Transport behaviour of future generations:

Plane or train between Malmö and Stockholm?

Transportbeteende av framtida generationer:
Flyg eller tåg mellan Malmö och Stockholm?
Abstract

This thesis investigated what influenced student at Malmö Högskola in their choice of train or plane travel between Malmö and Stockholm. The thesis proposed four hypotheses that were investigated: maximization of leisure time, substitute goods, comfort and environmental concern. Data was collected by manufacturing and distributing a questionnaire to 248 students which was analyzed statistically. Environmental concern was found to have less of an influence on the choice of travel means than the other investigated factors, a result consistent with previous research. Cost was found to be the most important factor. Train travel was more common among the sampled population than in the Swedish population. The results were associated with some uncertainty as the population was likely to change their choice of travel means after graduation. The thesis aimed to carry out an initial measurement of the above variables to allow the resulting material to be used in future studies with a generational replacement approach.

Keywords: Environment, transport, plane travel, train travel, carbon emission, speed, cost, environmental concern, comfort, Stockholm, Malmö, generational replacement theory.

Sammandrag


Nyckelord: Miljö, transport, resor, flygresor, tågresor, koldioxidutsläpp, hastighet, kostnad, miljöhänsyn, komfort, Stockholm, Malmö, generationsskiftesteor.
Chapter 1 – Introduction

1.1 Train or plane travel a choice made by young people

Failure to abate heat trapping gas emissions from the transport sector could be detrimental to global mitigation efforts aimed at alleviating adverse climate change (PBL/JRC 2011, p. 23, 28). Success in reducing emissions from the transport sector depends to a significant degree on the choices made by ordinary citizens, in addition to top-down policy measures made by politicians and business leaders aimed at achieving such reductions. This thesis’s concern is with the choices made by ordinary citizens, represented by the demographic group young people, to travel by either train or plane. Young people are represented in this thesis by students at Malmö Högskola of which 73% are between 19 to less than 30 years of age (Swedish National Agency for Higher Education 2011). Train being a low emission travel choice, reconcilable with efforts to reduce transport sector emissions, while plane travel is a high emission travel choice, aggravating emission reduction efforts.

Changes in the distribution of choices and attitudes over time can be traced back to have two sources of origin: effects of events specific to the period of measurement and that of generational replacement (Hellevik 2002, p. 14). This thesis favors the generational replacement theory approach, which argues that the attitudes of young people can be viewed as important markers of long-term social change (Wray-Lake et al. 2010, 62-63). However, long-term social change in this sense may only occur if the changed distribution of attitudes is sustained over time from the point of measurement (Hellevik 2002, p. 16). This thesis aims to perform one measurement on the distribution of choices and attitudes of the sampled population concerning train and plane travel. More specifically the ambition is to gain knowledge on the process of what may influence the sampled populations choice between train and plane travel. Since no time series of similar measurements with this particular construction exists, the thesis is limited to its singular measurement for conclusions. The thesis is therefore encouraging the use of its findings in future generational replacement attitude studies with similar a construction. This will allow future inferential comparisons of the measurements on generational attitudes and choices as distributed over time.
In reducing the ambitions of the thesis to feasibility, limitations and constraints had naturally to be made. To collect quantitative data for the measurement, a questionnaire was manufactured, distributed and analyzed. The following limitations were applied to extract the sample: Young people were limited to 248 completed questionnaires by students at Malmö Högskola. The choice between train and plane travel was constrained to Malmö - Stockholm. Determinant factors investigated for their influence on the process of choosing means of travel were limited to: cost, speed, comfort and environmental concern.

1.2 Purpose and problematization
The purpose of this study is to determine what factors affect the sampled population when they choose between train and plane travel. Investigated factors were limited to cost, speed, comfort and environmental concern. The choice of the sampled population and the attitudes that helped spawn them can in turn affect the environment as train travel is here defined as a low carbon emission choice and plane travel a high carbon emission choice. The aim of this thesis is to begin initial measurements of these choices and attitudes among young people, represented by students at Malmö Högskola, with the goal of enabling future generational replacement studies on this topic.

1.3 Disposition
To facilitate for the reader this thesis has been divided into 7 chapters. Charts and tables are present throughout the thesis while complementary material, such as the questionnaire, are available as attachments.

Chapter 1: Introduction and purpose.
Chapter 2: Theory, previous research and hypotheses.
Chapter 3: Method and Material.
Chapter 4: Descriptive statistics of the sampled population.
Chapter 5: Results and Analyses.
Chapter 6: Conclusions.
Chapter 7: Discussion.
Chapter 2 - Theory, previous research and hypotheses.

2.1 Generational replacement theory

Political scientist Michael X. Delli Carpini (1989) succinctly describes the necessary axiom of generational replacement theory in the following words:

> There is no more fundamental transfer of power, and therefore no more fundamental potential for change, than that which occurs between generations. This is so because, unlike any other type of change, it is inevitable, it is all-inclusive, and it is untested. (Delli Carpini 1989, p. 11). Original italics.

Generational replacement is thus the inevitable consequence of mortality (Ibid, p. 12). The overturn rate of a generation is approximately 30 years (Ibid). Generational replacement theory suggests the processes from which a particular age demographic within the population is marked by to be attributable to the combination of social forces and individual life-cycle stages (Ibid, p. 18). These parallel processes do differ from the processes that enacts on entire cultures, in the sense that they stem from the interaction between age and experiences. In this way the “socialization” of the generation is less general than that of an entire culture, but more general than the experiences of any one individual (Ibid). Furthermore, the generations that replace their predecessors are not completely free from biases as they are molded by their experiences in a reality that was shaped by their predecessors (Ibid, p.13).

Generational replacement is recommended to be conducted in small units of time, in order to maximize its visibility and to filter out historical and life-cycle forces (Ibid, p. 30). The recommendation for empirical studies is to begin with a particular age group (Ibid). In this thesis the demographic group sampled is represented by students at Malmö Högskola of which 73 % are between 19 to less than 30 years of age (Swedish National Agency for Higher Education 2011). Furthermore, it is recommended to consider key factors that may be enacting on the chosen age group in shaping their personality (Delli Carpini 1989, p.30). This thesis considers and limits its investigation to the effect of four hypotheses factors: maximization of leisure time, substitute goods, deprivation of comforts and environmental concern as enacting on the sampled
population and shapes the expression (choice and attitude) of their personality in terms of train or plane travel. As this thesis aims to create an initial measurement on which future generational replacement theorists can use the results in the construction of their own studies a larger group of individuals needed to be sampled than what could be accomplished by interviewing. To facilitate this process, the investigated factors were limited to the four factors mentioned above in order to be applicable to a larger amount of respondents.

However, it is important to point out that the selections that were made in this thesis involves tradeoffs for both the level of analysis and the generalizability of the results for this and other thesis (Ibid, p. 34). For this reason the results of this thesis is considered applicable to the sampled population exclusively.

2.2 Effect of specific events relevant to the period of measurement
Changes in the distribution of choices and attitudes over time can be traced back to two origins: effects of events specific to the period of measurement and that of generational replacement (Hellevik 2002, p. 14). This thesis focuses primarily on collecting data to map out where the choices and attitudes of the sampled population’s generation lay at the time of the measurement. However, an attempt has been made by the authors to attribute a change in choices and attitudes to the effect of two events considered relevant to the period of measurement. These events are here proposed to be the particularly severe winters of 2009/2010 and 2010/2011, which were both anomalous in terms of their large snowfalls as well as their subsequent perturbation of train travel (Government Offices of Sweden 2011). In the questionnaire this aspect has been attempted to be captured in the question on the influence of service disruptions on the choice of travel means (see Attachment 1).

2.3 Environmental concern in previous generational replacement studies
The perspective of young people has been largely neglected in studies of public opinion since the inception of the environmental movement (Wray-Lake et al 2010, p. 62). It is this premise that Wray-Lake et al (2010) sets out to rectify with their multi-decadal (1976-2005) generational replacement study of young people’s attitudes, beliefs and behaviour towards the environment in the USA. They found environmental concern to be declining steadily across a wide range of
indicators since the beginning of the period of measurement until the end of the time period of measurements (Wray-Lake 2010, p. 82-83). A brief increase in the level of environmental concern was detected in the early 1990s which subsided shortly afterwards to join the overall downward trend (Ibid). In particular personal responsibility for the state of the environment among young people is declining and that the current trend is suggesting young people to assign this responsibility to the government and consumers (Ibid). Wray-Lake et al (2010, p. 83) conclude that young people’s perspective is in need of a renewed focus and better environmental education as well as governmental leadership is needed.

Similar conclusions are drawn from a Norwegian generational replacement study covering the period 1991-2001 (Hellevik 2002, p. 18). The study finds the over time the general Norwegian population is worrying less about environmental problems, has experienced declines in their pro-environmental attitudes as well as in their environmentally friendly behaviour (Ibid). Young people are modestly more aware about environmental problems and are more likely to give political priority to these concerns, however “The young apparently lag far behind their parents and grandparents when it comes to personal sacrifices for the sake of the environment” (Hellevik 2002, p. 18). Hellevik (2002) attributes this generational replacement trend to rising prosperity, particularly from the late 1980s onwards, when it is proposed that affluence lead to immediate gratification of desires which in turn lead to environmental concerns to slip into the background (Ibid, p. 18). This detected trend Hellevik (2002, p. 18) suggests, signifies increasing barriers for preventing environmental deterioration in the future (Ibid).

Turning now to Sweden, although technically not a generational replacement study, Harring et al (2011) is relevant to this thesis as their study attempts to explain the measured fluctuations in environmental concern that has been expressed over time by the general Swedish population in the period 1987-2010. The fluctuations of environmental concern were viewed through the influence of economic cycles, media coverage and ecological modernization (Harring et al 2011, p. 390-393). Their findings suggests the influence of economic cycles on environmental concern to be diminishing overall, although still remaining detectable; an economic downturn can be expected to be associated with a downturn in environmental concern (Ibid, p. 398). The amount of media coverage was also found to have an influence, where more coverage could be expected
to be associated with increasing environmental concern (Ibid). Ecological modernization, a
discourse stating economic growth to be reconcilable with environmental concern, was proposed
as explaining the diminishing influence of economic cycles on environmental concern (Ibid).

From these three examples of environmental concern, it is possible to conclude that
environmental concern has experienced a decline among young people in the USA (Wray-Lake
et al 2010) and Norway (Hellevik 2002). From Sweden (Harring et al 2011) it is possible to
conclude that ecological modernization has been having a negative influence on the linkage
between economic cycles and environmental concern in the general population. The findings of
these studies lend both credence and urgency to this thesis’s aim of commencing initial
measurements of the choices of young people, as represented by students at Malmö Högskola, to
travel with either train or plane. The ultimate goal is then for this thesis to help enable future
generational replacement studies on this topic. In accordance with this ambition it is imperative
to first determine how the distribution of the choice of travel means lay in Sweden.

