection and analysis tools, aiming to increase the knowledge of the case that is to be investigated (Gummesson, 2004). This study was divided into a qualitative and a quantitative. Using quantitative methods, the aim is to get a comprehensive picture of the attitudes towards TDM measures and parking strategies. Qualitative methods are used to gain knowledge of policy aspects of sustainable mobility and implementation of Green parking purchase according to property owners.

5.2 Discourse Analysis

The method chosen for analysing the policy document ‘Översiktsplan Umeå Kommun – Fördjupning för Umeå’ was discourse analysis. Discourse can be described as spoken or written communication, including the context and implied meanings of said communication (Denscombe, 2010). An analysis of discourse therefore focuses on the context and implied meanings of in this case policy documents written by the planning department of Umeå municipality, as well as how they are received by the recipient. While performing an analysis of this kind, it was important to take my own preconceptions of the content into account. The content was analysed through a perspective of urban- and traffic planning, as this is the main focus of this study. This simply meant that the main focus of the analysis was on the parts in the policy documents that deal with policy measures of this nature. Of course, there are other aspects in the documents, however the focus had to be on the parts dealing mainly with structural measures within the field of urban and traffic development. Through this, the focus also landed on sustainability to a large extent. Not only because this was the overarching subject of this study, but also due to my own perception of the sustainability aspects being a vital part of modern urban development.

The reason for this choice of method was that by using discourse analysis, the data could to some extent be deconstructed to reveal underlying motives and discourses. The focus of the analysis therefore is more on the implied meaning of the policies rather than the explicit content (Denscombe, 2010). By looking at the language and phrasing in the policy document, the purpose of the language chosen can become more evident. The reason for choosing this qualitative approach to the policy document was that the municipality has to convince residents and organisations in the municipality of the efficiency of their planning, in which language can be seen as a key factor. The approach used to analyse the discourse can be described as critical, to find motives and explanations for goals in the policy documents.

The results from the discourse analysis were divided into different segments in the results section. Firstly, an overview of the goals of the comprehensive plan was presented to show the context and aim of the documents, but also to investigate the reasons for these policy goals. After this segment, some aspects of urban development that were deemed important for understanding the implementation of TDM measures were picked out and described in further
To finalize the analysis, two discourses that were deemed to be the most prominent throughout were picked out and described more thoroughly.

5.3 Qualitative Interviews

5.3.1 Informant Interviews

The purpose of a qualitative approach to research interviews is gaining insight into a specific case (Dalen, 2007). The understanding for certain processes can therefore be deepened from specific points of view, in this case the property owner’s views. By using this approach, focus is slightly shifted from a mere description of events by adding the respondent’s opinions, personal experiences and feelings to the equation (Dalen, 2007). Choosing interview as a method for this study brings the opportunity of gaining insight in property owners opinions and priorities when it comes to the implementation of TDM measures like Green parking purchase. Considering the relatively low number of properties, it is desirable that representatives from all property owners are interviewed, in order to understand different thoughts on implementation and motives concerning TDM measures. The low number of property owners could also pose a problem, as mentioned in the ‘Ethical considerations’-section.

The semi-structured interview provides an opportunity to gain insight in how the interviewee’s ideas develop along the line of selected topics from the researcher (Denscombe, 2010). There is a higher degree of flexibility in a semi-structured interview than in a structured interview, allowing questions to be added whilst the interview was underway. This does not mean that there is not a finished list of questions for the interview, but rather that the order is not fixed (Denscombe, 2010). The semi-structured interview was used in this study in order to let the property owners’ answer more freely to the issues addressed, without using leading questions or forcing them to talk about a specific topic at a specific time. This way, the interviewee is able elaborate on their specific topics of interest.

5.3.2 Selection of Informants

The selection of informants was rather straightforward in this study. The owners of the properties that have signed a contract to utilize the Green parking purchase programme were contacted to arrange an interview. From Länsförsäkringar, owner of the property Fabriken 8, the property manager was contacted due to his leading role in signing the agreement for Green parking purchase. Balticgruppen AB is represented by their development manager, who took part in early discussions concerning Green parking purchase.

5.3.3 Recording and Transcribing

In order to ensure accurate data collection during the interviews, the conversations were recorded using a mobile phone. Before the recording started, the informants were asked for permission to record the interviews. The interviews were then recorded and transcribed accordingly afterwards. By using this technique, the data received from the interviewee is ensured to be accurate. The focus of the transcription process was on the content of the interviews, meaning that not much attention was paid to for instance pauses or body language during the interviews.

5.3.4 Interview Analysis

After transcribing, the data collected during the interviews were analysed using a scaled-down version of thematic analysis. Thematic analysis was selected as a method for analysis due to the large degree of freedom that the data could be analysed with. This method is comprised of
three different stages: Identifying, analysing, and reporting patterns in the data (Braun & Clarke, 2006). As the main goal of the interviews was to gain knowledge on the motives, implementation and the role of property owners in the context of TDM measures, these were also the three themes that were the most prominent during the interviews. In the results section, these three themes were outlined in detail.

5.4 Quantitative Survey

5.4.1 Data collection

Denscombe (2010) argues that the social survey has three main features: Wide and inclusive coverage, a specific point in time, and empirical research. ‘Wide and inclusive view’ means that a survey covers a very broad area by employing a panoramic view (Denscombe, 2010), trying to capture as many aspects as possible of the research question. The temporal aspect of a survey is mostly the ‘current state of affairs’, meaning it provides a snapshot of how things are in a specific point in time. This made this study a cross-sectional study, meaning the survey study investigates the conditions at a specific point in time. The last characteristic of the social survey is empirical research, meaning that it always brings new empirical research to the table (Denscombe, 2010). Using survey as a tool for data collection in this study has given the possibility to collect a wide variety of opinions and attitudes about the implemented TDM measures from a broad selection of informants.

There are several advantages to using a questionnaire in a wide variety of research situations (Denscombe, 2010). Using a questionnaire or a survey as a method of data collection can for instance prove to be very useful when dealing with large numbers of respondents (Ejlertsson, 2014), they are therefore ideal for situations when mass data is to be collected. In this case, the possible informants included employees from a multitude of companies, making the number of possible informants quite large. Therefore, the survey was deemed to be a suitable means of data collection. Surveys are most appropriately used when straightforward information, meaning relatively brief and uncontroversial information is required to conduct the research, which was deemed suitable in this survey study. These two factors may however be a drawback as well, as the width of coverage and straightforwardness means that really complex issues are hard to research thoroughly. The questions answered are always identical and don’t require face-to-face interaction in order to yield results. The specificity required to conduct survey research however requires that the researcher is aware which factors are important and what information is needed. Lastly, surveys are useful when looking at phenomena that can be categorized into groups rather than looking at individuals (Ejlertsson, 2014).

5.4.2 Purposive Sampling

In this study the sampling was purposive, as the sample selected for the survey consisted of employees at properties that utilize Green parking purchase to promote sustainable travel. In that way, the sample is guaranteed to include participants that are exposed to the TDM measures of the municipality and property owners, who can provide relevant information about attitudes towards and effects of TDM measures. By focusing on a small number of groups that are hand-picked to fit the subject by their knowledge or attributes, purposive sampling is applied (Denscombe, 2010). The sample is selected by either relevance to the issue or theory being investigated or the knowledge or experience about the topic. The application of purposive sampling is most effective when the researcher knows something about the specific people in the sample in advance, thus selecting the people with a specific purpose. This way of sampling is also a way of ensuring the most relevant information by selecting people most likely to have experience to provide such information, enabling the researcher to focus on instances that will fit the topic the best (Denscombe, 2010). Other common possibilities of sampling could for
instance have been a randomized sample selection, in order to achieve results that could have been generalized to the entire population of Umeå. However, this would have rendered it difficult to catch the experiences of those that have experience of the measures implemented through Green parking purchase.

The size of the sample is 57 employees in the properties where Green parking purchase has been implemented. The size of the total population is hard to estimate, as there is no easily accessible information on the total number of people employed in these properties. Another thing to consider is that the sample can be considered to be a biased group of individuals, as they are expected to have more knowledge of the measures offered through Green parking purchase than the average citizen.

5.4.3 Procedure
In order to collect data, surveys were handed out at various places of employment in the properties that are part of this study. For larger offices, the companies were contacted beforehand to ask whether or not they could imagine participating in this study. Some of the surveys were collected electronically, whereas the majority were in hand written form. For smaller employers, such as the stores in the shopping mall Utopia located in the property Forsete 5, surveys were handed out in all businesses. The respondents were given one week to answer the surveys, after which they were collected again.

5.4.4 Data reduction
A factor analysis is a means of data reduction that measures the covariance between different variables to check for underlying factors. The reason this was done has partly been mentioned: data reduction. The answers about the importance of different measures to reduce car use (question 9) and attitude towards different measures (question 10) were reduced to six factors, rather than 21 individual variables. Factor analysis proved to be a sensible way to both reduce data as well as sort the variables into different categories. The factor analysis that was conducted was done in an exploratory way, meaning that the number of factors were not given from the start, but based on eigenvalues (factors with a loading over 1 were retained (see Table 1)). The variable q9a (perceived importance of shorter distances for reducing car use) was omitted from the first factor analysis, as it together with the variable q9c (Increased access to bike parking) constituted a component with a very low internal reliability. By removing it, q9c was part of ‘Factor2’ increased the internal reliability for this component (Factor2 in Table 1).

