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Importance and value of airline service attributes. Routes from Helsinki to Germany in non-business segments

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ABSTRACT
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This study focuses on analyzing importance of airline service attributes on routes between Helsinki-Vantaa Airport and Germany. The goal of the study is to find out which airline service attributes are important for the passengers and are there differences in the importance levels caused by the type of passenger. Another interest area was willingness-to-pay measures for two airline service attributes and possible differences inside the focus group. Literature review discusses the most relevant theoretical areas and earlier research in the area of passengers' airline choice process.

Empirical part of the study was conducted as quantitative research. Respondents were recruited at Helsinki-Vantaa Airport and three forums to take part in the questionnaire built with Sawtooth Software to dedicated web domain. Altogether 166 completed and applicable responses were received for the analysis. Willingness-to-pay measures are calculated for reduced travel time and food service attribute from individual-level utilities, which were estimated with hierarchical Bayes estimation.

The two most essential findings are the importance levels of different service attributes and willingness-to-pay measures. Low price of the ticket, direct flight to the destination in addition to safety reputation of the airline and punctuality of the flight were found as being the most important attributes. Frequent-flyer programs, name of the airline and seat width were found to be the least important attributes. Some demographic and traveler specific variables were found to affect the importance levels. Average willingness-to-pay measures for direct flight with the reduction of flight with two hours was 97,94 euros and willingness-to-pay for free food and drinks 19,55 Eur. Cluster analysis revealed three clusters; time sensitive (62,65% of the respondents), price sensitive (22,30%), and time sensitive, conditional buyers (15,05%).

KEY WORDS: airline, hierarchical Bayes, utility, choice-based conjoint analysis

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Tämä tutkimus keskittyy analysoimaan lentoyhtiöiden palveluattribuuttien tärkeyttä Helsinki-Vantaan lentoaseman ja Saksan välisillä reiteillä. Tutkimuksen päämäärä on löytää asiakkaille tärkeät attribuutit ja mahdollisia eroja eri asiakasryhmien välillä. Toinen kiinnostuksen alue on matkustajien maksuhalukkuus kahdelle palveluattribuutille ja maksuhalukkuuden mahdolliset erot ryhmien välillä. Kirjallisuuskatsaus käy läpi oleellisimmat teoreettiset alueet ja edelliset tutkimukset koskien matkustajien lentoyhtiön valintaprosessia.

Tutkimuksen empiirinen osa toteutettiin kvantitatiivisena tutkimuksena. Vastaajat rekrytoitiin Helsinki-Vantaan lentoasemalla ja kolmelta eri foorumilta ottamaan osaa kyselyyn, joka rakennettiin Sawtooth Softwarella kyselylle erikeen perustetulle domainille. Analyysiä varten saatiin yhteensä 166 kelvollista vastausta. Maksuhalukkuuudet laskettiin lyhyemmälle matkustusajalle ja ruokatarjoilulle yksilötason utiliteeteista, jotka estimoitiin hierarkkisella Bayes-mallilla.

Tutkimuksen kaksi oleellisinta löytöä ovat palveluattribuuttien tärkeystasot ja maksuhalukkuus arviot. Tärkeimmät attribuutit ovat tutkimuksen tulosten pohjalta lipun alhainen hinta, suora lentoyhteys kohteeseen, lentoyhtiön turvallisuus, lentojen täsmällisyys. Kanta-asiakasohjelma, lentoyhtiö nimi ja penkinleveys olivat vähiten tärkeitä attribuutteja. Joidenkin demograafisten ja matkustajakohtaisten muuttujien löydettiin vaikuttavan attribuuttien tärkeyteen. Keskiarvoinen maksuhalukkuus suoralle lennolle oli 97,94 Euroa ja hintaan sisältyvälle ruoalle ja juomille 19,55 Euroa. Klusterianalyysillä löytyi kolme klusteria; aikaherkkä (62,65% vastaajista), hintaherkkä (22,30% vastaajista) ja aikaherkkä, ehdolliset ostajat (15,05%).
AVAINSANAT: lentoyhtiö, hierarchical Bayes, utiliteetti, valintaan perustuva conjoint analyysi

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1. INTRODUCTION

1.1 Background

Doganis (2002) writes in his book that during the last five decades, the airline industry has seen rapid growth, but has remained only marginally profitable and faces continuous ups and downs. After suffering through SARS and 9/11 terrorist attacks, the airline industry is currently going through its hardest times ever as airlines made the loss of 11 billion USD in the year 2009. This has forced airlines to cut their capacity and costs, and even though some signs of recovery can already be seen such as 4,5% increase in passenger traffic in December 2009 in comparison to the same month in 2008 (IATA, 2010), the expected increase in oil prices, lower average yields, overcapacity in many markets and decline in business travel will guarantee that the hard times are not over yet. Also, signs of improvement in air passenger demand can already be seen, but the situation of air carriers is still tough due to the low level of average fares. There is also scepticism whether business travel will recover to its earlier numbers as companies are restricting their travel budgets and could and have replaced business travel with inexpensive alternatives as video conferencing or by switching booking class from business class to lower classes.