2.4 Elaborating on the distribution and significance of the choice of travel means

It is possible to determine how the contemporary choices of means of travel are distributed in the
Swedish population. This distribution is available in the nationwide communications survey from
2007, which was carried out by the Swedish Institute for Transport and Communications
Analysis and covered the years 2005-2006 (SIKA 2007, p. 3). The SIKA (2007) survey was
conducted to provide information for future policy decisions on topic as far ranging as national
and regional transport policy, development of infrastructure, transport services, traffic safety and
research and development (Ibid, p. 9).

The SIKA (2007) survey found the primary choice of travel means by the Swedish population to
be the car, which was preferred in 70 % of all undertaken journeys (SIKA 2007, p. 8). In line
with the findings of SIKA (2007) heat trapping gas emissions associated with car travel and
more generically, road transports, are being addressed through policy measures by the Swedish
Government (Ministry of the Environment 2009, p. 47-50). For this reason road transports were
excluded from this thesis. Furthermore, since emissions from road transports are being addressed
with policy measures, the focus of this thesis was instead turned to the segments of the transport sector that currently lacks similarly stringent policy measures: train and plane travel.

For journeys of >100 km, about 12% of the population chose train travel and roughly 7% plane travel (SIKA 2007, p. 36-37). This division between train and plane travel is important to the findings of this thesis. When car and other means of travel are excluded, two thirds of the Swedish population choose train travel while about a third choose plane travel. If the findings of this thesis detect a different distribution of the preferred choice of travel than that of the Swedish population as a whole, this would be considered a significant initial finding on which future generational replacement studies could elaborate on.

In 2010, domestic plane travel in its totality contributed five times the emissions of heat trapping gases as compared to the totality of contributions from domestic train travel (Swedish Environmental Protection Agency 2012, p. 72). It is in consequence of these numbers that this thesis classifies train travel as a low emission travel choice and plane travel as a high emission travel choice.

The Swedish Government refers the lack of policy measures aimed at reducing emissions from in particular plane travel, to the assumption it has included in the projections of future travel patterns of the population; the popularity of domestic plane travel is projected to decline with time as travelers increasingly will migrate to domestic train travel instead (Ministry of the Environment 2009, p. 47-50). However, the validity of this assumption has recently begun to be tested as observational data disagrees with its premise. The growth of domestic passenger travel by train has been stagnating since 2009 (Transport Analysis 2011a, p. 27, 50). On the other hand, domestic passenger travel by plane has been growing by 3% during the same time period, both in terms of absolute passenger numbers but also in total kilometers travelled per passenger (Transport Analysis 2011b, p. 7, 9, 11, 21). The implication of these tentative figures further underlines this thesis’s interest in focusing on the process of choosing between train and plane travel.
2.5 Limitation of the thesis: Four hypotheses

In order for this thesis to better achieve its goal of commencing an initial measurement on which future generational replacement studies expand and build on, four hypotheses have been proposed, targeted and measured with the questionnaire.

To construct the four hypotheses of this thesis, the perspective as articulated by Lindén (1994) on lifestyle choices, acted as starting point. Lindén (1994, p.26) distinguishes between an individual's way of life, ideal lifestyle and realized lifestyle. According to Lindén (Ibid) the individual’s ideal lifestyle arises as a reaction to the way of life that is possible for the individual within the hierarchical structure of society which uphold its promoted way of life through laws, norms and recommendations. The individual’s way of life is constantly shaped by striving to achieve his or hers ideal lifestyle. In this sense the individual has a constant yearning to incorporate as many facets from the ideal lifestyle to his or her actual way of life in order to moves toward what Lindén (Ibid) names: the realized lifestyle. The origin of the hypotheses are constructed with this model in mind. The ideal lifestyle is proposed to influence the choice of travel means by the respondents in terms of speed, cost, comfort and environmental concern.

Furthermore, the concept of cognitive dissonance as introduced by Festinger (1957) has been included in the hypothesis. Cognitive dissonance argues that people desire to behave consistently and this has been showed to be present in their lifestyle choices (Thøgersen 2004, p. 100). Concluding this chapter is a rundown of the hypothesis that have been investigated for their effect on the choice between train and plane travel from Malmö to Stockholm.

2.5.1 Hypothesis 1: Maximization of leisure time

Hupkes (1982 p.38) describe time as a scarce resource. He points out that when an individual gets more return on his work the value of his leisure time increases as it will be longer. If the individual can achieve the same amount of work or other obligatory activity in less time, he will have more leisure time. Travel is an obligatory activity if the individual is to reach his destination. When travelling frequently the potential increase in leisure time by traveling faster will be greater. Hupkes (1982 p.38) points out that two major strategies for maximizing leisure time exist, to do more than one thing at the same time and to do the same work in less time by
allocating less time to the activity. To travel faster would be to allocate less time for the same activity.

The questionnaire attempts to circle in factors related to maximizing of leisure time by asking how frequently the population travels, what opinions they have regarding what is the fastest means of travel and whether faster travel time is a factor when they choose means of travel. The first part of the hypothesis is that frequent travelers will be more inclined to travel fast as it will increase their leisure time and thus increase the value of their total leisure time. The second part of the hypothesis is that respondents who care about the speed of travel will be more inclined to choose the fastest means of travel as it will require less time to be allocated to travelling.

2.5.2 Hypothesis 2: Substitute goods
Economic goods or services can have a price relationship with other goods or services so that changes in the price point on one affects the price point of the other (Mankiw 2011, p.70). This type of relationship exist when goods or services are close enough to replace one another. Mankiw uses the term “substitute goods” to describes the type of goods that exist in a relationship like this. Travel by train and plane are substitute goods to one another since they both have the same task of taking the traveler to his or her destination. The price relationship that exist between such substitute goods is that when the price of one drops, the other must follow or risk losing its consumers. Mankiw (2011, p.70) also describes how goods can be normal or inferior. Normal goods increase in demand when the consumer has more money while inferior goods do the opposite. Inferior goods in terms of travel is a cheaper, but less desirable means of travel that the consumer chose when he or she has less money.

The thesis thus states that there is a competition between the two substitute goods of traveling by plane or train and that one is less desirable (an inferior good) because it doesn’t offer the consumer all that he or she wants from the travel. This type of inferiority could be due to slower speed, lower cost, less comfortable or less environmentally friendly. If this thesis is to be true, then the consumer will be more willing to compromise when he or she has less income and those consumers that concern themselves greatly with price will be more willing to compromise on other aspects of the traveling than those who concern themselves less with the travel cost.
2.5.3 Hypothesis 3: Deprivation of comforts
Classical psychological theory states that people have a series of basic wants or drives that need to be satisfied (McFadden 1974, p.304). If these wants or drives are not satisfied it leads to increased activity, which in turn increases the level of deprivation from these wants and drives. The questionnaire makes an attempt to circle in potential wants and drives the sampled population may have and in addition allows the respondents to answer from a pre-populated list what they consider important comforts (see Attachment 1). Examples include: the ability to purchase food onboard the vehicle, access to internet or a low noise level. Furthermore, the questionnaire asks for the opinions of the sampled population on the comfort level in train and plane travel as well as the influence of service disruptions (e.g. cancelled flights due to weather) and if it affects their travel choice.

The hypothesis states that individuals who travel often will be more inclined to decrease the deprivation of their wants and drives because these grow in significance the more they travel. Because of this, the list of comforts has been estimated from what the traveler would have had when not traveling (e.g. toilet and internet). What correlation comfort has to the other factors in choosing means of travel will be investigated in order to determine how important role it has.

2.5.4 Hypothesis 4: Environmental concern
Individuals with high environmental concern are expected to choose travel means accordingly. These individuals have a constant yearning to incorporate many facets from the ideal lifestyle of concern for the environment to their way of life and consequently move toward a realized lifestyle (Lindén 1994 p.26). Pro-environmental attitudes can to some extent affect travel behaviour (Nilsson & Küller 2000, p. 228). For pro-environment attitudes to translate into behaviour, this thesis expects those that nurture these types of attitudes to always or most often travel by train. Environmental friendliness should be the most important determinant factor when choosing means of travel for these respondents and their opinion should be that train is most environmentally friendly means of travel. Acknowledging heat trapping gas emissions as significant when choosing means of travel should also be present and the means of travel should not change after graduation if the respondent travelled most often or always by train.
Chapter 3 - Method and Material

3.1 Questionnaire

This thesis collected its empirical data with a questionnaire consisting of 14 questions (see Attachment 1). The targeted population was students at Malmö Högskola. In total 254 people were asked to fill in the questionnaire of which 248 did so, giving this thesis a participatory answering rate of 98 % which is much higher than the Swedish average of 75-80 % (Esaiasson et al 2007, p. 210-211). Before handing out the questionnaire, the potential respondents were asked if they had in fact travelled between Malmö and Stockholm and if they were students at Malmö Högskola. The four introductory questions of the questionnaire target the background details of the respondent: age, gender, study pace and income level, while the remainder of the questions targets the respondents current travel behaviour, opinion and choice of either train or plane while travelling between Malmö and Stockholm. The questionnaire then ends with a question about the respondents estimated future travel behaviour as well as their view on their personal choice of means of travel and its significance in terms of carbon footprints.

3.2 Sampling

In order to be able to generalize the results to a broader segment of the general population, Esaiasson et al (2007, p.195-196), emphasises random sampling as the preferred and superior method to be used on theory testing or descriptive surveys. However, he also points out that when testing theories it is sometimes better to target a larger sample of respondents by using nonrandom sampling than getting a possibly smaller sample of respondents by sticking to a strict random sampling. During the initial attempt of completing this thesis there was an attempt to use true random selection although it yielded too few respondents.

The thesis alternated its targeted population to include all students on Malmö Högskola who has ever travelled the distance between Malmö and Stockholm without changing the questions in the questionnaire. Esaiasson et al (2007, p.95) explains how the best types of selections are complete selection and true-random sampling. All the students of Malmö Högskola represent the total sample of the group being tested, but there existed no feasible way of giving the questionnaire to
all of them. Esaiasson et al (2007 p.95) points out that it is beneficial to borrow components from a true random sampling to strengthen lesser means of sampling.

In order to strengthen the non random sampling used in this thesis it was collected during two different times of the day on two different days. On the first day, Thursday 10th of April, respondents were asked to fill in the questionnaire from 12:00 and 16:00. On the second day, Wednesday 11th of April, respondents were asked to fill in the questionnaire from 8:00 and 12:00. These two time intervals represent a full day that students could have classes on. The aim was for the sampled population to reflect the gender and age distribution of the total population of students at Malmö Högskola, figures from 2010 puts the distribution of the genders as constituted by 67 % women and 73 % of the students being less than 30 years old (Swedish National Agency for Higher Education 2011). The distribution of the sampled population in this thesis was 65 % women and 83 % were under 30 years of age. To accomplish this all but the working staff at Malmö Högskola’s library “Orkanen” were asked to fill in the questionnaire on both occasions. Unavoidably excluded from the sample population were all students who did not frequent Orkanen at the time of the sampling as it was not possible to locate those individuals.