A factor loading of 0.4 or higher shows that the variable can be categorised into a factor. The Cronbach’s Alpha shows the internal reliability of the factors, where a value of above 0.7 is preferred. Factor 3 in the factor analysis for question 9 (pullPT_imp) showed a lower internal reliability than this. However, the low alpha-value can be explained by that the sample in this study was rather small, and the factor only was constituted by two items, which both had a negative effect on internal reliability. The factor was used despite the low alpha-value, which needs to be taken in consideration in when interpreting the results.
Table 1: Rotated factor loadings, uniqueness and Cronbach’s Alpha of factor analyses for questions 9 and 10 from the survey.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor1</th>
<th>Factor2</th>
<th>Factor3</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer parking spaces (car)</td>
<td>0.7925</td>
<td>0.1221</td>
<td>0.0476</td>
<td>0.3453</td>
</tr>
<tr>
<td>Reduced possibilities for car use</td>
<td>0.7839</td>
<td>0.1895</td>
<td>-0.1268</td>
<td>0.3284</td>
</tr>
<tr>
<td>Increased cost of car use</td>
<td>0.7556</td>
<td>0.0337</td>
<td>0.0748</td>
<td>0.4182</td>
</tr>
<tr>
<td>Increased access to bike parking</td>
<td>0.1442</td>
<td>0.6916</td>
<td>0.1502</td>
<td>0.4653</td>
</tr>
<tr>
<td>Increased traffic safety</td>
<td>0.1076</td>
<td>0.7504</td>
<td>-0.0084</td>
<td>0.4241</td>
</tr>
<tr>
<td>Improved bike infrastructure</td>
<td>0.2526</td>
<td>0.5746</td>
<td>0.2472</td>
<td>0.5087</td>
</tr>
<tr>
<td>Cheaper public transport</td>
<td>-0.0658</td>
<td>0.1436</td>
<td>0.4596</td>
<td>0.7576</td>
</tr>
<tr>
<td>More frequent bus departures</td>
<td>-0.0231</td>
<td>0.1994</td>
<td>0.5286</td>
<td>0.6778</td>
</tr>
<tr>
<td>Alpha</td>
<td>0.8492</td>
<td>0.7567</td>
<td>0.5065</td>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor1</th>
<th>Factor2</th>
<th>Factor3</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestion charge</td>
<td>0.8409</td>
<td>0.1194</td>
<td>-0.1789</td>
<td>0.2442</td>
</tr>
<tr>
<td>Fewer parking spaces</td>
<td>0.8396</td>
<td>0.103</td>
<td>-0.0924</td>
<td>0.2648</td>
</tr>
<tr>
<td>Car free streets in central Umeå</td>
<td>0.6496</td>
<td>0.1127</td>
<td>0.0988</td>
<td>0.5032</td>
</tr>
<tr>
<td>Car free town centre</td>
<td>0.6544</td>
<td>0.026</td>
<td>0.0896</td>
<td>0.5031</td>
</tr>
<tr>
<td>Shorter distances to destinations</td>
<td>0.0444</td>
<td>0.5785</td>
<td>0.2505</td>
<td>0.5689</td>
</tr>
<tr>
<td>More parking spaces (bike)</td>
<td>0.1523</td>
<td>0.8291</td>
<td>0.1158</td>
<td>0.2748</td>
</tr>
<tr>
<td>Increased traffic safety</td>
<td>0.1097</td>
<td>0.7182</td>
<td>0.0449</td>
<td>0.3887</td>
</tr>
<tr>
<td>More frequent bus departures</td>
<td>-0.0754</td>
<td>0.2408</td>
<td>0.6461</td>
<td>0.4875</td>
</tr>
<tr>
<td>More bus lines</td>
<td>-0.1341</td>
<td>0.0899</td>
<td>0.722</td>
<td>0.4167</td>
</tr>
<tr>
<td>Improved bike infrastructure</td>
<td>0.1856</td>
<td>0.3697</td>
<td>0.1705</td>
<td>0.5565</td>
</tr>
<tr>
<td>Cheaper public transport</td>
<td>-0.245</td>
<td>0.1882</td>
<td>0.3644</td>
<td>0.6893</td>
</tr>
<tr>
<td>Alpha</td>
<td>0.8609</td>
<td>0.7745</td>
<td>0.6985</td>
<td></td>
</tr>
</tbody>
</table>

5.4.5 Variables

The survey was 4 pages long and consisted of 16 questions. Only those questions that are used in the analysis will be described in this section. The questions in the survey were designed from theories of altruism and self-interest (Stern et al., 1993; Nordlund & Garvill, 2003), as well as TPB (Ajzen, 1991) in order to examine travel mode use, evaluations of Green parking purchase, as well as the importance of TDM measures and their acceptability (Eriksson et al., 2006).

There are several variables that were derived from answers to multiple questions in the survey. These variables are displayed in Table 2, and include ‘bususe’, ‘caruse’, ‘bikeuse’, ‘env’, besides those derived from the factor analyses described in section 5.4.4. The variables for use of different travel modes (bikeuse, bususe, caruse) were generated by using the averages for travel mode use in question 7 in the survey (See appendix). ‘Env’, which is used to show a measure of environmental awareness, was derived from the average of questions 15 and 16 ($\alpha = 0.755$).

The factors derived from the factor analysis were made into six variables by adding the variables that constitute each factor and using an average value of the sum. For instance: Factor1
(*push_imp*) is constitutes of variables q9b (fewer parking spaces for cars), q9g (reduced possibilities for car use) and q9h (increased cost of car use). The three values of these variables were added together, and then divided by three to get a value that represents the respondent’s perceived importance of push measures to reduce car use\[\frac{(q9b + q9g + q9h)}{3}\]. The variables derived from this are ‘*push_imp*’ (q9b; q9g; q9h); ‘*pullbike_imp*’ (q9c; q9f; q9i); ‘*pullPT_imp*’ (q9d; q9e); ‘*pull_att*’ (q10a; q10b; q10d; q10e); ‘*pullbike_att*’ (q10i; q10j; q10l) and ‘*pullPT_att*’ (q10f; q10g) (see Table 2 for definition). The reason for constructing these variables was partly to investigate how the motives and general outlines of the comprehensive plan suit the attitudes and perceptions of importance towards different push and pull measures. In this way, there could be some indications of the acceptability of some of the measures.

Table 2: Variables used in the analysis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel mode use</strong></td>
<td></td>
</tr>
<tr>
<td>Caruse</td>
<td>Level of car use of the respondent, 1 – 5.</td>
</tr>
<tr>
<td>Bikeuse</td>
<td>Level of bike use of the respondent, 1 – 5.</td>
</tr>
<tr>
<td>Bususe</td>
<td>Level of use of public transport of the respondent, 1 – 5.</td>
</tr>
<tr>
<td><strong>Environmental concern</strong></td>
<td></td>
</tr>
<tr>
<td>Env</td>
<td>Environmental awareness related to car use, 1 – 5.</td>
</tr>
<tr>
<td><strong>Importance of measures to reduce car use</strong></td>
<td></td>
</tr>
<tr>
<td><em>pullbike_imp</em> a</td>
<td>Importance of pull measures (bicycle) to decrease car use, 1 – 5.</td>
</tr>
<tr>
<td><em>push_imp</em> a</td>
<td>Importance of push measures to decrease car use, 1 – 5.</td>
</tr>
<tr>
<td><em>pullPT_imp</em> a</td>
<td>Importance of pull measures (public transport) to decrease car use, 1 – 5.</td>
</tr>
<tr>
<td><strong>Attitude towards TDM measures</strong></td>
<td></td>
</tr>
<tr>
<td><em>pullPT_att</em> a</td>
<td>Attitude towards pull measures (public transport), 1 – 5.</td>
</tr>
<tr>
<td><em>pullbike_att</em> a</td>
<td>Attitude towards pull measures (bicycle), 1 – 5.</td>
</tr>
<tr>
<td><em>push_att</em> a</td>
<td>Attitude towards push measures, 1 – 5.</td>
</tr>
<tr>
<td><strong>Importance of measures to reduce car use on work trips (part of Green parking purchase)</strong></td>
<td></td>
</tr>
<tr>
<td>Bussubs b</td>
<td>Importance of bus ticket subsidies, 1 – 5.</td>
</tr>
<tr>
<td>Dressroom b</td>
<td>Importance of dressing rooms with showers at work, 1 – 5.</td>
</tr>
<tr>
<td>Bikepark b</td>
<td>Importance of heated parking spaces for bikes at work, 1 – 5.</td>
</tr>
<tr>
<td>Carpool b</td>
<td>Importance of carpools provided by place of employment, 1 – 5.</td>
</tr>
<tr>
<td>Carpark b</td>
<td>Importance of parking spaces (car) close to place of employment, 1 – 5.</td>
</tr>
</tbody>
</table>

*Variable created in the factor analysis (see Table 1)*

*Variable derived from question 14 in the survey (See Appendix)*

5.4.6 Quantitative Analysis

In order to analyse the quantitative data in this study, STATA 14 was used. The data collected with surveys was analysed and presented in various ways. First of all, a description of the dataset had to be made. This was especially important since the sample is not representative of all employees in the affected properties, making a thorough description of the different aspects and characteristics of the sample necessary. This was done by using descriptive statistics and presenting these in written form. The next step was describing the responses and use of
measures related to green parking purchase, where the importance of these measures was tested for with the importance of environmental awareness and transport mode use. This was done by using four different OLS-regression models, using the importance of the measures implemented through green parking purchase as dependent variables. These models were tested in order to investigate to what extent self-interest or altruism (represented through environmental awareness) affect perceptions of importance of implemented measures. Each model has two predictor variables, which always included environmental awareness (env), as well as use of different modes of transport (caruse, bususe, bikeuse).

The third and final step of the quantitative analysis consisted of a description of TDM measures, correlations (Pearson correlations), as well as OLS-regressions. The correlations were performed in order to understand relations between transport mode usage, as well as conceptions of push- and pull-measures and environmental awareness. The regressions were performed to explain attitudes towards TDM measures by drawing on travel mode use, environmental concern and the importance of TDM measures for car use reduction. There are five predictor variables that are the same in all three OLS-regression models. These are: the importance of shorter distances for changing travel behaviours (q9a), which represents a consequence of densification; environmental awareness (env); the importance of push measures for changing travel habits (push_imp); the importance of bicycle-related pull measures for changing travel habits (pullbike_imp); and the importance of public transport-related pull measures for reducing car use (pullPT_imp).

5.5 Ethical considerations

5.5.1 Studies of Human Participants

When conducting studies with human participants, there are some issues that need to be addressed. These issues became relevant to this study through the research methods of interviews and surveys. Privacy, confidentiality and anonymity concerns of respondents are the most vital to consider (Buchanan & Hvizdak, 2009). These three become especially important if the subject that is to be examined through the survey or interview is of a sensitive topic. Since the survey or the interviews contain no sensitive information, many of the ethical considerations that apply to sensitive topics need not be addressed, even though they had to be kept in mind whilst conducting the research. In order to prevent the privacy concerns to drive the response rates down, a clear privacy policy had to be put in place and presented to the respondents before they were faced with the survey or interview itself (Buchanan & Hvizdak, 2009).