The airline business has been suffering from overcapacity since the introduction of wide-bodied aircraft in the early 1970s, which partly caused airlines to move from sales-oriented marketing to consumer-oriented marketing where services are shaped to meet consumers' needs and expectations rather than shaping consumers' needs to fit available services. As a result, there was a need for market research to find out who are flying, why they are flying, what they wanted and liked and what they could afford and so on, which increased a need for different kinds of tests and surveys for new products to discover what consumers really want. (Wensveen, 2007) In addition, before the low-cost carriers entered the market, the competition between airlines was based on price, schedule and frequency, and, as a consequence, airlines optimized these parameters focusing less on what customer's wished on product attributes and design. (Flenskov, 2005 & Lee & Luengo-Prado, 2004)

Overcapacity is not the only problem concerning network carriers. Currently, low-cost carriers can offer much lower prices in comparison to network carriers and it has been hard for network carriers to match with prices as their cost and organizational structures do not allow it. Based on the results of Seristö & Kilpeläinen (1997), the airlines which have high variation in sector distances also have lower productivity of flying personnel and high operating expenses. National carriers often operate long distance flights resulting in higher variation in the flight distance and construction of fleet. In contrast, the low-cost carriers often operate only short distance flights and may operate using only type of aircraft. This would suggest that national carriers have to find other ways to compete against low-cost carriers than only price which is affected by the cost structure.

The only option left for network carriers is to differentiate their service offering and thereby delivering more value to the customers. This can be done by seeking a deeper understanding about customers' needs and expectations to find out the right element of differentiation. (Flenskov, 2005) However, as regulations have been relaxed, airline managers have more possibilities to decide what features to offer in different segments. (Doganis, 2002) Lee & Luengo-Prado (2004, pp. 378) write that full service carriers can "differentiate themselves from LCCs by offering a number of service characteristics typically unavailable from LCCs such as extensive national and international route networks, pre-assigned seats, some degree of in-flight meal service on longer flights, multiple service/cabin classes, and comprehensive frequent flyer programs that permit passengers to earn and redeem miles in a wide range of domestic and international partners (both airline and non-airline)."

Airline management is about matching the supple of air services with the demand for such services. Management can control supply, but has less power in controlling demand, and in order to stay profitable, the key is to find right balance between unit costs, unit revenues and load factor. (Doganis, 2002) It is only product planning through which airlines can affect demand. In order to find right match, a throughout understanding about the demand, which is being satisfied, is required. Aircraft type,

routes, schedules, price, advertising, in-flight service and equipment, ground handling have an effect on demand and it is the responsibility of airline marketing and product planning to identify and satisfy customer needs, to decide what should be produced and how it should be sold, and to make adjustments to different features so that supply meets the changes in demand. (Doganis, 2002) Airlines must find new ways to attract customers by differentiating their services and develop new sources of revenues such as creating extra services for which customers are willing to pay for, but which may not be required by other customers. Proussaloglou and Koppelman (1999, pp. 193) write that "air carriers have been searching for ways to increase product differentiation and obtain market advantage. Among the strategies adopted are the implementation of capacity controls, differentiated pricing by market segments, frequent-flyer programs aimed at inducing traveler loyalty, improvements in terminal and on-board amenities, coordination of schedules and joint marketing with code-sharing partners, and monitoring and improving on-time performance. An essential component in the evaluation of these and other strategies is gaining a better understanding of the needs and wants of individual travelers."