3.3 Data entry

The three types of data that were collected in the questionnaire was interval, ordinal and nominal. Scale are variables that shares the same absolute distance to one another, examples given: age, income (Esaiasson et al 2007 p.395-396). 20 years is 5 years from 25 years and 25 years is 5 years from 30 years. The ordinal scale is variables that can be arranged on a scale, but have no absolute distance to one another, used mostly when measuring attitudes. Example given: to say something is “very important” has no absolute distance to saying something “not very important”. Nominal is a variable that is categorising and cannot be arranged in any way, example given: gender. In order to investigate the data, the results of the questionnaire was added to a statistical program. In order to be able to make use of a greater number of statistical test types certain data was added twice as different data types. Scale variables in cases where scale variables needed to be cross tabulated with ordinal variables, the scale variable had to be divided into ranked groups to effectively become an ordinal variable (Pallant 2004, p. 81-84). This was done, for example, for the variable frequency of travel, which was divided into three
groups, below average, average and above average travel frequency. The division was done according to the percentile cut off point of the scores, with below average being from 0 and up to the 33.33 percentile value, the average being between 33.33 and the 66.66 percentile value and consequently the above average travel frequency group were above this value (Ibid).

3.4 Descriptive statistics
Descriptive statistic methods were used on all variables to determine the characteristics of the sampled population and to assess the magnitude of missing data (Pallant 2004, p. 51).

3.4.1 Frequencies
Frequencies of answers was extracted in order to determine how common certain answers on the nominal variables were and how many missing responses had been received (Pallant 2004, p. 51-52).

3.4.2 Continuous variables
For continuous variables, on the both scale and ordinal variables, descriptive statistics with summary values was used to determine the mean, standard deviation, minimum, maximum, skewness and kurtosis of the values (Pallant 2004, p. 52-54). Decimals to the variables have been rounded off to even numbers where possible. This caused the percentage count to exceed one hundred in isolated cases.

3.5 Assessing the normality of the sampled population
As a non random sampling method was used to collect the data an assessment of the normality of the sampled population was done. Analysing collected data can be conducted by opting for one out of two statistical techniques: parametric or nonparametric. The techniques differs in the sense that they make fundamentally different assumptions about the collected data (Pallant 2004, p. 255). The parametric technique makes an assumption about the shape of the data and assumes the sampled population to be normally distributed, in line with what a theoretical total population would be, while the nonparametric technique makes no such assumption about the data (Ibid). In addition, nonparametric tests tend to be less sensitive than their parametric counterparts when it
comes to detecting correlations between variables, as the former might not find one where the latter might have had (Ibid, p. 255).

Performing a test of normality on the whole sample permitted the determination of which statistical technique to use (Ibid, p. 54). A Kolmogorov-Smirnov test was conducted to determine normality (Ibid, p. 58). The test showed the collected data on all variables to not be normally distributed as the resulting values were less than the threshold value of 0.05 (see Attachment 2) and thus lead to the conclusion that the nonparametric statistical technique should be used (Pallant 2004, p. 58, 78). Additional outputs from that tests also showed positive values for both skewness and kurtosis. A positive skew indicates the scores to be more clustered on the left side of the mean value and for the tail of the distribution to be longer on the right side than on the left side of the mean (Ibid, p. 53-54). A positive kurtosis indicates that the shape of the distribution is relatively peaked around a center value and tends to have long thin tails stemming from this center (Ibid).

For the sampled population not to be normally distributed was an expected characteristics of the collected data since it necessarily had to reflect the underlying nature of the construction of the sample (Ibid, p. 59). Not normally distributed data samples tend to be quite common in social science research and measurements (Ibid, p. 59, 172). It is therefore strongly recommended to enlarge the sample size above at least 30 respondents (Ibid). An important caveat to the results of this thesis: the data collected from the sampled population and its accompanied analyses are not appropriate to extrapolate on a total population, as the results cannot be considered to be representative beyond the sample itself. Put in another way: generalization is suitable only within the sample itself.

3.6 Statistical analyses - cross tabulations

To determine correlation between factors cross tabulations between data was used. Cross tabulations compares one or more variables to one or more other variables. Only test types suitable for nonparametric data was used in order to produce usable results (see discussion in chapter 3.2 and 3.3). Eta test, somer’s d test and Chi-square test was being used (see Attachment 2).
Chapter 4 - Descriptive statistics of the sampled population

4.1 Background of the sampled population

The background of the sampled population is presented through frequencies of answers to questions regarding their backgrounds. The frequencies of responses show that the population’s background is close to what we would expect students at Malmö Högskola to be.

4.1.1 Age

The majority (73 %) of the students at Malmö Högskola are less than 30 years old (Swedish National Agency for Higher Education 2011). In the sampled population 83 % were under 30 years of age. See results from our sampled population below in chart 1.

![Chart 1](image)

**Chart 1.** Age distribution of the sample. Standard deviation is illustrated with the symbol ±. Mode and median age was 25 while the mean age was 26.

4.1.2 Gender

Statistics presented by the National Agency for Higher Education show that 67 % of the students at Malmö Högskola are women (Swedish National Agency for Higher Education 2011). Of the respondents participating in this thesis: 64 % of the population were women, only 3 % difference
from the total population at Malmö Högskola. See results from our sampled population in chart 2.

**Chart 2.** Gender distribution of the sample. 64 % were women and 36 % men.

### 4.1.3 Study pace

The study pace of the sampled population can be seen in chart 3. No data could be collected for the study pace of the total population at Malmö Högskola as no such data were available.

**Chart 3.** Distribution of part-time and full-time students. The vast majority (94 %) were full-time students. A speculative explanation to this distribution might be that part-time students are less often at Orkanen than full-time students and as a result they could not be targeted.

### 4.1.4 Monthly income level

The monthly income level of the sampled population is presented through its calculated mean, median and mode values that can be seen in chart 4 below. The sampled population’s income level range allows for the statistically inferred conclusion that the majority of the population is receiving financial aid for their studies from the Swedish Government authority body CSN in
charge of such aid. The current level of financial aid from CSN is 8920 SEK a month (CSN 2012).

Chart 4. Monthly income levels. Standard deviation is illustrated with the symbol ±. It was inferred from the distribution of income levels that the majority of the sampled received financial aid from CSN.

4.2 Frequency and distribution of answers in the sampled population
How common specific answers is among the sampled population is presented through frequencies of answers to questions regarding their attitude and behaviour towards train and plane travel.

4.2.1 Frequency of travel per year
The yearly frequency of travel among the sampled population is presented through its calculated mean, median and mode values that can be seen in chart 5 below. The sum total of yearly traveling between Malmö and Stockholm among the 248 respondents was 967 one-way trips.
4.2.2 Purpose of travel

The purpose of travelling between Malmö and Stockholm among the sampled population is presented in table 1. The respondents had the possibility to choose more than one alternative as their stated purpose of travel.

Table 1. What is usually the purpose of your travel? Multiple answers possible.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percent of reason for travelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work trip</td>
<td>09.1 %</td>
</tr>
<tr>
<td>Pleasure trip</td>
<td>50.6 %</td>
</tr>
<tr>
<td>Visiting friends and family</td>
<td>61.3 %</td>
</tr>
<tr>
<td>Study related trip</td>
<td>02.5 %</td>
</tr>
</tbody>
</table>

The most common purposes given by the sampled population were to visit friends and family and to make a pleasure trip as reasons for travelling between Malmö and Stockholm.

4.2.3 Most commonly used means of travel

Of the sampled population 37 % travelled always by train, 30 % most often by train, 15 % equally by each, 12 % most often by plane and 6 % always by plane. The most commonly used means of travel from Malmö to Stockholm is presented in chart 6.
Chart 6. Which means of travel do you use most often? Train travel was the most commonly used means of travel for more than two thirds of the sampled population. This is a deviation from the general Swedish population were slightly less than two thirds travel by train on a comparable distance (SIKA 2007, p. 36-37).

4.2.4 Opinions about train and plane travel

Opinions about which means of travel the sampled population considered to be the fastest, cheapest, most environmentally friendly and had the highest comfort level are presented in charts 7.
Chart 7. Opinions about the fastest, cheapest, most environmentally friendly and the highest comfort means of travel. The majority of the sampled population considered plane the fastest and train to be the most environmentally friendly means of travel. A slight majority considered train travel to be both cheaper and more comfortable.

4.2.5 Comfort factors

The sampled population were asked to specify from a pre-populated list of comfort alternatives, which comfort aspects they considered important when travelling. The results are presented in table 2.
Table 2. Which comfort factors are important? Multiple answers possible.

<table>
<thead>
<tr>
<th>N=248</th>
<th>Type of comfort is important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable seats</td>
<td>90 %</td>
</tr>
<tr>
<td>Access to toilet</td>
<td>68 %</td>
</tr>
<tr>
<td>Electrical outlet</td>
<td>56 %</td>
</tr>
<tr>
<td>Ability to buy food and drink on the vehicle</td>
<td>44 %</td>
</tr>
<tr>
<td>Ability to move freely around the vehicle</td>
<td>39 %</td>
</tr>
<tr>
<td>Less noise</td>
<td>39 %</td>
</tr>
<tr>
<td>Access to internet</td>
<td>32 %</td>
</tr>
<tr>
<td>Ability to take a large amount of luggage</td>
<td>25 %</td>
</tr>
<tr>
<td>Few other travellers on the vehicle</td>
<td>13 %</td>
</tr>
<tr>
<td>Other comfort</td>
<td>08 %</td>
</tr>
</tbody>
</table>

The bare necessities: comfortable seats, access to toilets and electrical outlets were listed as important comforts by over half of the sampled population. Secondary comforts listed as important by a third of the sampled population consisted of food and drinks, to be able to move freely around the vehicle, a low noise level and access to internet.

4.2.6 Ranking of determinant factors

The sampled population was asked to rank four factors according to how determinant each factor was on the choice of means of travel between Malmö - Stockholm (see Attachment 1). The ranking contained: not at all, partially, largely and completely. Of the respondents in descending order of importance: cost was considered completely or largely important by 80 %, speed was considered largely or partially largely important by 80 %, comfort was considered largely or partially important by 82 % while environmental concern was considered not at all important by 36 %, partially by 35 % and largely by 22 %. Italics were used here to signify the most important findings. The results are presented in chart 8.
Chart 8. How would you rank these determinant factors on the choice of your means of travel? Price had the strongest influence on the choice of means of travel, followed by speed then comfort and lastly by environmental concern. This finding is consistent with Nilsson & Küller’s (2000) study that finds environmental concern to have a subordinate position in travel behaviour.