5.5.2 Interviews

When performing an interview, the informed consent is one of the most important aspects to consider. The interviewee should consent to giving the interview voluntarily and should not be pressured to it by the researcher. The participant should also be informed about her or his part in the entirety of the study and what the participant is contributing to the research process (Dalen, 2007). Allmark et al. (2009) recommend that continuous or process consent is used during the interviews, reaffirming consent during the entire process. The consideration concerning information is also connected to consent, as this means the researcher should thoroughly inform the participant about the purpose of the study, which methods are to be used, what the possible consequences could be as well as what terms there are for the interviewees participation in the study. For instance, one of the terms could be that the interviewee can at any time change their mind about participating in the study (Dalen, 2007).
Privacy and confidentiality is critical, as the researcher must consider the possible will of the interviewee to remain anonymous. Anonymity means that the information presented in the study that was obtained from the interview cannot be traced back to the participant, should he or she wish to be anonymous. This was mentioned in the interviews, but the informants expressed no concern or issues with being named in the study. Concerning confidentiality, the small number of possible participants that are being interviewed pose a problem in this study. Because of the low number of participants, concealing identities is impossible in this study. As the nature of the topic studied is not very sensitive, the question of anonymity was not at all controversial.

5.5.3 Survey Research
The ethical considerations mentioned above needed to be addressed for the survey research. Through presenting the results of the survey in groups rather than individually, personal anonymity is guaranteed to the survey respondents, as there is no way of identifying the individuals. This was stated on the first page of the survey to clarify any anonymity concerns.

Informed consent in survey research can be considered to be given when a fully answered survey is given back to the researcher. If there is no consent, neither is there a survey result which can be presented, as there are no answers.

One can assume that the topic of Travel Demand Management and daily commutes might not be extremely sensitive to the respondents, nor can the respondents be considered to be a ‘vulnerable population’. This makes the ethical considerations for this survey a bit easier to handle, however it is still necessary to ensure the privacy and confidentiality of the respondents, which had to be kept in mind during the study.

5.6 Method Discussion
The methods used to conduct this study were all chosen to capture different elements and aspects of the project Green parking purchase. Therefore, there is a wide variety of methods, which all have their own strengths and weaknesses. First of all, there were different approaches to the different methods used. The questions posed in the survey were grounded in theoretical starting points, making the quantitative study a more deductive approach. The discourse analysis and interview material were also collected with a mainly deductive approach, as the results presented are a selection of what is deemed to be relevant for the study. This is also affected by my own preconception of partly what is relevant but also what I deem to be fitting to a certain discourse or theme. Therefore, all three methods can be said to have been influenced by my own world view and opinions on urban development and sustainability. This can of course come to influence the reliability of the study.

The reliability of methods is often assessed differently depending on whether the method is qualitative or quantitative. The statistical reliability of the quantitative measures can be found in the quantitative method section above, whereas there is no easy way to determine the reliability of qualitative methods. To ensure that the data has been accurate, which could be considered to be a first step to ensure reliability, the interviews were transcribed, and the comprehensive plan was quoted where it was needed. Of course, my own perceptions of environmentalism an urban development come into play more during the qualitative analysis, which had to be considered throughout the study.
The same critique is possible for the method of data collection. There is a large difference in answering a survey anonymously and answering questions in a personal interview. The anonymity may partly be advantageous, as respondents may answer more truthfully. However, it can also become a problem in surveys, as some respondents may not have bothered to answer some questions, of course without consequences. It is however impossible to speculate in the severity of this problem, as it is very difficult or even impossible to control for in a study of this scale. A possible drawback with the interview method in this study is the small number of respondents, as has been mentioned earlier in the ‘Ethical Considerations’-section. However, as one respondent especially pointed out, the theme of the interviews was highly uncontroversial. Sustainability is widely accepted in society and actors in the field of urban development are expected to act in line with this paradigm. The interview respondents were selected due to their participation in an environmentally sustainable project and are therefore had rather uncontroversial views on this topic. Anonymity was therefore not an issue for either of the respondents.

A potentially problematic aspect of the methods chosen is the sample investigated with the survey. The aim was to get a representative view of attitudes towards TDM measures in the affected properties, however it is hard to determine whether or not the 57 respondents give a representative picture of all employees’ attitudes. Apart from the sample size, the composition of the sample can also be discussed. There is a clear majority of female respondents, which also could be problematic. In this case, it is hard to say whether or not this has an impact on representation, as equal gender distribution might not necessarily be needed to achieve this: The shopping mall Utopia was included in the survey study which may have had an impact on the gender distribution of the respondents as women are generally overrepresented in these types of businesses (Andersson et al., 2016). However, there are no indications that this sample is biased, except possibly that the level of car use is relatively low, as will be shown in the results later. Besides from the potential issue of representation, the relatively small sample size could also have had an impact on the quantitative analysis. The internal reliability of the results was most certainly affected by the small dataset, and possibly also the regression results. The obvious improvement to this study then of course is to increase the size of the sample, to gain a more representative view of the population and get results with a higher reliability.
6. Results

6.1 Policy Analysis

6.1.1 Goals, Strategies and Context

The comprehensive plan for Umeå from 2011 has the particularly clear objective of achieving a population growth up to 200,000 inhabitants in the municipality of Umeå until the year 2050. The goal of a significant population growth coupled with the Aalborg commitments (a policy aid for European cities to work with sustainable development) for sustainable urban development affect all parts of the plan, and the land use planning therefore has a strategic role in the environmental efforts of the municipality (Umeå Kommun, 2011a). Through the Aalborg commitments, Umeå Municipality pledges to work to integrate a set of principles into their daily activities, all connected to sustainable development. By committing to these, the municipality will incorporate several aspects into their city planning policies. These are as follows:

- Reuse and revitalize abandoned and deprived areas.
- Counter urban sprawl by increasing densities in the existing urban landscape as well as prioritize land use within the city limits rather than using land that is in the outer fringes of the city.
- Ensure a mix of functions and services in the city centre, prioritizing housing whilst working for balanced levels of housing, workplaces and service.
- Preserve, protect and use the urban cultural heritage in an appropriate way.
- Implement demands for sustainable urban development and construction, as well as promoting architecture and construction technology of the highest quality (Umeå Kommun, 2011b).

The stated aim of the comprehensive plan of 2011 is to create beneficial conditions for the following: A ‘sustainable and attractive city’, ‘preparedness for future expansions’, ‘Increased attractivity by creating possibilities and favourable conditions’, as well as ‘strengthening the role of Umeå as a regional centre and driver of growth in the north’ (Umeå Kommun, 2011a, p. 9), which seems to correspond to the Aalborg commitments.

The context of the comprehensive plan is therefore very much in tune with the current paradigm of sustainable development for urban areas. As a response to climate change, the aspect of sustainability is worked into many aspects of everyday life. The comprehensive plan in this context becomes a tool to point the urban area of Umeå in the right direction in terms of sustainability. The strategic role of land-use and urban planning in the environmental efforts becomes evident very early on in the comprehensive plan. One of the main concepts that is a focus in the entire plan is that of ‘Sustainable growth’. The reoccurring use of this term in the comprehensive plan indicates the weight that is being put behind the intention of incorporating the Aalborg commitments and sustainable development in the long-term planning of the municipality.

The use of the commitments has also been the ground pillar in the development of the six main strategies for the urban development of Umeå. The first of these is the ‘five-kilometre-city’, aiming to gather the majority of the urban growth within five kilometres from the city centre or university, in order to enable a high level of accessibility for walking and biking (Umeå Kommun, 2011a). This strategy states that the future city centre of Umeå should be more densely built-up in order to benefit the freedom of movement of women and children in the
urban area. Also, the short geographical distances that are a consequence of a dense, functionally mixed city will according to the comprehensive plan reduce the need for transportation, thus promoting sustainable travel modes such as walking and biking (Umeå Kommun, 2011a). A further strategy called ‘More city’ (Mer stad!) aims to reduce the number of ‘dead’ spaces in the city, increasing the flows of people past places where there previously have been low levels of activity. A result of this will, according to Umeå municipality, be a stronger sense of security and more freedom of movement for all citizens. Connected to these two strategies is the third strategy of creating densely built-up areas at several locations, taking support and supporting surrounding urban areas. The fourth strategy concerns growth within areas close to the biggest lanes for public transport. This would automatically promote the usage of public transportation in newly built-up areas (Umeå Kommun, 2011a). The last two strategies concern accessibility for all citizens from the perspective of sustainability, as well as the promotion of safety and accessibility of public places. In short, the physical environment of the sustainable city appears to be a spatially contained, densely built-up, functionally mixed urban area with high levels of accessibility for all citizens.

6.1.2 Sustainability and growth

As mentioned, the two most prominent goals in the comprehensive plan of Umeå are those of population growth and sustainability (as well as ‘sustainable growth’). There is however no real motivation for any of these goals. The goal of 200 000 inhabitants by 2050 would most likely have extensive consequences for Umeå as a city, yet the goal is not specified or reasoned for any closer. Why 200 000 inhabitants is such an important number and why 2050 is the year when this needs to happen would need some motivation in order to give the plan some additional strength. Given the urgent problem of poor air quality in the central parts and the high level of car usage of Umeå residents, the population growing at such a rate would probably only worsen the current problem. The traffic system therefore is of importance to the city when considering the population growth. This is recognized by addressing traffic by saying ‘in the perspective of 200 000 inhabitants, traffic will be one of the key issues for Umeås future growth’ (Umeå Kommun, 2011a, p. 41). There are several levels that can be read from this statement, the first being that the goal of population growth is indisputable. The second level would be that the state of the air quality is so severe that it must be solved as soon as possible. The solution in this case, is ‘sustainable urban development’ (Umeå Kommun, 2011a, p. 41).