4.2.7 Influence of service disruptions

The sampled population were asked to answer if service disruptions affect their choice of travel between Malmö - Stockholm by train or plane. Available alternatives were: no effect, opts out of travelling by plane and opts out of travelling by train. The results are presented in chart 9.
Chart 9. Does service disruptions have an effect on the choice of your means of travel? Most respondents were not affected by service disruptions. However, respondents stating they were affected were more likely to opt out of travelling by train.

4.2.8 Ranking of influence from external factors
The sampled population were asked to rank how frequently promotions from airline companies and train companies influenced their means of travel between Malmö - Stockholm. They were also asked to rank how frequently claims about the train’s environmentally friendliness influences their choice of means of travel. Finally they were also asked how frequently a desire to reduce their personal carbon footprint influenced their choice of means of travel. The results are presented in chart 10.
Chart 10. Does travel promotions and/or environmental concerns affect your choice of means of travel? Half or more than half of the respondents stated to be rarely affected by any of purposed variables. About a third of the respondents stated to be sometimes affected by promotions and/or environmental concern while between 10-20 % stated to be often affected by the same. Environmental concern had a slight higher level of respondents who stated it to be often influential on their choice of travel means.

4.2.9 Keeping means of travel after graduation
The sampled population were asked to answer if, after their graduation, they will still keep the same means of travel between Malmö to Stockholm. The results are presented in chart 11.
Chart 11. Do you keep your travel behaviour after graduation? Over half of the sampled population stated that they will keep their used means of travel after graduating. However, over a third was not sure if they would change means of travel and 9 % said that they would change. This introduces an uncertainty to the results and conclusion of this thesis and suggests that a time-series with similar measurements over time would be needed to reduce this uncertainty.

4.2.10 The personal choice of means of travel and the carbon footprint

The sampled population were asked if they considered their personal choice of means of travel between Malmö to Stockholm to be significant in terms of carbon footprints. The results are presented in chart 12. Available alternatives were, no, my personal contribution is not significant (presented as insignificant in the chart), yes, all small contributions count (presented as significant in the chart) and I do not know (presented as don’t know in the chart).
Chart 12. Do you consider your personal choice of means of travel to be significant as a contributor to the greenhouse effect? The majority of the sampled population considered their personal choice of travel means to be a significant contributor of heat trapping gas emissions.
Chapter 5 - Results and Analyses

5.1 Hypothesis 1: Maximization of leisure time
Cross tabulations were done in order to determine how much leisure time an individual have and if anything is done to increase it.

5.1.1 Most used means of travel and its impact on determinant factor speed
To determine whether a potential correlation could be made between the independent variable *most commonly used means of travel* and the dependent variable *determinant factor speed* a somers’ d test was conducted. The result gave a value of 0.44 which indicates a medium correlation (see Attachment 2). In other words, it was found to be more common among travellers who always or most often travel by plane to rate the determinant factor speed as important.

5.1.2 Frequency of travel and its impact on determinant factor speed
To attempt to seek out a correlation between the independent variable *frequency of travel* and the dependent variable *determinant factor speed*. To be more manageable the variable frequency of travel was divided into three ranked groups to create an ordinal scale variable (Pallant 2004, p. 81-84). This new ordinal variable was then tested with somers’ d. The three groups of the frequency of travel variable is presented in table 3.

<table>
<thead>
<tr>
<th>Table 3. The respondents were divided into groups according to their stated frequency of travel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower than average</td>
</tr>
<tr>
<td>Average</td>
</tr>
<tr>
<td>Higher than average</td>
</tr>
</tbody>
</table>

The correlation between these three groups ranking of importance for the determinant factor speed was then investigated through a somers’ d cross tabulation. No correlation could be found as the resulting value (0.07) failed to reach the detectable effect size level of 0.1 (see Attachment 2).
5.1.3 Opinions about fastest means of travel and its impact on most commonly used means of travel

A chi-square test was done to determine a correlation between the independent variable opinion about the fastest means of travel and the dependent variable most commonly used means of travel. The chi-square test gave a value below 0.001 which indicates a statistically significant correlation (see Attachment 2). Respondents who considered plane travel to be the fastest means of travel also travelled by plane most often (see chart 13).

**Chart 13.** Opinion about the fastest travel means and its correlation to the most commonly used means of travel. A curious split: train travellers considered train the fastest while plane travellers considered plane the fastest. In the chart it can be seen that no one who mostly, or always travel by plane consider train the fastest means of travel.
5.1.4 Frequency of travel and its impact on the opinion about the fastest means of travel

In order to determine if frequent travelling had an impact on opinions on what means of travel was the fastest an Eta test was conducted. Three groups of frequency of travel was constructed and used for this test (see table 3 in 5.1.2). The test gave an Eta value of 0.25, which is a moderate effect. Eta squared was 0.06 which is a moderate effect. The average number of trips was close to equal in both categories of opinion. However, none of the respondents who took more than 12 trips a year considered the train to be faster, which tilted the correlation between higher frequency of travel per year and the opinion that planes are faster. The conclusion drawn from this is that there is a vertex of 12 yearly trips after which travelers cease to consider train travel as being faster than plane travel. The values can be seen in chart 14.

![Chart 14](image)

**Chart 14.** How frequency of travel affects the opinion about the fastest means of travel.

Frequent travellers were found to be more likely to consider plane travel to be faster.

5.1.5 Determinant factor speed and its impact on other determinant factors

Three somer’s d tests were done to determine correlation between speed as determining factor in choosing means of travel and other determining factors. Speed was the independent variable
being tested against the other 3 factors. A negative value means that the respondents who though speed was important did not consider the negative factor was important. See results in table 4.

**Table 4.** Speed and its correlation to the other investigated determinant factors.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Somer’s d</th>
<th>Size</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>0.14</td>
<td>Smaller than typical</td>
<td>243</td>
</tr>
<tr>
<td>Comfort</td>
<td>0.15</td>
<td>Smaller than typical</td>
<td>241</td>
</tr>
<tr>
<td>Environmental concern</td>
<td>-0.12</td>
<td>Smaller than typical</td>
<td>242</td>
</tr>
</tbody>
</table>

Respondents who ranked speed as highly important were also likely to rank both cost and comfort highly. These respondents were less likely to rank environmental concern as important.

### 5.2 Hypothesis 2: Substitute goods

A series of cross tabulations have been made to test whether train and plane travel are substitute goods to one another.

#### 5.2.1 Most commonly used means of travel and its impact on cost as determinant factor

To determine whether the independent variable *most commonly used means of travel* could be correlated with the dependent variable *determinant factor price* a somers’ d test was conducted. The test value was 0.04 and is not statistically significant (See Attachment 2).

#### 5.2.2 Frequency of travel and its impact on determinant factor cost

To determine whether the independent variable *frequency of travel* could be correlated with the dependent variable *cost* as determined variable in choosing means of travel a somers’ d test was done. The somer’s d value was 0.1 which is indicative of small correlation. Above average frequent travellers were more likely to rate the importance of cost as largely and completely determinant on their choice of means of travel (see chart 15).
Chart 15. Frequency of travel and determinant factor cost. Respondents who travelled more frequently were more influenced by cost. Determinant factor cost was ranked as the highest influencing factor of the four factors investigated by the sampled population (see chart 8).

5.2.3 Opinions about cheapest means of travel and its impact on most commonly used means of travel

To determine whether the independent variable opinion about the cheapest means of travel could be correlated with the dependent variable most commonly used means of travel a chi-square test was conducted. The resulting value was less than 0.001 which indicates a statistically significant correlation. Respondents who considered plane travel to be the cheapest alternative also travelled by plane most often and the opposite was also true for train travellers (see chart 16).
Chart 16. Opinions about the cheapest travel means and the most commonly used means of travel. A curious split: train travellers considered train cheapest while plane travellers considered plane cheapest.

5.2.4 Frequency of travel and its impact on the opinion about the cheapest means of travel
To determine whether the independent variable frequency of travel could be correlated with the dependent variable opinion about the cheapest means of travel an eta test was conducted. The eta test value was 0.29 which indicates a moderate correlation. The eta squared value was 0.08 which is also a moderate effect size. Frequent travellers were more likely to consider plane as cheapest means of travel, while the less frequent travellers considered train as cheaper.

5.2.5 Determinant factor cost and its impact on other determinant factors
Three somers’ d tests were conducted to determine whether a correlation could be found between the independent variable determinant factor price and the dependent variables speed, comfort and environmental concern (see table 5).
Table 5. Cost and its correlation to the other investigated determinant factors.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Somer’s d</th>
<th>Size</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>0.14</td>
<td>Smaller than typical</td>
<td>243</td>
</tr>
<tr>
<td>Comfort</td>
<td>-0.05</td>
<td>No statistical significance</td>
<td>241</td>
</tr>
<tr>
<td>Environmental concern</td>
<td>0.03</td>
<td>No statistical significance</td>
<td>242</td>
</tr>
</tbody>
</table>

Respondents ranking cost as highly important were also more likely to rank speed as highly important.

5.2.6 Promotions on travel by train and plane

A somer’s d test were done to determine if the same respondents who were affected by promotions from airline companies also were affected by promotions from train companies. Among the respondents who was affected by plane travel promotions, how many was also affected by promotions on train travel? The somer’s d gave a positive value of 0.52, which is a larger than typical statistical significance. The reversed test, how many among those affected by promotions on train travel were also affected by promotions on plane travel, gave a positive value of 0.5, which is a larger than typical statistical significance. This indicated that train and plane travel can be considered to be substitute goods to one another and thus are competing for the same consumers with their promotions.

5.2.7 Income level and its effect on determinant factors

To attempt to seek out a correlation between income level and its effect on determinant factors. The income level needed to be divided into three ranked groups to create an ordinal scale variable (Pallant 2004, p. 81-84). The new ordinal variable is then usable for analysing with somers’ D. Income level was divided into three ranked groups presented in table 6.

Table 6. The respondents were divided into groups according to their income level.

<table>
<thead>
<tr>
<th>Income Level</th>
<th>N=230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income</td>
<td>0-8500 SEK a month</td>
</tr>
<tr>
<td>Medium income</td>
<td>8501-10 000 SEK a month</td>
</tr>
<tr>
<td>High income</td>
<td>10 001+ SEK a month</td>
</tr>
</tbody>
</table>
Four somers’ d tests were then conducted to seek out a correlation between the effect of income level on the determinant factors. No statistically supported significant results could be found for any of the four tests as the values were too low. See table 7 and Attachment 2.

Table 7. Effect of income on determinate factors

<table>
<thead>
<tr>
<th></th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>0.00</td>
</tr>
<tr>
<td>Speed</td>
<td>0.02</td>
</tr>
<tr>
<td>Eco friendliness</td>
<td>0.02</td>
</tr>
<tr>
<td>Comfort</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Income level could not be found to have a correlation with any of the determinant factors. It is possible that the uneven distribution of the respondents income levels could have been a contributing factor to this result.

5.2.8 Effect of income on comforts

Cross tabulations were done to determine how income affects the importance of comforts. Positive results means that the higher income the respondent had, the higher is the probability that he or she cares about the listed comfort. Negative results means that the higher income the respondent had, the lower is he or she cares about the listed comfort. See table 8 for results.

Table 8. Income level and important comforts.

<table>
<thead>
<tr>
<th>Comfort type</th>
<th>N=230</th>
<th>Eta value</th>
<th>Size of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable seats</td>
<td>-0.40</td>
<td>Larger than typical</td>
<td></td>
</tr>
<tr>
<td>Access to toilet</td>
<td>-0.48</td>
<td>Much larger than typical</td>
<td></td>
</tr>
<tr>
<td>Access to internet</td>
<td>-0.39</td>
<td>Larger than typical</td>
<td></td>
</tr>
<tr>
<td>Ability to move freely around the vehicle</td>
<td>-0.40</td>
<td>Larger than typical</td>
<td></td>
</tr>
<tr>
<td>Ability to buy food and drink on the vehicle</td>
<td>-0.48</td>
<td>Much larger than typical</td>
<td></td>
</tr>
<tr>
<td>Electrical outlet</td>
<td>-0.44</td>
<td>Larger than typical</td>
<td></td>
</tr>
<tr>
<td>Ability to a large amount of luggage</td>
<td>-0.42</td>
<td>Larger than typical</td>
<td></td>
</tr>
<tr>
<td>Less noise</td>
<td>-0.24</td>
<td>Typical</td>
<td></td>
</tr>
<tr>
<td>Few other travellers on the vehicle</td>
<td>-0.46</td>
<td>Much larger than typical</td>
<td></td>
</tr>
</tbody>
</table>

These values show that the higher income the respondent had, the less he or she cares about the various types of comforts. This goes against our thesis that individuals with less income will be more willing to compromise on other aspects of travelling. However, it is possible that the
uneven distribution of the respondents income levels could have been a contributing factor to this result.

5.2.9 Effect of income level on the opinion about the cheapest means of travel
An eta test was conducted to determine whether income level had an effect on the opinion about the cheapest means of travel. The eta test produced a value of -0.46 which indicates a much larger than normal association between the variables. The eta squared value is -0.21 which is a large effect size and suggests that income level explains 21% of the variance of the variable opinion about the cheapest means of travel. Respondents with medium and low income were more likely to consider train as the cheaper means of travel.

5.2.10 Effect of income level on the opinion about the most comfortable means of travel
An eta test was conducted to determine whether income level had any effect on the opinion about the most comfortable means of travel. The eta test produced a value of -0.43 which indicated a large association the variables. The eta squared value is -0.19, a large effect size which explains 19% of the variance of the comfort variables. Positive results means that the more income the respondents has, the higher the probability that respondent hold the opinion that plane travel is more comfortable, while negative values indicates that the less income the respondent has, the higher the probability is that he or she hold the opinion that train travel is more comfortable. Therefore, the results show that lower income levels can be associated with the opinion that train travel is more comfortable. Missing responses for these variables attained 11.6%.

5.2.11 Income level and its effect on travel promotions by train or plane
Two somers’ d tests were conducted to determine whether the income level affected the influence posed by promotions on train or plane travel. The test yielded no statistically significant association between income level and promotions on train travel, which gave the value 0.05 and neither on income level and promotions of plane travel, which gave the value 0.03.
5.2.12 Income level and the most commonly used means of travel
To determine whether income level could be associated with the most commonly used means of travel an eta test was performed. The eta value 0.15 indicates a small correlation. Eta squared was 0.02 which also indicates a small effect on the variance. Broken down according to income level, the results show that train was the most common means of travel for all three income levels. Plane travel was most common within the high income group, but also within the low income group. The medium income group were less likely to travel by plane (see chart 17).

![Chart 17. Income level and the most commonly used means of travel. Both high and low income earners were more likely to be plane travellers.](image-url)
5.3 Hypothesis 3: Comfort
Cross tabulations have been done in order to test if a higher frequency of travelling has an impact on demand for comforts.

5.3.1 Most commonly used means of travel and its impact on the determinant factor comfort
To determine whether the independent variable most commonly used means of travel could be correlated with the dependent variable determinant factor comfort a somers’ d test was performed. The resulting value was 0.02 (N=236) which does not indicate a statistically significant correlation.

5.3.2 Frequency of travel and its impact on the determinant factor comfort
To determine whether the independent variable frequency of travel could be correlated with the dependent variable determinant factor comfort a somers’ d test was performed. The resulting value was 0.04 (N=235) which does not indicate a statistically significant correlation. Respondents who travelled above average were more likely than other travellers to rank the determinant factor comfort as being a partially important when choosing means of travel.

5.3.3 Opinion about most comfortable and impact on most common means of travel
To determine whether the independent variable opinion about the most comfortable means of travel could be correlated with the dependent variable most commonly used means of travel a chi-square test was conducted. The resulting probability value of less than 0.01, indicates a statistically significant association. Those who thought plane travel was most comfortable also traveled by plane more often (see chart 18). Those who thought train travel was most comfortable also traveled by train more often. This shows that comfort does have a large amount of influence on decision regarding what means of travel to use.
Chart 18. Opinion about highest comfort and the most commonly used means of travel. A curious split: train travelers considered train to be more comfortable while plane travelers considered plane travel as the most comfortable of the two.

5.3.4 Frequency of travel and its impact on the opinion about the most comfortable means of travel

An eta test was conducted to determine whether the independent variable frequency of travel had any effect on the dependent variable opinion about the most comfortable means of travel. The eta test produced a value of -0.24 (N=231) which indicated a medium effect. The eta squared value is -0.06, a moderate effect size which explains 6 % of the variance of the dependent variable. Positive results means that the less frequent the travellers is the higher the probability that the respondent thinks train travel is the most comfortable, while negative values indicates that the more frequent the travel is the higher the probability that the respondent considers plane travel to be the more comfortable. Therefore, the results show that frequent travellers can be associated with the opinion that plane travel is more comfortable.
5.3.5 Determinant factor comfort and its impact on other determinant factors
To determine whether the independent variable *determinant factor comfort* could be correlated with the ranking of the dependent variables *speed, cost and environmental concern*, three somers’ d tests were performed. Negative results means that respondents who consider comfort important does not consider the dependent variable important. See table 9 for results.

**Table 9. Comfort and its correlation to the other investigated determinant factors.**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Somer's d</th>
<th>Size</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>0.15</td>
<td>Smaller than typical</td>
<td>241</td>
</tr>
<tr>
<td>Cost</td>
<td>-0.05</td>
<td>No statistical significance</td>
<td>241</td>
</tr>
<tr>
<td>Environmental concern</td>
<td>0.15</td>
<td>Smaller than typical</td>
<td>241</td>
</tr>
</tbody>
</table>

Respondents who ranked comfort as important were also more likely to rank environmental concern and speed as important determinant factors.

5.3.6 Most commonly used means of travel and its impact on the importance of comforts
To determine whether the independent variable *most commonly used means of travel* could be correlated with the dependent variable *importance of comforts* (see table 2 for a list of these comfort types), chi-square tests were performed. The resulting chi-square values indicated that either the distribution was not sufficiently distributed or the level of chance was too high to be useful for most of the listed comforts.

However, a correlation could be found between most commonly used means of travel and the ability to move freely around the vehicle and the access to electrical outlets as the resulting values were 0.03 and 0.02 (N=241), respectively which indicates a statistical significance. In both cases respondents travelling most often or always by train were more likely to list these comforts as important.

5.3.7 Frequency of travel and its impact on the importance of comforts
Cross tabulations were done to determine how the independent variable *frequency of travel* effects the dependent variable *importance of comforts*. Positive results means that the higher frequency of travel, the higher is the probability that he or she cares about the comfort listed.
Negative results means that the higher the frequency of travel, the lower is the probability that he or she cares about the comfort listed. See table 10 for results.

Table 10. Frequency of travel and comforts.

<table>
<thead>
<tr>
<th>Comfort type</th>
<th>Eta value</th>
<th>Size of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortable seats</td>
<td>-0.17</td>
<td>Smaller than typical</td>
</tr>
<tr>
<td>Access to toilet</td>
<td>-0.30</td>
<td>Typical</td>
</tr>
<tr>
<td>Access to internet</td>
<td>-0.29</td>
<td>Typical</td>
</tr>
<tr>
<td>Ability to move freely around the vehicle</td>
<td>-0.24</td>
<td>Typical</td>
</tr>
<tr>
<td>Ability to buy food and drink on the vehicle</td>
<td>-0.28</td>
<td>Typical</td>
</tr>
<tr>
<td>Electrical outlet</td>
<td>-0.26</td>
<td>Typical</td>
</tr>
<tr>
<td>Ability to a large amount of luggage</td>
<td>-0.26</td>
<td>Typical</td>
</tr>
<tr>
<td>Less noise</td>
<td>-0.24</td>
<td>Typical</td>
</tr>
<tr>
<td>Few other travellers on the vehicle</td>
<td>-0.26</td>
<td>Typical</td>
</tr>
</tbody>
</table>

The results of these Eta tests show that contrary to our thesis the less the respondents travel the higher demand for comforts they have.

5.3.8 Most commonly used means of travel and its impact on the influence of service disruptions

A chi-square test was conducted to seek out a correlation between the independent variable most commonly used means of travel and the dependent variable service disruptions. The test yielded no statistically significant results since the distribution was not sufficiently distributed between the different groups. However, it was possible to infer from the resulting percentage of the distribution that respondent’s travelling most often or always by plane were more likely to opt out from travelling by train when considering the influence of service disruptions to their choice of means of travel.

5.3.9 Frequency of travel and its impact on the influence of service disruptions

In order to determine if the independent variable frequency of travel could be correlated with the dependent variable influence of service disruptions on the choice of travel means, an Eta test was performed. The eta test gave a value of 0.33 which is considered to be medium or typical. The eta squared value is 0.11 which is a moderate effect and indicates that 11% of the variance can
be explained by the frequency of travel. The mean values of trips taken per year for the three possible responses are listed seen in table 11.

**Table 11.** Service disruptions and how frequently respondents travel.

<table>
<thead>
<tr>
<th>N=234</th>
<th>Are not influenced by service disruptions</th>
<th>3.9 yearly trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opt out from using air-travel</td>
<td></td>
<td>2.9 yearly trips</td>
</tr>
<tr>
<td>Opt out from using train-travel</td>
<td></td>
<td>4.8 yearly trips</td>
</tr>
</tbody>
</table>

The majority of the sampled population stated that they were not influenced in their choice travel means (see 4.2.7). The results indicate that frequent travellers are more inclined to opt out from choosing train travel due to service disruptions.