6.1.3 Traffic strategies

A lot of the focus on sustainability in the comprehensive plan is put on the municipality’s traffic system. Sustainability in the transport system in this case is indirectly specified as the use of other modes of transport than the personal car (Umeå Kommun, 2011a), meaning walking, biking, as well as the use of public transport. The extensive car use of Umeå’s inhabitants is described as a structural problem, which implies that the traffic system and urban landscape can be fundamentally and structurally changed to attain a more sustainable traffic system. The description of the problems as structural could also imply that the solutions are mainly structural, which is supported by the very often recurring themes of densification and the bypass road. Another structural measure that is deemed to be of major importance to the sustainable growth of the city is the use of public transport. The public transport section in the comprehensive plan depicts the car as a mode of transport that contributes to ‘mobility’ and ‘accessibility’, whilst ‘claiming large areas of land’ and causing pollution (Umeå Kommun, 2011a, p. 43).
The traffic strategy of Umeå is a so called Sustainable Urban Mobility Plan (SUMP) as mentioned in the literature review and has been developed according to the ECs guidelines (Umeå Kommun, 2011a, p. 41). The reoccurring use of proximity as a remedy for many of Umeås problems, in this case the problems caused by traffic, namely congestion and pollution, strengthens the argument for densification of the already built-up areas. The entire strategy of future expansions of the city being contained to the more central parts becomes part of the traffic strategy in this manner. The structure of the traffic system today makes for very high flows of traffic through the city centre, it is argued (Umeå Kommun, 2011a, p. 45). As this is planned to change, space is made available by changing the land use of the current highways to new built-up areas. There are many different measures that address the accessibility of Umeå and the mobility of its citizens, which like most traffic-related measures can be sorted into the two main categories of push and pull measures. The proposed parking strategy is mainly push-oriented, aiming to reduce the number of parking spaces for commuters employed in the city centre and to some degree replace them with parking spaces for visitors. This reduction means relocating parking spaces to just outside the city centre, which would potentially remove some of the traffic from the most central areas. Relocating parking spaces and roads would deal with the very local problem of pollution and noise pollution. However, it does not really address the structural problem of the large number of trips travelled by car in Umeå. Apart from the parking strategy, there is a number of pull-measures aimed at increasing the number of trips by more sustainable modes of transport. The public transport system is under review and is aimed to be improved by giving it structural advantages and increasing the frequency of trips. Another pull-measure is the planned expansion of the network of bike paths and increased traffic safety for pedestrians and bicyclists in the city centre. All in all, the traffic strategy is largely focused around a combination of push and pull measures to decrease the number of trips taken by car by both making it less attractive and improving conditions for sustainable travel.

6.1.4 Bypass road and densification

A major challenge that can be identified in the comprehensive plan is the poor air quality in the central parts of Umeå. The main strategy for doing this is reducing car usage by a number of means (Umeå Kommun, 2011a). One measure that is currently under construction is a redirection of traffic flows from the inner city to the outer parts by the use of a bypass road around the city, replacing the highway E12 running through Umeå. This will free space in the city centre and allow for densification along the old traffic hotspots (Umeå Kommun, 2011a). This might be a solution to the very local problems of poor air quality in the city centre, it does however only move the problem, as the traffic levels are likely to be just as high on the bypass road, creating emissions at the new location. This solution is therefore simply a way of moving the problem, not solving the cause of the problem, which is an unsustainable traffic system.

Densification of already built-up areas is portrayed to be a sort of universal solution to many of Umeås problems, as the densification in today's spaces that are not efficiently used will bring destinations closer together (Umeå Kommun, 2011a). This is argued to reduce the need for travel by car and will by default promote walking, biking and the use of public transport as trips will be shorter and safer. Further, it is claimed that ‘investments in pre-existing infrastructure can be utilized to a greater extent as this water and drainage, schools, daycare and commercial services are normally already there’ (Umeå Kommun, 2011, p. 22). In this way, densification is argued for through an environmental perspective as well as the perspective of cost-efficiency.
6.1.5 Ecological Discourse
A comprehensive plan is in many ways a political document, aimed at developing society in a certain way. The comprehensive plan of Umeå is aimed at gearing the structure of the city into a more densely built-up urban form, with sustainability as the leading concept. The concept of sustainability in the plan is used very freely, and as mentioned earlier there is no clear definition of what sustainability or sustainable growth means in this context which of course is problematic, as this is the main topic of the plan. The concept of sustainable development, which sustainable growth is expected to fall under, has one definition that is more widely accepted and recognized than other definitions. ‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ was the Brundtland Reports stated definition of sustainable development in 1987, and it clearly still influences politics to this day (Williams & Millington, 2004). Given that this is the foundation of the comprehensive plan, there are some different approaches to sustainability within the document.

Mobility Management is mentioned in the comprehensive plan, which is a way to promote sustainable travel by trying to affect commuters’ behaviour. Changing behaviour to reduce the impact on the environment to promote sustainability is considered to be one of two broad approaches to sustainability, called ‘deep ecology’ (Williams & Millington, 2004). This approach advocates reducing the consumption of humanity, thus adapting our behaviour to the planet. However, in the same section of the comprehensive plan, another approach to sustainability becomes evident, as Intelligenta trafiksystemlösningar (ITS, Intelligent traffic system solutions) are mentioned. This rather technical approach is the opposite to deep ecology and is often referred to as ‘weak sustainability’ or ‘shallow environmentalism’. Using this approach, technical solutions are the main tool to expand the pool of resources: adapting the planet to our behaviour (Williams & Millington, 2004). Both deep ecology and weak sustainability can be said to fall under the sustainability discourse yet are within this considered to be two opposites. In the comprehensive plan, both are present through promoting both structural and behavioural changes, but also through technical improvements inducing behavioural changes.

6.1.6 Discourse of Inclusion
There is a clear will in the comprehensive plan of Umeå to inclusion of all inhabitants and visitors. This is partly expressed through “Alla ska vara med!” (‘Everyone should be included!’) (Umeå Kommun, 2011b, p. 13), a developmental strategy for sustainable development. This means that the city should plan for children, elderly and people with disabilities to create an inclusive city and have this as a starting point in building processes. The aspect of safety is also an essential part in this, as an experienced feeling of insecurity in the urban landscape can be restricting in everyday life (Umeå Kommun, 2011a). This is also a question of equity, which brings up both gender and ethnicity into this context. These are mentioned as ‘different experiences and knowledge’ about how different spaces are experienced in an urban landscape (Umeå Kommun, 2011a, p. 18). Certain places are ‘coded’ by different characteristics, such as age, gender, class, or ethnicity, which has a segregating effect. Places like this must be incorporated properly into the urban landscape to create a secure urban area for all inhabitants.

To briefly summarize the policy analysis, one can say that the overarching theme of the comprehensive plan is sustainability and growth. A lot of focus is being put on solving the
current problems that traffic is causing both through a will to influence travel behaviours, as well as structural and technical solutions. As the comprehensive plan is an important document for the development of the urban area, stressing the points of sustainability and inclusion could be important for the communication with the property owners, who have a big role in the development of Umeå. Influencing behaviour of inhabitants as is being highlighted in some sections is also a key part in the implementation of the plan, as travel behaviour is something that needs to change if the goals of sustainable growth are to be met.

6.2 Implementation & the Property Owners Point of View

One interview informant claims environmental aspects are of tremendous importance to property owners. He lifts several aspects for joining in environmentally oriented projects like Green parking purchase, both from a technical and an environmental perspective. The more technical aspect is that of building certification. BREEAM is the certification system put in place by the European Union (EU) and takes into consideration both the sustainability of the building itself, but also its location and communication. Given these additional dimensions of location and communication, the informant stresses the importance of influencing the employees travel habits. In this process, Green parking purchase becomes an important brick in the wall. The parking spaces near the newly constructed office have not increased since the building was opened. The number of parking spaces remains at the count of 80, despite nearly 6 000 m² of office space being added. This strategy is very well aligned with the comprehensive plan of Umeå. The parking spaces that the employees are ‘forced’ to use instead are referred to as ‘evacuation spaces’ by the informant are located outside of the most central parts of town. In this way, the pollution issues addressed in the comprehensive plan could partially be remedied by moving the routes of motorized traffic to destinations outside the immediate city centre. Of course, this does not guarantee that motorized commuters won’t cross the city centre to get to these ‘evacuation spaces’.

Another view is presented by another informant as he claims the space in the central areas of Umeå is a resource that is scarce. Therefore, it is not rational to use this resource for parking spaces, which is a very costly form of land use given its function. The motives therefore are also aligned with a perspective of property development, as well as marketing and branding. Even though the environmental aspects of Green parking purchase have not been the main motive of all property owners, it is still captured by the project and can be used as an efficient tool to impact the local environment positively. Another aspect that is brought up by one of the informants is the financial benefits that Green parking purchase brings for the property owners. In addition to not building parking spaces, the municipality offers a discount on the parking spaces that the property owners normally would buy out. In this way, the respondent claims that the property owners are more likely to sign these deals, as in addition to environmental and branding benefits, there is a financial gain for them as well.

The acceptability of measures amongst employees like those included in Green parking purchase has not been a problem in the property ‘Fabriken 8’ after a shorter testing period. According to the informant at Länsförsäkringar, there were some complaints when announcing the changes that were to be implemented. However, the majority of feedback has been positive after the first few weeks. The companies renting office space here have been included in the planning for the implementation of this project and are therefore aware of the conditions. Communication to the public however is a problem, according to one informant. Questions related to car use is what he calls a ‘trigger subject’ and changing public opinion towards more
sustainable travel is a problem, especially in the north of Sweden. As acceptability for these measures varies, there needs to be a gradual change towards adapting cities to more sustainable travel. Something that becomes apparent in this is that the parking spaces have moved rather than being removed. The new location is just outside the central area, which causes the need for the employees to walk the last distance to their office, which is a matter of around three minutes. This is of course an expected improvement for the city centre in terms of traffic volume and should reduce the amount of pollutants in the air in the city centre, as well as representing a form of gradual change towards pushing motorized commuting traffic out of the city centre.

### 6.3 Travel patterns & Attitudes

#### 6.3.1 Data Sample

The data sample consists of 57 individuals that are employed by companies that rent office space or storefront space in the properties that utilize the Green parking purchase. The sample population is mostly young, with over half of the respondents under the age of 35. The dominance of young respondents can probably partially be explained by the shopping mall Utopia, as these types of businesses tend to employ a younger staff than other businesses. The median age of the respondents is 28.5, whereas the mean age is 34.2 years of age. This means there is a positive skew in the data concerning the age of the respondents. The level of education is split rather evenly: 46 % have the Swedish ‘Gymnasieskola’ as their highest education, 51 % have a university degree, and the remaining 3 % have another type of education. The gender distribution is not even, as 36 (63 %) women have replied to the survey whereas only 21 (37 %) men have replied.