5.3.10 **Determinant factors and their impact on the influence of service disruptions**

To determine whether the independent variables *determinant factor comfort, speed, cost and environmental concern* could be correlated with the dependent variable *influence of service disruptions*, four chi-square tests were conducted. The resulting chi-square values indicated that either the distribution was not sufficiently distributed or the level of chance was too high to be useful as indicators of statistical significance.

5.4 **Hypothesis 4: Environmental concern**

In order to test if any of the pro-environmental attitudes held by the respondents could be shown to have a statistically significant association with the most commonly used means of transport three somers’ d tests were conducted.

5.4.1 **Most commonly means of travel and its impact on determinant factor environmental concern**

The first test sought an association with a somers’ d test between the independent variable determinant factor *environmental concern* and the dependent variable *most commonly used means of travel*. A somers’ d test value was -0.29, which is indicative of a small effect size. Respondents who stated environmental concern as determining factor are more likely to travel by train.
5.4.2 Frequency of travel and its impact on determinant factor environmental concern
To determine whether a correlation could be made between the independent variable frequency of travel and the dependent variable environmental concern, a somers’ d test was conducted. No statistically significant correlation could be made as the resulting value of 0.09 (N=236) was too low.

5.4.3 Opinion about most environmentally friendly means of travel and most used means of travel
To determine whether a correlation could be made between the independent variable opinion about the most environmentally friendly means of travel and the dependent variable most commonly used means of travel a chi-square test was performed. The test yielded no statistically significant results since the distribution was not sufficiently distributed between the different groups and the influence of chance alone were too high.

5.4.4 Frequency of travel and its impact on opinion about most environmentally friendly means of travel
In order to see if the independent variable frequency of travel had any impact on opinion of what means of travel is considered most environmentally friendly an Eta test was done. The value was 0.24 which is considered a typical value. The more the respondents travelled, the more likely they were to consider plane travel to be the most environmentally friendly.

5.4.5 Determinant factor environmental concern and its impact on the other determinant factors
To determine whether the independent variable determinant factor environmental concern could be correlated with the ranking of the dependent variables, the other determinant factors: speed, cost and comfort, three somers’ d tests were performed. See table 12.
Table 12. Environmental concern and its correlation to the other investigated determinant factors.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Somers’ d</th>
<th>Effect size</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>-0.11</td>
<td>Smaller than typical</td>
<td>242</td>
</tr>
<tr>
<td>Cost</td>
<td>0.03</td>
<td>No statistical significance</td>
<td>242</td>
</tr>
<tr>
<td>Comfort</td>
<td>0.11</td>
<td>Smaller than typical</td>
<td>241</td>
</tr>
</tbody>
</table>

Respondents who considered environmental concern important were less likely to rank speed as important. No statistically significant correlation could be found between environmental concern and price. Respondents who ranked as high the importance of environmental concern were more likely to rank comfort as important.

5.4.6 Claims of environmental friendliness and impact on the most common means of travel

A somers’ d test sought an association between the independent variable claims about the environmental friendliness of train travel and the dependent variable most commonly used means of travel. The somers’ d test value was 0.25, which is indicative of a small effect size. Respondents stating they were influenced by claims about the environmental friendliness of the train were more likely to be most often or always travelling by train, while those travelling most often or always by plane were less likely influenced by such claims.

5.4.7 Claims about the environmental friendliness of train travel and its impact on frequency of travel

A somers’ d test sought an association between the independent variable claims about the environmental friendliness of train travel and the dependent variable frequency of travel. No statistical significance could be found as the resulting value of 0.03 was too small (N=238).

5.4.8 Desire to reduce one's person footprint and its impact on the most commonly means of travel

A somers’ d test sought an association between the independent variable desire to diminish one's own carbon footprint and the dependent variable most commonly used means of travel. The somers’ d test value was 0.28 (N=240), which is indicative of a small effect size. Respondents
with a desire to diminish their own carbon footprints were more likely to always or most often travel by train, while the opposite was found for those travelling always or most often by plane.

**5.4.9 Desire to reduce one's person footprint and its impact on frequency of travel**

A somers’ d test sought an association between the independent variable *desire to diminish one's own carbon footprint* and the dependent variable *frequency of travel*. The somers’ d test value was 0.03 (N=239) which is too low to be statistically significant.

**5.4.10 Importance of personal emissions and most used means of travel**

To determine whether the independent variable *personal emissions from one’s own choice in means of travel* could be correlated with the dependent variable *most commonly used means of travel*, a chi-square test was conducted. The test yielded no statistically significant results since the distribution was not sufficiently distributed between the different groups and the influence of chance alone were too high.

**5.4.11 Importance of personal emissions and its impact on frequency of travel**

An Eta test was done to determine if the independent variable *importance of personal emissions* had any impact on *frequency of travel*. Eta value was 0.12 which is considered a smaller than typical value. Eta squared was 0.01 which is considered a small effect size. The respondents who consider their personal emissions important travel more often.

**5.4.12 Keeping means of travel after graduation and its impact the most commonly used means of travel**

To determine whether the independent variable *keeping means of travel after graduation* could be correlated with the dependent variable *most commonly used means of travel*, a chi-square test was performed. No statistical significance could be found to this correlation as the resulting value of 0.09 makes chance too influential in the findings.
5.4.13 Keeping means of travel after graduation and its impact on frequency of travel
To determine whether the independent variable *keeping means of travel after graduation* could be correlated with the dependent variable *frequency of travel*, an eta test was performed. The eta test value was 0.04 which is too low to be statistically significant.

5.4.14 Income level and its impact on keeping means of travel after graduation
To determine whether the independent variable *income level* could be correlated with the dependent variable *keeping means of travel after graduation* an eta test was conducted. The eta value was 0.14 which indicates a small correlation. Eta squared was 0.02 also indicating a small effect size on the variance of the changing travel patterns after graduation. Broken down according to income level, the results show that high income respondents are more likely to change their behaviour, while those with medium income are less likely to change their behaviour and those with low income are more uncertain about future travel choice (see chart 19).

![Chart 19](image)

**Chart 19.** Income level and keeping means after graduation. To not know is common for all income groups. However, high income earners are more likely to change their means of travel after graduation. Medium income earners are found to be more likely to keep their choice of travel means after graduation while low income earners are divided between not knowing and keeping their choice of travel.
Chapter 6 - Conclusions

6.1 The distribution of travel choice among the entire sampled population

Within the sampled population it was more common to travel by train than what the distribution of train and plane travellers of the general Swedish population would suggest (SIKA 2007, p. 36-37). This is a particularly important finding as this suggests that young people, represented by the sampled population, are choosing to a greater extent the lower emission travel choice: train than they are choosing the high emission travel choice plane.

The implications of this finding depends to a large extent on how the data is viewed. If, by disregarding the recommendation made at the end of section 3.5, the choices made by this sampled population were to be extrapolated to apply to all young people in Sweden, one would expect the assumption made by the Swedish Government, that domestic plane travel will lose travellers to train, to be valid (Ministry of the Environment 2009, p. 47-50). The anticipated consequence from such conjecturing would then be for observational data to begin reflecting this trend and effectively reverse the current trend which seem to be pointing in the opposite direction (Transport Analysis 2011a,b). However, this is not necessarily supported by the findings here since the sampled population was not normally distributed and therefore should not be extrapolated further than to the sample itself. In order to determine if these findings are attributable to generational replacement, additional measurements are inevitably required to maximize the visibility of a potential generational deviation among young people over time to, in effect, travel more by train than the general Swedish population (Delli Carpini 1989, p. 30).

Noteworthy as a caveat to this finding is that close to half of the sampled population stated that they were not sure or would change their means of travel after graduating. This finding introduces an uncertainty to the conclusions of the thesis and suggests that a time-series with similar measurements over time is required to reduce the magnitude of this uncertainty.

The influence of the time specific event that can change behaviour (Hellevik 2002, p. 14) and that were proposed as being service disruptions associated with the winters of 2009/2010 and
2010/2011 had largely no effect on the choices of the respondents. However, respondents effect by such disruptions were more likely to opt out of train travel, suggesting that plane travel is potentially favoured if these type of events continues to occur.

Furthermore, it is possible to conclude that concern for the environment played the least important role in choosing means of travel among the respondents. This is consistent with the findings of Nilsson & Küller (2000) who found environmental concern to fill a subordinate role, but it is also close to the findings of both Hellevik (2002) and Wray-Lake et al (2010), who found environmental concern on a personal level to be declining among young people. In the sampled population cost played the most important role while comfort and speed were of roughly equal importance. This is somewhat compatible with the findings of Harring et al (2011) who found economic cycle to have a detectable effect on environmental concern albeit a diminishing one. From this perspective, as the majority of the sampled population lives on financial aid from CSN (see 4.1.4) their concern is less likely to be with the environment and more likely to be with cost. Incidentally, train travel is nevertheless considered by the sample as being the cheaper alternative over plane travel and thus it is conceivable one of the reasons for the sample to be travelling more by train. Although, this interpretation would not be sufficient to explain why the majority of the sample are likely to change their choice of travel means after graduation.

Some evidence for cognitive dissonance is manifested throughout the thesis (Thøgersen 2004, p. 100). Notable examples can be found in 5.1.3 where train travelers considered train to be the fastest travel choice which deviates from the opinion of 79 % of the sample (see 4.2.4) who considered plane to be the fastest. Similar results can be found in 5.2.3 where plane travellers considered plane to be cheaper although 60 % the sample considered train to be the cheapest (see 4.2.4). In 5.3.3 train or plane travellers both considered their choice as being the most comfortable. Most noteworthy in this category can be found in 5.4.4 where frequent travelers considered plane travel to be most environmentally friendly alternative which is contrary to the opinion of 98 % of the sample.
What follows below is a more in depth look at the conclusions from the four hypotheses. All cross tabulations conducted and their respective results can be found summarized in Attachment 3.

6.2 Hypothesis 1: Maximization of leisure time
This hypothesis addressed speed and its correlation to increasing leisure time (See 2.5.1).

The findings of this thesis showed that the majority of the sampled population considered plane travel to be faster than train travel. Respondents who cared more about speed were more inclined to care about price and comfort, but less about environmental friendliness.

Frequent travellers could not be associated with choosing the fastest means of travel as no statistically significant correlation could be found. This goes against the first part of thesis 1, which stated that frequent travellers should be more inclined to choose the fastest means of travel. However, respondents who considered plane travel faster also travelled more by plane. This suggests it to be a conscious decision to maximize leisure time among these respondents (Hupkes 1982, p.38). This supports the second part of thesis 1, which states that individuals who care about speed will be more inclined to choose the fastest means of travel as it will require less time.

6.3 Hypothesis 2: Substitute goods
This hypothesis addressed the competition between train and plane travel (See 2.5.2).

The findings of this thesis showed that train and plane travel could be considered to be substitute goods as they compete for the same population of travellers (Mankiw 2011, p.70). None of them could be said to be absolutely inferior as they both had their strong and weak sides (ibid). They were in other words both inferior to one another but on different aspects. Train travel was considered cheapest, the most environmentally friendly and the most comfortable means of travel while plane travel was considered the fastest means of travel. The findings further suggested that the more a respondent travelled, the more susceptible he or she was to the influence of promotions on both train and plane travel. The more a respondent traveled, the more
likely it was that he or she consider plane travel to be cheaper than train travel. Furthermore, both low and high income earners considered plane travel to be cheaper while medium income earners considered train travel cheaper. Medium income earners also travelled more by train. A small linkage could be made between caring about cost and speed, but no linkage could be found between any of the other factors. When it comes to comforts the more income a respondent had, the less he or she cared about all forms of comforts. Low income respondents considered train to be the most comfortable means of travel.

Hypothesis 2 is concluded to have a detectable effect on the respondents choice and attitude towards train and plane travel. This signifies a potential solution to how to make the next generation choose train travel over plane travel; increase train travel by making this means of travel cheaper and faster. Train travel will then be able to outcompete plane travel both in price and in the factors speed, environmentally friendliness as well as comfort.

6.4 Hypothesis 3: Comfort and service disruption

This hypothesis addressed how demand for comfort affected travel choice (see 2.5.3).

The findings of this thesis showed that comfort did play a part in the choice of travel as the most commonly used means of travel matched what the respondents considered most comfortable. Comfort was not a completely determinant factor in choosing means of travel, however it did play a partial or large role in most cases. The more a respondent traveled, the more likely it was that he or she considered plane travel as the most comfortable means of travel. Frequent travelers also tended to opt out from using train travel to reduce the risk of service disruptions. Respondents traveling more often by plane favoured this means of travel both in terms of speed and comfort. There was almost no linkage between the most commonly used means of travel and with demanded comforts. The link that could be found was between the most commonly used means of travel and a demand for electrical outlets and the ability to move freely around the vehicle. The more respondents traveled by train, the more likely they were to demand these two comforts. The more frequently a respondent traveled, the less likely it was that he or she cared about different forms of comforts such as access to internet and toilet.
Hypothesis 3 is concluded to be partially true. Increasing comforts to attract travellers is not an effective strategy to further train travel as the main means of travel as frequent travellers care less about comforts. The preferred means of travel when it comes to most comfortable changes from train to plane as the respondents travel more often. This indicates that the perceived higher speed of plane travel within the sampled population (see 4.2.4) is viewed as a form of comfort that acts against deprivation of wants and drives since it reduces exposure (McFadden 1974, p.304). Furthermore, avoidance of service disruptions can be concluded to favour plane travel and thus signifies a future challenge for train travel.

6.5 Hypothesis 4: Environmental concern

This hypothesis addressed how environmental concern affected travel choice (see 2.5.4).

The findings of this thesis showed that respondents who considered environmental concern important also traveled more by train. These respondents have incorporated facets from their ideal lifestyle into a realised one (Lindén 1994, p.26). However, the more a respondent traveled, the more likely it was that he or she considered plane travel to be more environmentally friendly. Those considering environmental concern as important in choosing means of travel were more likely to consider comfort as important, but less likely to consider speed as important while cost consideration was not significantly affected. Those who were influenced by claims about the environmental friendliness of train travel also travelled slightly more by train. Those who wanted to diminish their personal emissions also travelled slightly more by train. Those who travelled more often were also more concerned about reducing their personal emissions. Income level had a slight impact on whether or not travel habits will change after graduation. High income earners were found to be more likely to change their choice of means of travel, medium income earners were less likely to change their choice of means of travel while low income earners were more uncertain about their choice of means of travel after graduation.

Hypothesis 4 is concluded to have a detectable effect on the respondent’s choice and attitude towards train and plane travel. Those who considered environmental concern as important in their choice of means of travel behaved consistently with this attitude and chose train travel over plane travel. These respondents were less affected by both speed and cost but more affected by
comfort when choosing means of travel. Environmental concern favours train travel, however, environmental concern was more prominent among frequent travelers and made them more likely to choose train travel. These findings suggest that more focus should be turned to less frequent travelers in order to convince them to also chose train travel as their travel choice has an impact on the environment too.
Chapter 7 - Discussion

The ambition of this thesis was to begin an initial measurement of the choice and attitude to train and plane travel among the students at Malmö Högskola. To do this a questionnaire was manufactured, distributed and completed by 248 students which acted as the basis for statistical analysis. The research method used to gather data had two major problems. The first being that it was difficult to operationalize the results because the participants were given ready made questions to fill in, with no ability of two-way communication in order to ensure that the questions were fully understood. This lack of two way communication meant that the results had to be interpreted after data collection had been completed. The reason for choosing this research method was to get a larger sample population as data gathering was significantly quicker.

The second problem was that the non random selection of participants gave a sample population that could not be applied to any larger population. After having entered the collected data into the statistical program used, a normality test was conducted and the nonparametric distribution of all the variables became apparent. This solidified the limitation of the generalizability of the results to only be applicable to the sampled population. Furthermore, as the implication of the distribution of the data became more apparent during the analyses, it was possible to conclude that some variables were going to be difficult or impossible to correlate with other variables due their uneven distribution, as an example of this see the distribution of study pace in 4.1.3. This fact enacted as a further constraint to the possible width of the results of this thesis.

Environmental concern in was found to be less influential on the sampled population as a whole compared to the influence of both cost and speed. This result is consistent with previous studies (Nilsson & Küller 2000). The sampled population were more likely than the general Swedish population to travel by train.

The results from the hypothesis testing indicated that travel choices were affected by the hypotheses of speed, cost and environmental concern in the way they were stipulated. Due to the previously mentioned one way communication between the sampled population and researchers this can only be speculated to be the case. The participating respondents could not confirm the reasons behind their behaviours, instead it was extracted from their responses. When it comes to
the researched factor comfort, it was found that it played the opposite role to that stipulated in the associated hypotheses: more travel means less concern for comforts. The reason behind this can be speculated to be that frequent travelers have either become accustomed to not have comforts on board a train or plane, or that they bring their own comforts, such as pillows, food, entertainment, etc. Further testing would be required to investigate why comfort have the impact it does on travel behaviour.

In general it is recommended for future studies on this topic to extract a larger sample or having a different method in extracting the sample in order for the distribution to be more even and to possibly approach a normal distribution. This would likely allow for the use of parametric statistical techniques which are more sensitive and more capable of finding correlations than the nonparametric techniques used here. This recommendation is given in the hope that further generalizability will be possible in studies of this topic.
References


Studenter som tåg- eller flygresenärer på sträckan Malmö-Stockholm

Syftet med denna enkät är att undersöka vilka faktorer som avgör hur konsumenter väljer att resa.

Din medverkan är anonym. Tack för din medverkan!


4. Inkomst (per månad efter skatt): __________________________________


6. Vilket av följande alternativ passar bäst in när du reser sträckan Malmö-Stockholm?

   □ Arbete       □ Nöje       □ Besöka familj och/eller vänner       □ Studier

7. När du reser sträckan Malmö-Stockholm, vilket ressätt använder du dig av?

   □ Alltid med tåg □ Mest med tåg □ Hälften var □ Mest med flyg □ Alltid med flyg

Notera att undersökningen inte inkluderar övriga transportsätt, så som bil.

8. Angående sträckan Malmö-Stockholm:

   a. Vilket resesätt anser du vara snabbast? □ Tåg □ Flyg
   b. Vilket resesätt anser du vara billigast? □ Tåg □ Flyg
   c. Vilket resesätt anser du vara mest miljövänligt? □ Tåg □ Flyg
   d. Vilket resesätt anser du ha högst komfort? □ Tåg □ Flyg


   □ Bekväma sittpelser □ Toalett □ Trådlöst internet □ Möjlighet att röra sig fritt i fordonet
   □ Möjlighet att köpa mat och dryck på fordonet □ Eluttag för att använda medtagen elektronik
   □ Möjlighet att ta med mycket bagage □ Låg nivå av oljud □ Lite folk på fordonet
   □ Annat: ____________________________________________

Var god vänd!
10. Vilka faktorer har varit avgörande när väljer ressätt på sträckan Malmö-Stockholm?

<table>
<thead>
<tr>
<th>Faktor</th>
<th>Inte alls</th>
<th>Till viss del</th>
<th>Till stor del</th>
<th>Helt och hållet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hastigheten</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miljövänlighet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Komfort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Påverkas du i ditt val av ressätt på sträckan Malmö-Stockholm av möjligheten för driftstörningar?

- Nej
- Ja, jag väljer bort flyget
- Ja, jag väljer bort tåg

Till driftstörningar räknas förseningar eller inställda resor orsakade av exempelvis snö, vulkanaska, el-fel etc.

12. Hur påverkas ditt resande på sträckan Malmö-Stockholm av följande faktorer?

a. Reklamerbjudanden med tillfälligt lägre priser från flygbolag
   - Ofta
   - Ibland
   - Sällan

b. Reklamerbjudanden med tillfälligt lägre priser från tågbolag
   - Ofta
   - Ibland
   - Sällan

c. Påståenden om tågets mindre miljöpåverkan
   - Ofta
   - Ibland
   - Sällan

d. En önskan att minska min personliga klimatpåverkan
   - Ofta
   - Ibland
   - Sällan

13. Efter dina studier när du befinner dig i arbetslivet, kommer du då att använda samma ressätt mellan Malmö-Stockholm som idag?

- Ja
- Nej
- Vet ej

14. Anser du att ditt personliga val av ressätt på sträckan Malmö-Stockholm vara betydelsefullt för utsläpp av klimatpåverkande gaser?

- Nej, min personliga påverkan är inte betydelsefull
- Ja, alla små förändringar påverkar
- Vet ej

Tack så mycket för er medverkan!

Den färdiga undersökningen kommer att finnas tillgänglig på www.dspace.mah.se till sommaren.
Assessing normality - Kolmogorov-Smirnov test
To determine the normality of the distribution a Kolmogorov-Smirnov test was conducted. This test assesses the normality of the scores of the sampled population (Pallant 2004, p. 58). In order for the distribution to be considered normal a value of 0.05 or above would be needed. Values below this threshold signify a non-normal distribution. Furthermore, in order to better assess normality and the interpretation of the Kolmogorov-Smirnov test, the sample’s skewness and kurtosis values should also be considered (Ibid). The skewness and kurtosis values should be close to 0 to indicate normality (Ibid, p. 53-54).