As this study partly investigates travel behaviours, the distance between the workplace and place of residency is of importance. As Umeå itself is not that widespread, it is not surprising to find that more than half the sample population (32) lives within 5 kilometres of their workplaces. Roughly 19 % of respondents live somewhere between 5 to 10 kilometres away from their workplaces, whereas 21 % of respondents live further away than 10 kilometres.

Car access is also an important description of this sample. More than half (30) respondents answered that they have daily access to a car for transportation to and from work, whereas 19 % of the respondents have occasional access to motorised transport. 28 % of respondents have no access to a car for their daily commute. This shows a relatively high degree of car access; however, this does not necessarily mean that the cars are used daily, only that the option is there. The question asked was specified only for the commute, meaning that car access in other situations does not matter in this case.

The measure ‘env’ indicates how environmentally aware a respondent is, based on questions on urban car use and its effect on the environment. The mean value (M = 3.9) for this measure shows that the sample can be considered to be highly environmentally aware when it comes to car-related environmental problems. The standard deviation (SD = 1.1) indicate there is some spread to the environmental awareness: Some respondents are not as environmentally aware as others.

To briefly summarize the description of the sample, there is a majority of respondents that are under the age of 35, living within five kilometres of their places of employment. The level of education is fairly high, with all respondents having finished at least the Swedish Gymnasieskola (High school), and a majority having a university degree. A large number of
respondents also have access to a car for their daily commute, whereas some only have access to a car for some days of the week.

6.3.2 Travel Mode Choices
The car use of the participants in the study can be divided into three different travel categories: Trips to work, shopping trips, and trips to leisure activities. As 44% of participants have answered that they travel to work by car less than once a month, and 22% have answered they use their car to get to work one to three times each month, it is safe to say that a majority of the respondents are not heavy car users in their daily commute to work. 19% of respondents use their car to get to work five times or more each week, which is the highest frequency possible in this question. The number of answers for shopping and activity trips is also high (58%) in the categories for low-frequency car use, whereas shopping and leisure activity trips are remarkably more common than work trips in the frequency group 1-2 times per week.

Bus use is considerably lower than car use in all three travel categories. The majority of respondents very rarely use the bus, and most seldom occurring is the shopping trip by bus. 46% of respondents have answered that they take the bus to work less than once every month, whereas 17.5% of respondents travel by bus to work on a daily basis. Trips to work are the most frequent reasons for respondents to use the bus service, however almost half of the respondents (46%) travel by bus very seldom. Work trips by bike or on foot are more common among respondents, with 26% of respondents walking or biking to work more often than 5 times a week. 38% of respondents have answered that they walk or bike to work less than once each month.

6.3.3 Grönt parkeringsköp
The benefits offered to employees through the Green parking purchase are as mentioned before access to changing rooms with showers, membership in a car pool as well as access to parking spaces for bikes that are heated, presumably to counteract the harsh winter climate of Umeå. However, knowledge of the availability of these benefits does not seem to be widespread. As can be seen in figure 1, 50.8% of the respondents know of the heated parking spaces for bikes, yet only six 10.5% of the respondents have answered that they were aware that the employer offers memberships in car pools. Knowledge of the changing rooms is also higher, with 33% of respondents claiming they were aware of these.
Figure 1: Number of respondents being aware of the benefits provided through Green parking purchase.

Figure 2 below shows the degree to which these benefits are used by employees in these workplaces. The most frequently used benefit is the heated parking spaces for bicycles, however these are only used by a very small number of individuals. The changing rooms are used more seldom, with only two respondents using them more frequently than less than once a month. One respondent has answered that she or he has in fact used the car pool one to three times a month. Overall, the use of the benefits offered can be considered to be remarkably low.

Figure 2: Rate at which respondents are using the facilities offered through Green parking purchase.
Table 3 shows the mean values and standard deviations for different TDM measures associated with Green parking purchase. The values show how important different measures are for reducing car use on work trips. The mean value of 3.75 for bus subsidies indicates that this sample perceive this pull measure to be important for car use reduction. Another important factor according to respondents is having a parking space in proximity to the place of employment. Values around 3, such as the mean values for changing rooms with showers and indoor bike parking, show that respondents think these measures are neither important or unimportant. Car pool membership as a pull-measure can be deemed to be unimportant to respondents.

Table 3: Mean values and standard deviations for importance of different measures for reducing car use on work trips.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus subsidies</td>
<td>3.75</td>
<td>1.35</td>
</tr>
<tr>
<td>Changing rooms w. showers</td>
<td>2.82</td>
<td>1.31</td>
</tr>
<tr>
<td>Indoor bike parking</td>
<td>3.02</td>
<td>1.31</td>
</tr>
<tr>
<td>Car pool membership</td>
<td>2.62</td>
<td>1.16</td>
</tr>
<tr>
<td>Parking space nearby</td>
<td>3.71</td>
<td>1.23</td>
</tr>
</tbody>
</table>

In order to investigate if value orientations such as altruism and self-interest have an impact on the perceived importance of measures implemented through Green parking purchase, Table 4 displays regression models with environmental awareness and the use of different modes of transport related to the importance of different measures in Green parking purchase for a car use reduction on work trips. The travel modes selected for the model is the mode of travel that is closest related to the TDM measure. For instance, access to indoor parking space for bicycles is aimed at bicyclists, which is why bike use is used as a predictor variable. Environmental awareness is significant for the importance of access to dressing rooms with showers, whereas the bike use of respondents is not. Access to heated parking spaces for bicycles is another pull measure aimed at bicyclists. Environmental awareness and bike use explain 12 percent of the variance in the perceived importance of this measure. However, only the environmental awareness is significant in this model. Access to a carpool through the place of employment can only be explained to 6 percent by environmental awareness and bus use, however in this model, the mode of transport is significant. This indicates bus users are interested in car pools instead of using public transport. The model with environmental awareness and bike use has no explanatory power what so ever.
Table 4: Regression models with importance of different measures for reducing car use on work trips, explained by environmental awareness and travel mode use.

<table>
<thead>
<tr>
<th>Access to dressing rooms with showers</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-sq</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>env</td>
<td>0.4785</td>
<td>0.2241</td>
<td>2.14</td>
<td>0.037</td>
<td>0.045</td>
<td>55</td>
</tr>
<tr>
<td>bikeuse</td>
<td>-0.0911</td>
<td>0.1490</td>
<td>-0.61</td>
<td>0.544</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to heated parking spaces for bicycles</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-sq</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>env</td>
<td>0.6507</td>
<td>0.2161</td>
<td>3.01</td>
<td>0.004</td>
<td>0.1201</td>
<td>55</td>
</tr>
<tr>
<td>bikeuse</td>
<td>-0.0645</td>
<td>0.1437</td>
<td>-0.45</td>
<td>0.655</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to carpool through place of employment</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-sq</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>env</td>
<td>0.1445</td>
<td>0.1874</td>
<td>0.77</td>
<td>0.444</td>
<td>0.0589</td>
<td>55</td>
</tr>
<tr>
<td>bususe</td>
<td>0.3684</td>
<td>0.1676</td>
<td>2.2</td>
<td>0.032</td>
<td></td>
<td></td>
</tr>
<tr>
<td>env</td>
<td>0.1501</td>
<td>0.2069</td>
<td>0.73</td>
<td>0.472</td>
<td>-0.028</td>
<td>55</td>
</tr>
<tr>
<td>bikeuse</td>
<td>-0.0231</td>
<td>0.1376</td>
<td>-0.17</td>
<td>0.867</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the pilot study for Green parking purchase, a subsidy on bus tickets was implemented as a pull measure aimed at increasing public transportation ridership. Respondents in this survey that are identified as having a high degree of public transportation use have a significant positive impact on the importance of this pull measure, as can be seen in table 5. The model explains just over 14 percent of the variance of the dependent variable. Another consequence of Green parking purchase is that parking spaces are no longer available in close proximity to the work places. Therefore, a model of environmental awareness and car use was established to test for the importance of this. The model explains the variance to 13,5 percent, and both environmental awareness and car use have a close to significant effect. Higher car use is connected to a greater importance attached to parking spaces close to the workplace, whereas higher environmental awareness has a negative impact on the importance of parking spaces.

Table 5: Regression models with parking spaces and bus subsidies, explained by environmental awareness and travel mode use.

<table>
<thead>
<tr>
<th>Subsidised bus tickets</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-sq</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>env</td>
<td>0.0928</td>
<td>0.2078</td>
<td>0.45</td>
<td>0.657</td>
<td>0.1426</td>
<td>55</td>
</tr>
<tr>
<td>bususe</td>
<td>0.6113</td>
<td>0.1858</td>
<td>3.29</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to parking space (car) close to place of employment</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-sq</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>env car use</td>
<td>-0.3753</td>
<td>0.2030</td>
<td>-1.85</td>
<td>0.07</td>
<td>0.1348</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>0.4553</td>
<td>0.2510</td>
<td>1.81</td>
<td>0.075</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.3.4 TDM measures
To show positive or negative attitudes, as well as high or low perceived importance of measures, Table 6 shows the mean values and standard deviations for the variables derived from the factor analyses as well as the perceived importance of shorter distance to destinations (q9a). It shows that respondents think that car restrictions are not very important for them to decrease their car use, whereas encouraging public transport (PT) use through pull measures is very important.
There is a very positive attitude towards public transport pull measures among respondents, as well as a positive attitude towards bicycle-related push measures. Push measures are on the other hand met with a more negative attitude. The standard deviations show that there is somewhat larger discrepancy in the opinions about the importance of push and pull measures, when compared to attitudes.