Statistical analysis - cross tabulations with eta test
To determine if significant statistical correlation could be found in the sampled population, the eta test was performed to measure the correlation between one nominal variable and one scale variable. The nominal variable was tested for a statistically significant effect on the scale variable, example given; does the student's study pace (full- or part-time studying) affect how often they travel (Morgan et al. 2004, p. 106-107). The reverse was also done by using eta test to determine if the scale variable had any effect on the nominal variable. 1.0 is equal to a total dependency where the nominal variable completely determines the scale variable and 0.00 is equal to no statistical significance. Morgan et al’s (2004, p. 91) evaluation of results was used to interpret the interval in between total dependency and no statistical significance. To evaluate the strength of a correlation using an eta test a table for interpreting the results was created (see table 13).

Table 13. Eta test value range.

<table>
<thead>
<tr>
<th>Eta Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Total dependency</td>
</tr>
<tr>
<td>0.46-0.99</td>
<td>Much larger / much larger than typical</td>
</tr>
<tr>
<td>0.37-0.45</td>
<td>Large / larger than typical</td>
</tr>
<tr>
<td>0.24-0.36</td>
<td>Medium / typical</td>
</tr>
<tr>
<td>0.10-0.23</td>
<td>Small / smaller than typical</td>
</tr>
<tr>
<td>0.00-0.09</td>
<td>No statistical significance</td>
</tr>
</tbody>
</table>

After the eta test the resulting eta value was squared to indicate the proportion of variance of the dependent variable which could be explainable by the independent variable (Pallant 2004, p. 175). Pallant’s (2004, p. 175) evaluation of the results was used to create a table for interpretation of eta squared (see table 14).

Table 14. Eta squared, the size of variance.

<table>
<thead>
<tr>
<th>Eta Squared</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Total dependency</td>
</tr>
<tr>
<td>0.13-0.99</td>
<td>Large effect</td>
</tr>
<tr>
<td>0.06-0.12</td>
<td>Moderate effect</td>
</tr>
<tr>
<td>0.01-0.05</td>
<td>Small effect</td>
</tr>
<tr>
<td>0.00</td>
<td>No effect</td>
</tr>
</tbody>
</table>

Statistical analysis - cross tabulations with Somers’ d test
Somers’ D test was used to test the correlation between two variables that are both on the ordinal scale (Gerber et al. 2005, p. 135). Somer’s D is preferred when it is appropriate to predict one
variable from another. Somers’ d belongs to what is referred to as the $r$ family of effect size measures and is used to indicate the amount of shared variance between variables (Ferguson 2009, p. 535-536). This means that its utility is similar to eta squared, but is instead applied to ordinal scales. Since the results do not need to be squared like the results of an ETA test, the resulting value can then be used directly. 1.0 is equal to a total dependency where one ordinal variable completely determine the other ordinal variable and 0.00 is equal to no statistical significance. Morgan et al’s (2004, p. 91) evaluation of results was used to interpret the interval in between total dependency and no statistical significance. To evaluate the strength of a correlation using a Somers’ D test a table for interpreting results was created (see table 15).

**Table 15.** Somers’ D test value range.

<table>
<thead>
<tr>
<th>Value Range</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Total dependency</td>
</tr>
<tr>
<td>0.70-0.99</td>
<td>Much larger than normal</td>
</tr>
<tr>
<td>0.50-0.69</td>
<td>Larger or larger than typical</td>
</tr>
<tr>
<td>0.30-0.49</td>
<td>Medium or typical</td>
</tr>
<tr>
<td>0.10-0.29</td>
<td>Small or smaller than typical</td>
</tr>
<tr>
<td>0.00-0.09</td>
<td>No statistical significance</td>
</tr>
</tbody>
</table>

**Statistical analysis - cross tabulations with Chi-square test**

Chi-square is used to test correlations between two variables on the nominal scale (Pallant 2003, p.256-257). The chi-square test generates a table which categorizes the percentage of the sampled population according to how they relate to the variables tested, example given; how many men support presidential candidate A (Ibid, p. 260). In order to determine how statistically significant this correlation is, Pallant’s (2004, p. 259) value was used to indicate significance (see table 16)

**Table 16.** Chi-square significance.

<table>
<thead>
<tr>
<th>Value Range</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06-1.0</td>
<td>No statistical significance</td>
</tr>
<tr>
<td>0.00-0.05</td>
<td>Statistical significance</td>
</tr>
</tbody>
</table>

**References**


<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most commonly used means of travel</td>
<td>Determinate factor speed</td>
<td>M=Plane travellers care about speed</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Determinate factor speed</td>
<td>No significance</td>
</tr>
<tr>
<td>Opinions about fastest means of travel</td>
<td>Most commonly used means of travel</td>
<td>+ =Thinking plane is faster equals more travel by plane</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Opinions about fastest means of travel</td>
<td>M=More than 12 trips a year, no longer consider train fastest</td>
</tr>
<tr>
<td>Determinate factor speed</td>
<td>Determinate factor price</td>
<td>S=Speed and price go hand in hand</td>
</tr>
<tr>
<td></td>
<td>Determinate factor comfort</td>
<td>S=Speed and comfort go hand in hand</td>
</tr>
<tr>
<td></td>
<td>Determinate factor environmentally concern</td>
<td>S=Speed and eco are opposed</td>
</tr>
<tr>
<td>Thesis 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most commonly used means of travel</td>
<td>Determinate factor price</td>
<td>No significance</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Determinate factor price</td>
<td>S=Above average travellers care about price</td>
</tr>
<tr>
<td>Opinions about cheapest means of travel</td>
<td>Most commonly used means of travel</td>
<td>+ =The considered cheapest means of travel was most used</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Opinion about the cheapest means of travel</td>
<td>M=Frequent travellers consider air-travel cheaper</td>
</tr>
<tr>
<td>Determinate factor price</td>
<td>Determinate factor speed</td>
<td>S=Price and speed go hand in hand</td>
</tr>
<tr>
<td></td>
<td>Determinate factor comfort</td>
<td>No significance</td>
</tr>
<tr>
<td></td>
<td>Determinate factor environmentally friendly</td>
<td>No significance</td>
</tr>
<tr>
<td>Sales on train-travel</td>
<td>Sales on air-travel</td>
<td>L=Sales on train- and air-travel go hand in hand</td>
</tr>
<tr>
<td>Sales on air-travel</td>
<td>Sales on train-travel</td>
<td>L=Sales on train- and air-travel go hand in hand</td>
</tr>
<tr>
<td>Income</td>
<td>Determinate factor, price, speed, comfort, eco</td>
<td>No significance</td>
</tr>
<tr>
<td>Income</td>
<td>Listed comforts</td>
<td>L to M on all—More income means one cares less about comforts</td>
</tr>
<tr>
<td>Income</td>
<td>Cheapest</td>
<td>M=Medium income considered train cheaper</td>
</tr>
<tr>
<td>Income</td>
<td>Most comfort</td>
<td>L=Low income means one consider train to be most comfortable</td>
</tr>
<tr>
<td>Income</td>
<td>Sales on train</td>
<td>No significance</td>
</tr>
<tr>
<td>Income</td>
<td>Sales on plane</td>
<td>No significance</td>
</tr>
<tr>
<td>Income</td>
<td>Commonly used means of travel</td>
<td>S=Medium income travel less by plane</td>
</tr>
</tbody>
</table>
### Thesis 3

<table>
<thead>
<tr>
<th>Most commonly used means of travel</th>
<th>Determinate factor comfort</th>
<th>No significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of travel</td>
<td>Determinate factor comfort</td>
<td>No significance</td>
</tr>
<tr>
<td>Opinion most comfortable means of travel</td>
<td>Determinate factor comfort</td>
<td>Opinion about most comfortable matches most used</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Opinion about most comfortable</td>
<td>Frequent travelers think air-travel is most comfortable</td>
</tr>
<tr>
<td>Determinate factor comfort</td>
<td>Determinate factor speed</td>
<td>S=Comfort and speed go hand in hand</td>
</tr>
<tr>
<td>Determinate factor price</td>
<td>No significance</td>
<td></td>
</tr>
<tr>
<td>Determinate factor environmental friendliness</td>
<td>Service disruptions</td>
<td>S=Comfort and environmental concern go hand in hand</td>
</tr>
<tr>
<td>Most commonly used means of travel</td>
<td>Listed comforts</td>
<td>Train-travelers want electrical outlets and freedom of movement</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Listed comforts</td>
<td>More traveling means less concern for all forms of comforts</td>
</tr>
<tr>
<td>Most commonly used means of travel</td>
<td>Service disruptions</td>
<td>No significance</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Service disruptions</td>
<td>Frequent travelers opt out of traveling by train</td>
</tr>
<tr>
<td>Determinate factor comfort</td>
<td>Service disruptions</td>
<td>No significance</td>
</tr>
<tr>
<td>Determinate factor speed</td>
<td>Service disruptions</td>
<td>No significance</td>
</tr>
<tr>
<td>Determinate factor cost</td>
<td>Service disruptions</td>
<td>No significance</td>
</tr>
<tr>
<td>Determinate factor eco friendliness</td>
<td>Service disruptions</td>
<td>No significance</td>
</tr>
</tbody>
</table>

### Thesis 4

<table>
<thead>
<tr>
<th>Most commonly used means of travel</th>
<th>Determinate factor eco friendliness</th>
<th>S=Train-travelers consider environmental concern more important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of travel</td>
<td>Determinate factor eco friendliness</td>
<td>No significance</td>
</tr>
<tr>
<td>Opinions about most eco means of travel</td>
<td>Determinate factor eco friendliness</td>
<td>No significance</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>Opinion about the most eco means of travel</td>
<td>Frequent travelers consider air-travel most eco friendly</td>
</tr>
<tr>
<td>Determinate factor eco friendliness</td>
<td>Determinate factor speed</td>
<td>Eco friendly consider speed less important</td>
</tr>
<tr>
<td>Determinate factor price</td>
<td>No significance</td>
<td></td>
</tr>
<tr>
<td>Determinate factor comfort</td>
<td>No significance</td>
<td>Eco friendly consider comfort important</td>
</tr>
<tr>
<td>Claims about eco friendliness</td>
<td>Most commonly used means of travel</td>
<td>S=Influenced by claims traveled more by train</td>
</tr>
<tr>
<td>Frequency of travel</td>
<td>No significance</td>
<td></td>
</tr>
<tr>
<td>Reducing personal emissions</td>
<td>Most commonly used means of travel</td>
<td>S=Reducing person CO2 means travel by train</td>
</tr>
<tr>
<td>Importance of personal emissions</td>
<td>Frequency of travel</td>
<td>No significance</td>
</tr>
<tr>
<td>Change of travel after graduation</td>
<td>Frequency of travel</td>
<td>No significance</td>
</tr>
<tr>
<td>Income</td>
<td>Change of travel after graduation</td>
<td>S=Income affects travel by train</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No significance</td>
</tr>
</tbody>
</table>