Table 6: Mean values and standard deviations for variables derived from factor analyses and the variable q9a.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of shorter distances to destinations</td>
<td>3,65</td>
<td>1,22</td>
</tr>
<tr>
<td>Importance of car restrictions</td>
<td>2,64</td>
<td>1,36</td>
</tr>
<tr>
<td>Importance of encouraging bike use</td>
<td>3,18</td>
<td>1,35</td>
</tr>
<tr>
<td>Importance of encouraging PT use</td>
<td>3,74</td>
<td>1,35</td>
</tr>
<tr>
<td>Attitudes towards push measures</td>
<td>2,61</td>
<td>1,14</td>
</tr>
<tr>
<td>Attitudes towards bike pull measures</td>
<td>3,62</td>
<td>1,04</td>
</tr>
<tr>
<td>Attitudes towards PT pull measures</td>
<td>4,11</td>
<td>0,89</td>
</tr>
</tbody>
</table>

To detect correlations between the levels of transport mode use amongst respondents and the reception of measures, Table 7 shows a correlation matrix between transport mode usage, importance of push and pull measures, attitudes towards push and pull measures, as well as environmental awareness. Car use is significantly negatively correlated to the importance of all push- and pull measures, as well as attitudes towards push measures and environmental awareness. Bike use is positively correlated towards importance of bicycle-related pull measures, attitudes towards push measures, as well as environmental awareness. The positive correlations for bus use are the importance of pull measures, both related to public transport as well as those related to bicycle use. Environmental awareness shows significant positive correlations to the importance of push measures and the importance of bicycle-related pull measures to reduce car use, as well as significant positive correlations to attitudes towards push measures and bicycle-related pull measures.

Table 7: Correlation matrix of transport mode use and attitudes/importance of push and pull measures.

<table>
<thead>
<tr>
<th></th>
<th>Caruse</th>
<th>bikeuse</th>
<th>bususe</th>
<th>Push_imp</th>
<th>Pullbike_imp</th>
<th>pullPT_imp</th>
<th>Push_att</th>
<th>Pullbike_att</th>
<th>pullPT_att</th>
<th>env</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caruse</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bikeuse</td>
<td>-0.4575*</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bususe</td>
<td>-0.3632*</td>
<td>-0.0147</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push_imp</td>
<td>-0.2362*</td>
<td>0.1837</td>
<td>0.0169</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullbike_imp</td>
<td>-0.3135*</td>
<td>0.2802*</td>
<td>0.2598*</td>
<td>0.3099*</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pullPT_imp</td>
<td>-0.2464*</td>
<td>0.0630</td>
<td>0.3008*</td>
<td>-0.0224</td>
<td>0.2721*</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push_att</td>
<td>-0.2549*</td>
<td>0.2446*</td>
<td>0.0795</td>
<td>0.6596*</td>
<td>0.5540*</td>
<td>-0.0249*</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullbike_att</td>
<td>-0.1996</td>
<td>0.1874</td>
<td>0.0981</td>
<td>0.0349*</td>
<td>0.5919*</td>
<td>0.2070</td>
<td>0.1921</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pullPT_att</td>
<td>-0.0000</td>
<td>-0.1143</td>
<td>0.0738</td>
<td>-0.1829</td>
<td>0.2274</td>
<td>0.5157*</td>
<td>-0.0751</td>
<td>0.2913*</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>env</td>
<td>-0.2975*</td>
<td>0.3698*</td>
<td>0.1026</td>
<td>0.5735*</td>
<td>0.4870*</td>
<td>0.1545</td>
<td>0.6338*</td>
<td>0.2810*</td>
<td>-0.0134*</td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

Previous studies indicate that problem awareness (in this case environmental awareness) should have a great impact on acceptability and attitudes towards TDM measures (Eriksson et al,
2006). As the built environment has been proven to have an impact on travel behaviour (Naess, 2006), and Umeå’s comprehensive plan puts a lot of emphasis on densification, the variable representing the importance of shorter distances to destinations is included in these regression models. Table 8 below shows the regression results from three different regression models. The motives for these regressions are to try to explain how environmental concern or awareness and the perceived importance of different TDM strategies influence attitudes towards TDM strategies. The first regression model uses attitudes towards push measures as the dependent variable. The model explains 61 percent of the variance in the dependent variable, with three variables having a significant impact on the attitude towards push measures. Environmental awareness has a positive effect on the attitude towards push measures, meaning that the higher your environmental awareness, the more likely you are to be positive to traffic reducing measures such as reduced parking spaces, car free streets or even a car free city centre. The importance of push measures to remove cars from the city centre as well as pull measures that are related to the promotion of bicycle use also have a positive impact on these attitudes. The second regression model tests the variance explained within the attitudes towards bicycle-related pull measures. The model explains 47.5 % of the variance within the dependent variable. Three variables have a significant impact on these attitudes as well, the importance of push measures and bicycle-related pull measures being two of them. The importance of shorter traveling distances for the reduction of car use is the third. The last model has the dependent variable public transportation-related pull measures, which is explained to 28.5 % by the model. The two variables that have a significant impact on these attitudes are the importance of push measures, as well as the importance of public transportation-related pull measures.

Table 8: Regression models with attitudes towards push & pull measures.

<table>
<thead>
<tr>
<th>Push_att</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-Sq.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>q9a</td>
<td>-0.0162</td>
<td>0.0806</td>
<td>-0.2</td>
<td>0.842</td>
<td>0.6135</td>
<td>51</td>
</tr>
<tr>
<td>env</td>
<td>0.2593</td>
<td>0.1397</td>
<td>1.86</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push_imp</td>
<td>0.3758</td>
<td>0.1009</td>
<td>3.73</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullbike_imp</td>
<td>0.367</td>
<td>0.1111</td>
<td>3.3</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pullPT_imp</td>
<td>-0.1763</td>
<td>0.115</td>
<td>-1.53</td>
<td>0.132</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pullbike_att</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-Sq.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>q9a</td>
<td>0.249</td>
<td>0.0699</td>
<td>3.56</td>
<td>0.001</td>
<td>0.475</td>
<td>49</td>
</tr>
<tr>
<td>env</td>
<td>0.1504</td>
<td>0.1113</td>
<td>1.35</td>
<td>0.184</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push_imp</td>
<td>-0.1927</td>
<td>0.0819</td>
<td>-2.35</td>
<td>0.023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullbike_imp</td>
<td>0.3713</td>
<td>0.0905</td>
<td>4.1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pullPT_imp</td>
<td>0.028</td>
<td>0.0932</td>
<td>0.3</td>
<td>0.765</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PullPT_att</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>p</th>
<th>Adj. R-Sq.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>q9a</td>
<td>0.1</td>
<td>0.0689</td>
<td>1.45</td>
<td>0.154</td>
<td>0.2844</td>
<td>52</td>
</tr>
<tr>
<td>env</td>
<td>0.0266</td>
<td>0.1148</td>
<td>0.23</td>
<td>0.818</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push_imp</td>
<td>-0.1657</td>
<td>0.0864</td>
<td>-1.92</td>
<td>0.061</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullbike_imp</td>
<td>0.1007</td>
<td>0.0949</td>
<td>1.06</td>
<td>0.294</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pullPT_imp</td>
<td>0.3672</td>
<td>0.0986</td>
<td>3.73</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Discussion

7.1 Green parking purchase

The aim of this study is to investigate the strivings of Umeå Municipality whilst considering the policy, implementation as well as response to TDM measures. By looking at these different aspects, this study manages to cover a wide spectrum of perspectives and perceptions of mobility and TDM measures, and how they interact with each other. Initiatives like Green parking purchase are clearly aimed at changing the structural conditions of commuters in order to influence travel mode choices. As the ABC-theory states, both attitudes and context can influence behaviours. Contextual barriers to behaviour can many times be seen as structural, which is why measures like those included in Green parking purchase and the comprehensive plan may be successful in the long run. The densification of Umeå is one of these measures that changes the structural conditions of the urban area, which is likely to have an impact on the influence context has on peoples’ behaviour. Shortening distances to destinations is an important determinant for those positive to bicycle-related pull measures, which could be an indicator that bike use might increase if destinations become more accessible by bike. This affects context in the ABC-theory, as well as the structural component of accessibility.

The property owners are one of the key actors in the implementation of TDM measures of this kind. The property owners can however influence the commuters’ context to some extent. Giving the benefits that the pull-measures contribute to can be seen as shifting the context towards fewer barriers to biking, bus use and walking to work. Moving parking spaces could be seen as an added contextual barrier for car use. Attitudes may also be influenced by property owners, by the implementation of mobility management campaigns as well as workplace travel plans. Despite all this, environmental policy largely relies on collective participation of the public, as this cannot be forced (Matti, 2006), which also becomes evident when looking at the frequency of use of the facilities installed through Green parking purchase. Neither the municipality nor the property owners can possibly force people to travel more sustainably, which in the end leaves it up to individual choices.

The acceptability of measures is an important aspect that needs to be taken into account when implementing TDM measures. Different measures can be received by commuters in different ways (Schuitema et al., 2010), which is also the case with the measures in Green parking purchase. The measure of moving the parking spaces to a more distant location is of a coercive nature, which according to Schuitema et al. (2010) should have rather low acceptability, at least among frequent car users. This could potentially explain the negative attitude towards many push-measures among car users in the survey results. The move of parking spaces could be seen as a measure that constricts the individual freedom of car users, and naturally this will lead to a negative attitude in this group of commuters. The pull-measures included in Green parking purchase are there to compensate for the loss of the perceived individual freedom caused by the alteration in parking possibilities. Non-coercive measures like these are generally received with a more positive attitude by the public (Gärling and Schuitema, 2007), which means that combining the coercive measures with the non-coercive measures should be received better than only coercive measures alone. This has been shown to be true for the sample in this study. Many respondents find these pull measures important to decrease car use, as well as showing a positive attitude towards them. Push measures on the other hand are not met with a positive attitude.
The main incentives for property owners to engage in pro-environmental behaviour, in this case signing the deal of Green parking purchase and implementing it appear to vary. Whereas one informant brings up the importance of sustainability in the urban area and enabling employees to travel sustainably by giving them incentives to do so, the other respondent mainly talks about financial aspects and space as a scarce resource. However, these incentives appear to be enough for the property owners to engage in pro-environmental behaviour. Having the support of property owners is of course one of the central parts of implementing a policy of this kind. Their support does not mean much without the acceptance and changed behaviour of commuters, though. It is therefore important to deploy the information and incentives as mentioned by Stern (1999). The incentives are already in place, in the form of indoor bicycle parking spaces, changing rooms with showers and car pools, as well as a person responsible for workplace travel plans. As investigated in this study, different interests show that different measures act as incentives for not using a car to get to work. For instance, bicycle users might view the decreased carbon emissions as an incentive to ride their bike to work rather than using their car. Despite all this, there appears to be a substantial lack of information concerning all these incentives. The survey study has shown that the knowledge of any measure implemented is at best little above 50%, mostly lower. The motives may differ for property owners, but if there truly is a will for people to travel more sustainably, one would assume that the people affected by Green parking purchase also are informed about all the benefits, which obviously is not the case in the sample that was studied.

This is of course problematic, for both property owners and the municipal planners. The property owners have invested in facilities and incentives for those working in the buildings to promote sustainable travel, which are clearly not being used. If there is in fact an interest in people traveling sustainably as one informant claims, one would assume that the property owners would at least push companies to inform their employees about the pull measures that have been implemented in the building. For municipal planners, the work put into the comprehensive plan and the design of Green parking purchase feels somewhat wasted if the benefits are not being taken advantage of simply due to a lack of information.

There is of course also a degree of individual responsibility that needs to be taken into consideration. The individual aspect of sustainable travel could also be affected by information campaigns, as described in the comprehensive plan. Informing about the harmful effect of car travel on the environment, both local and global, has been shown to have the greatest effect on car use reduction when combined with push- and pull measures. This is to some degree shown by the fact that car use and environmental awareness or concern are negatively correlated (see table 6).

The part that Green parking purchase plays in the comprehensive plan becomes evident after reviewing the literature and the results. Combining hard and soft measures, push and pull measures as well as changing the structural context of the inhabitants to promote sustainable travel should be a recipe for success if the goal is to decrease car use. However, a number of problems appear to arise in the implementation of these policies. Getting the property owners on board does not seem to have been the biggest problem for the municipality, as there are ecological, financial and marketing incentives that motivate the property owners. The problem appears to be informing potential users of these facilities and benefits, as well as motivating people to use them. The ideal situation for Green parking purchase to be effective would of course be that all of the respondents knew about all the benefits that are offered. If there is
lacking information about these benefits, they will of course be used less frequently and by fewer employees.

Considering the apparent lack of information that surrounds Green parking purchase amongst employees in the affected properties, the low usage rates are not very surprising. The motives of altruism and self-interest could show what measures can be implemented or improved in order to attract different types of commuters. The positive attitudes towards some of these measures show that there is potential for higher usage of these facilities. However, without the information about these benefits reaching the target audience, these efforts are possibly wasted.

7.2 Sustainability and Travel Demand Management
The goals of sustainability in the comprehensive plan are very much in tune with the paradigms of sustainability in modern day planning systems. However, the motivation for this goal isn’t quite clear, and given that this comprehensive plan is meant to guide the future development of Umeå, a clear definition of what sustainable growth is and why it is so important would make the foundation of the plan and plans for the future less ambiguous.

The effects a densification will have on the travel patterns of inhabitants has been proven in many cases (Naess, 2006), it is however hard to predict how this will work in Umeå partly because of the harsh winter climate, which is likely to increase car use during the winter months. Of course, the climate is something that cannot be changed by municipal planning, however the conditions for bicyclists, bus users and pedestrians can be improved through measures implemented through for instance Green parking purchase. The 5-kilometre-strategy in the comprehensive plan seems like an interesting path towards sustainable mobility, as the densification this would bring has shown to have support of those who value pull-measures in order to reduce car use for work trips (see table 8). Of course, not all inhabitants would be affected by this, making planned expansions of the public transport system even more important to get the more distant commuters to choose sustainable travel modes.

Much of the focus in the comprehensive plan is on the city centre of Umeå. Here, the problems that the extensive car use of Umeå's inhabitants bring to bear has the greatest effect and is expressed through air pollution, noise pollution as well as congestion. The plan is to solve this by moving large volumes of traffic by constructing a bypass road, as well as moving parking spaces to just outside the central area. This will of course have a local effect of less pollution in the central area. However, the traffic will only be redirected to other areas, which will bring the problems to new areas unless effective TDM measures are implemented to counteract the high car use. Finding a balance between effective push and pull measures to achieve support and acceptance from the commuters will be a vital part of Umeå's strategy towards sustainable growth. For instance, the bus subsidies that were planned to be implemented in Green parking purchase were perceived as very positive, meaning that they could potentially replace the need to travel by car for some commuters. Given that the subsidy was not implemented for tax reasons, the more long-term solution to this would be to improve public transport to such a degree that commuters have the feeling they are getting their money’s worth when using public transportation. Another important aspect is not forgetting the more remote parts of the urban area of Umeå and improving infrastructure to support sustainable mobility in these parts.

7.3 Sustainable Mobility in Practice – From Planning to Reception
As shown in the results section, there are many different angles and perspectives on sustainable travel and the implementation on TDM measures. The role of municipal planning is one of the
most vital in this field, as it sets the general direction of how society develops, as well as how the urban space is used. By setting the direction towards more sustainable travel patterns, Umeå municipality hopes to affect their citizens' habits and choices in everyday life. There is a clear focus on the aspects of sustainability and environmental friendliness in the comprehensive plan, indicating a desired development in this direction. Sustainable mobility is mentioned, and the traffic strategy is based on a Sustainable Urban Mobility Plan (SUMP) as mentioned in the literature review. A comprehensive plan also works with a comparably long timeframe in mind. As it is the long-term development that is being planned for, measures like the densification of the urban centre can have great effect on travel in the long run. As Naess (2006) points out, the built environment has a substantial impact on travel behaviour by creating distance or proximity between destinations. Looking at aspects of accessibility, the increased density in central parts of Umeå would have an effect on primarily the land use component as well as the transportation component as defined by Geurs and van Wee (2004). The land use component would be affected by the increase of destinations within a spatially confined area, in this case the central parts of Umeå, which is a direct consequence of a denser urban structure. According to the comprehensive plan, a higher urban density will also lead to improvements in public transportation, as the population basis for these services would increase (Umeå Kommun, 2011a). In this way, the individual's ability to use the transportation system would increase, thus affecting the transportation component of accessibility.

By working with structural changes much like the aspects highlighted in the comprehensive plan, the municipal planning can affect the context of commuters. As described in the Attitude Behaviour Context (ABC) theory, removing contextual barriers can have an effect on behaviour, given that there is a pro-environmental attitude. Increasing densities for increased accessibility for bicyclists and public transport users, as well as improving the public transport coverage and departure frequency are structural changes that affect context. Given that many respondents have a positive attitude towards pull measures and find these important as well when it comes to changing travel habits, there might be some indications that the removal of some contextual barriers could in fact make the commuters travel mode choices more sustainable.

In this study, there are significant correlations between travel mode choice and attitudes or importance of push and pull measures to promote sustainable travel. For instance, there is a negative correlation between the importance of push measures and car use. This indicates that car users feel that this coercive measure might restrict their personal freedom in travel choice, making their attitude towards it more negative. On the other hand, bicyclists and bus users may feel that push measures will increase their personal freedom of choice through for instance increased traffic safety, making them more positive towards these types of measures. The relatively high measure of environmental awareness in the sample should also be an indicator of support for pro-environmental policy, such as the comprehensive plan of Umeå.

Environmental awareness has proven to be an important measure for perceptions and attitudes in this study. The regression results in table 3 show that the perceived importance of two of the measures implemented through Green parking purchase, environmental awareness is a strong predicting variable. As perceived importance of access to dressing rooms with showers as a dependent variable was significantly affected by environmental awareness when combined with bike use as explanatory variables, this may be an indicator of altruism in the determinants of the perceived importance. The same goes for the perceived importance of the access to indoor
parking spaces for bicycles: bike and bus users appear to display a level of altruism in their perceived importance of these measures. When compared to the regression results for the attitudes towards car pool access, explained by bus use and environmental awareness, the level of bus use is the significant variable, indicating that self-interest might be a determining factor. This could possibly mean that bus users would prefer to travel by car rather than by bus or travel by bus to work and use a car for work-trips, but for unknown reasons don’t have access to a personal car, making them more positive towards this measure. When looking at the planned, but never implemented measure of subsidised bus tickets, the model that explained most of the variance in the dependent variable was that with bus use and environmental awareness. In this model, bus use is significant whereas environmental awareness is not, also indicating that self-interest could be behind these attitudes. Car users are for obvious reasons very positive towards parking spaces close to their place of employment, which also indicates that self-interest is a determinant for this attitude. These regression models may capture some of the motivational factors for respondents to choose a certain travel mode, or to find certain measures in Green parking purchase to be important.

Environmental awareness is also strongly positively correlated to a number of attitudes towards measures. Importance of push measures, bicycle-related pull measures, and positive attitudes towards push and pull measures are significantly correlated to this variable, indicating that this might be a highly explanatory part in attitudes of commuters. The relatively high environmental awareness of the sample could therefore potentially explain the generally positive attitudes towards some measures.

7.4 Limitations, Implications & Future Studies

7.4.1 Limitations
There are several improvements to be made to this study for future research. The first improvement that comes to mind is to increase the sample size in the survey research. This would increase reliability in the quantitative analysis, as well as ensuring that the sample gives a representative picture of the entire population. Further, capturing the dimension of age was difficult in this study due to the sample size. Investigating if travel habits and predictors for these is a generational question, as well as if it is a question of socioeconomical factors would be interesting. The analysis of policy and implementation could be expanded to include national as well as regional policy in order to add further levels to the analysis.

The strength of this study is that it covers several layers of the implementation of pro-environmental policy and TDM measures. It also puts the policy into a context, giving some background and motives to the municipal perspective. Whilst these two aspects give the study additional depth, they have also brought some limitations with them. In order to give these different perspectives, focus had to be put on a geographically confined area, in this case Umeå. Studying TDM measures several towns of comparable size and character (University towns) like Lund and Linköping would be interesting, for comparative purposes. Also, a study with a larger sample of survey respondents would be beneficial to understanding perceptions of and attitudes towards TDM measures. Gaining more knowledge about the process of informing employees and what property owners think about the low usage of the facilities would be of interest. This might be especially interesting when Umeå Municipality implement Green parking purchase in their own offices in the near future as planned (Johan Sandström, personal communication, 2018-03-05).
7.4.2 Implications
As the results of this study show perceptions of and attitudes towards TDM measures, it can be useful for municipalities aiming to increase sustainable travel by using TDM measures. Also, showing the potential importance of information, it may be useful for the property owners included in this study to increase usage of the facilities, thus potentially reducing car use into the central areas of Umeå, which initially was Umeå Municipalities main goal.

Green parking purchase definitely has potential to reduce car usage, not only in Umeå but also in other Swedish cities, in my opinion. Other cities with similar infrastructure, especially strong bicycle infrastructure, should be able to implement programmes like Green parking purchase. I believe introducing this programme to the larger cities of Sweden, like Stockholm, Gothenburg and Malmö would show its true potential in reducing car usage, as it would be able to affect more people in their daily commutes.

7.4.3 Future Research
Investigating if travel habits and predictors for behaviours is a generational question, as well as if it is a question of socioeconomical factors would be interesting to investigate in further studies. The analysis of policy and implementation could be expanded to include national as well as regional policy in order to add further levels to the analysis. Given that the acceptability of push measures is low, one of the most important aspects for sustainable travel in urban areas is to investigate what measures are sufficient to compensate commuters for their perceived loss of individual freedom and traveling possibilities.

Given that the area of central Umeå faces change in many aspects, such as densification and the relocation of the E12 highway, as well as increasing traffic safety for pedestrians and bicyclists, the impact of workplace travel plans such as Green parking purchase should be investigated in the future as well. This is however something that could be done when the many of the measures to increase sustainable mobility in the comprehensive plan have been implemented, as I believe this would help Green parking purchase reach its full potential and increase the use of the facilities that are offered in the affected properties.

Also, seeing that more properties are on the way to implementing Green parking purchase, such as the municipal offices in Stadshusområdet (Johan Sandström, personal communication, March 7th, 2018), a study of the change of travel mode choices would be interesting. A baseline measurement of travel behaviour that includes a representative sample of the employees at the municipal offices before the implementation of Green parking purchase, as well as on after the implementation could for instance be performed to see the impact that the measures have on travel behaviour.
8. Conclusions

The policies of Umeå municipality concerning TDM measures and reducing car use are to a large degree aimed at commuters to and from the city centre. This is motivated by the fact that these parts of the city experience the largest amount of car-related problems, such as air and noise pollution, as well as congestion. The policies deployed include various promotion strategies of cycling, public transportation, walking and ride sharing. Another important aspect in the municipalities strategy towards sustainable growth to 200 000 inhabitants is the densification of the central city parts, which to a large extent needs to be done without increasing car traffic to or through these areas. Overall, sustainability and equity in growth are the pillars of the municipalities plan for the future.

The implementation of TDM measures happens on several levels. The municipality has their own strategies in promoting sustainable travel as mentioned above, and some of them, like Green parking purchase, are implemented through property owners. Property owners in the city of Umeå have several incentives to implement these programs, including financial and ecological benefits, as well as strengthening of their brand. However, it remains difficult to say how interested property owners are in changing their employees travel behaviours, as information surrounding these measures appears to be rather scarce amongst the employees in these properties.

When it comes to attitudes about more general TDM measures, the different regression models have shown that there are different predictors for attitudes towards push and pull measures. Individuals who find push measures important for car use reduction are often positive towards push measures, whilst having a negative attitude towards pull measures. A higher environmental awareness is also important for the perception of pull measures aimed at bicycle use are important, whereas a higher bus use is correlated with finding public transport-related pull measures important, strengthening the argument for altruism and self-interest as indicators of attitudes and perceptions. Concerning Green parking purchase, the perceived importance of the implemented measures depends on either altruism or self-interest, with bicyclists showing altruism in their perceived importance, whereas bus and car users’ perceived importance of measures is based on self-interest. The use of the measures is however limited, which partly could be improved by more accessible information about the benefits and more pull measures that are attractive to commuters. Green parking purchase certainly has potential to be implemented in other properties in Umeå, as well as in other cities. However, improvements need to be made in several areas, including information to commuters, as well as examining what measures effectively affect travel behaviours.
9. References


NE.se, 2018: https://www.ne.se/uppslagsverk/encyklopedi/l%C3%A5ng/ume%C3%A5 (Accessed 2018-01-25)


Umeå Kommun (2011b) Översiktsplan Umeå Kommun, Fördjupningen för de centrala stadsdelarna. Utvecklingsavdelningen, Umeå Kommun

Umeå Kommun (2013) [Link](http://www.transportportal.se/Energieffektivitet/Slutrapport-demonstration-av-gr%C3%B6na-parkeringsk%C3%B6p.pdf) (Accessed 2018-02-09)


Appendix – The Survey
Frågeformulär - Attityder till trafikminskande åtgärder och parkeringsstrategier

Mitt namn är Alexander Ericsson och jag skriver masteruppsats i Spatial Planning and Development vid Umeå Universitet. Uppsatsens syfte är att granska implementeringen av riktade åtgärder för att minska biltrafiken i centrum och även attityder till dessa. Detta ska åstadkommas med hjälp av policygranskning, intervjuer och denna enkät.

Enkäten består av 16 frågor och tar högst 10 minuter att besvara. Svaren kommer endast att redovisas på gruppnivå och jag garanterar därmed anonymitet. Deltagande är frivilligt men jag uppskattar din medverkan eftersom studien bidrar till en bättre förståelse för hur människor uppfattar vanliga åtgärder som införs för att förbättra trafiksystemet i svenska städer.

Tack för din tid och din medverkan!

Alexander Ericsson
alexander.ericsson@gmail.com
0730604175
1. Kön  
☐ Kvinna  
☐ Man

2. Ålder  
__________________

3. Vilken är din högsta avslutade utbildning?  
☐ Grundskola / folkskola  
☐ Gymnasieskola / folkhögskola  
☐ Universitet / högskola  
☐ Annat: ________________________________

4. Har du tillgång till bil för pendling till och från din arbetsplats?  
☐ Ja, dagligen  
☐ Några dagar i veckan  
☐ Nej

5. Vilken typ av bil har du tillgång till för pendling till och från din arbetsplats?  
☐ Bensinbil  
☐ Dieselbil  
☐ Elbil (Hybrid)  
☐ Elbil (Laddningsbar)  
☐ Annan: ____________________________  
☐ Olika bilar, vilka: ________________________________

6. Hur långt är avståndet mellan ditt hem och din arbetsplats (i kilometer)?  
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7. Hur ofta använder du nedan angivna färdsätt för resor till arbete, för inköp och för övriga resor?  
(Kryssa för det svarsalternativ som bäst svarar mot Din uppfattning för varje typ av resa)
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8. Hur viktigt är följande när du ska genomföra en vanlig arbetsresa:

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<tr>
<td>Begränsad möjlighet att använda bilen i centrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyrare att använda bilen (t.ex. genom skatter och avgifter)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utbyggt cykelnät</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. Vad anser du om följande åtgärder införs i Umeå med avsikt att minska bilresandet?

<table>
<thead>
<tr>
<th>Åtgärd</th>
<th>Mycket negativ</th>
<th>Negativ</th>
<th>Varken negativ eller positiv</th>
<th>Positiv</th>
<th>Mycket positiv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trängselavgift i de centrala stadsdelarna</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Färre parkeringsplatser i centrum för bilar som drvs av bensin eller diesel</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Utbyggt cykelvägnät</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Enstaka bilfria gator i centrum</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Bilfritt centrum</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Ökad turtäthet i kollektivtrafiken</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Fler linjesträckningar i kollektivtrafiken</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Fler parkeringsplatser för elbilar</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Kortare avstånd till resmål</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Fler parkeringsplatser för cykel i centrum</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Billigare bussresor</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Ökad trafiksäkerhet för gång &amp; cykeltrafikanter</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Fastigheten din arbetsplats befinner sig på har ingått ett avtal om Grönt Parkeringsköp, vilket innebär en reducering av parkeringsnormen för fastigheten. Fastighetsägaren åtar sig genom avtalet att tillhandahålla vissa tjänster och förmåner åt hyresgästerna i utbyte mot att fastigheten inte behöver lika många parkeringsplatser.


- ☐ Kollektivtrafikfond för köp av rabatterade busskort
- ☐ Omklädningsrum med dusch
- ☐ Bilpool via arbetsplatsen
- ☐ Uppvärmd cykelparkering
12. Har du använt kollektivtrafikfonden för att köpa rabatterade busskort?

<table>
<thead>
<tr>
<th>Aldrig</th>
<th>Sällan</th>
<th>Ofta</th>
<th>Mycket ofta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Hur ofta använder du dig av de förmåner som fastighetsägaren erbjuder genom Grönt parkeringsköp?

<table>
<thead>
<tr>
<th>Mindre än 1ggr/mån</th>
<th>1-3ggr/mån</th>
<th>1-2ggr/vecka</th>
<th>3-4ggr/vecka</th>
<th>5ggr/vecka eller mer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omklädningsrum med dusch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilpool via arbetsplatsen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uppvärmd cykelparkering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Hur viktiga anser du att följande alternativ är för ditt val av färdmedel till och från arbetet?

<table>
<thead>
<tr>
<th>Rabatterade bussresor från kollektivtrafikfonden</th>
<th>Helt oviktigt</th>
<th>Oviktigt</th>
<th>Viktigt</th>
<th>Mycket viktigt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillgång till omklädningsrum med dusch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tillgång till uppvärmd cykelparkering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tillgång till bilpool via arbetsplatsen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tillgång till parkeringsplats nära arbetsplatsen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. I vilken utsträckning anser du att resande med bil i tätort idag bidrar till miljöproblem såsom luftföroreningar och förbrukning av icke förnybar energi?

(Ringa in den siffra som bäst svarar mot din uppfattning)

<table>
<thead>
<tr>
<th>I mycket liten utsträckning</th>
<th>I mycket stor utsträckning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
16. Anser Du att miljöproblem såsom luftföroreningar och förbrukning av icke förnybar energi idag utgör ett allvarligt hot mot balansen i hela vårt ekologiska system?

*(Ringa in den siffra som bäst svarar mot din uppfattning)*

<table>
<thead>
<tr>
<th>Inte alls</th>
<th>Mycket</th>
</tr>
</thead>
<tbody>
<tr>
<td>allvarligt</td>
<td>allvarligt</td>
</tr>
</tbody>
</table>

1  2  3  4  5

Stort tack för din medverkan!