One distinctive feature of airline business and strategies is the strategic alliances. According to Kleymann & Seristö (2004), the alliances, which can be formed based on defensive, market-offensive, efficiency-seeking objectives, can create value-added in airline marketing. The alliances constantly shape the competitive environment and involve more and more co-operation between airlines which would otherwise be rivalry competitors. In the focus area of this thesis, there are several alliances in action and the oneworld-alliance has most recently seen a quite substantial change when the low-cost carrier AirBerlin joined the alliance which also includes one of the biggest competitors, Finnair. Finnair and AirBerlin had been strong competitors, but now they do code-sharing. As written by Kleymann & Seristö (2004) in their book, there are certainly lots of benefits gained from the alliances. However, one aspect of the alliances is the code-sharing which may then also create some problems. In a situation where a passenger is buying a ticket she or he may be making comparisons in Ebookers or related internet service. There the passenger may see several different options, for example Finnair and AirBerlin. If the traveler values Finnair's services more and buys the ticket from Finnair

which had been more expensive, the customer ill-will may be created when she or he goes to the airport and sees that; the flight is actually operated by AirBerlin, and that he or she could had bought the same ticket to the same flight with lower price.

This thesis focuses on analysing customers' perceptions concerning importance of services and their attributes provided by competing airlines on routes between Helsinki-Vantaa Airport and Germany. From Finland's point of view, the routes to and from Germany are important as more passengers travelled on those routes in 2009 than in any other route between Finland and some other country. In 2009, altogether 7 496 419 passengers travelled between Finland and EU-countries out of which 1 460 617 (19,48%) travelled between Finland and Germany. Germany is also one of the biggest trading partners to Finland and is home two major hubs, namely München and Frankfurt am Main. The next most important markets were Sweden with 1 096 925 (14,63%) and Great Britain with 829 044 (11,06%). (Finavia, 2010)

Since there is no revealed preference data available, this thesis uses stated preference data gathered from passengers at Helsinki-Vantaa Airport. Revealed preference analysis would use data gathered from consumers' historical behavior and reveals the choices which consumers have done under current situation in the market. Stated preference method tool can be used to find out how consumers value different product/service attributes by asking respondents to rank, rate or choose between different hypothetical product/service scenarios that consist of different attribute mixes (Ableу, 2000). The gathered data, which will be collected from departing passengers using internet questionnaire, will be analyzed using Sawtooth software to obtain utilities.

The air passengers are assumed to choose an alternative from which they receive the highest utility after they have evaluated different combinations of air travel service which have been presented. In this study, consumers are asked to choose a flight among set of flights where they are offered a combination different fares, flights times and service levels to find out more about consumers decision making criteria and utility levels which consumers receive from different combinations of service attributes. Also, consumers are asked some demographic details to reveal different consumer groups.

Consumers are expected to make trade-offs in their decision in terms of service level which utility values determining the choice can be analyzed.

The main goal of this thesis is to find out which airline service features customers value and how the importance of features is affected by passenger characteristics. Also, this thesis includes measures that how much consumers would be willing to pay for the airline services, which have been or have not been altered. The basic idea behind this is to provide information that would help the competing airlines on selected routes to build and plan a service, which consists of the best combination of different product features. At the end, knowing the consumers' preferences and their willingness to pay for each attribute, the airlines can change their pricing in different market segments to increase profits.

1.2 Research problem

"How do consumers travelling between Finland and Germany value different airline service attributes?"

1.3 Research questions

1. How important are airline service attributes for travellers in routes between Helsinki and Germany and how the importance level is affected by the type of passenger?
2. What are the willingness-to-pay measures for each selected service attribute and how the measures are affected by the type of passenger?

1.4 Definitions and limitations

This study focuses only on routes between Helsinki-Vantaa and Germany due to difficulties of building realistic choice experiments for all Finnish airports and consists of holiday and leisure segment passengers. The routes to Germany were chosen due to

personal interest in Germany. Business segment passengers are not included due to the difficulties to find the decision maker in terms of travelling choice and, more importantly, the studying behaviour of business passengers would require different choice sets and levels of attributes to fulfil the requirements of proper stated preference choice research. Also, due to the nature of pricing corporate customers it would be impossible to achieve realistic choice sets as contracts are not public and the business class passenger may not have information about the total price.

Utility maximization. In the choice-based conjoint analysis, a respondent faces different alternatives and he or she is required to choose one of the alternatives. Based on the utility maximization rule, a person is expected to choose in the choice-based conjoint experiment the alternative which maximizes his or her utility. The utility indicates a relative value that a person receives from certain alternative. (Kopppelman & Bhat, 2006)

Airline choice process. The choice of an airline is part of wider interrelated travel choice making process, which includes destination, time and main mode decisions. Air travel choice consists of origin- and destination-sides including selection of airport, mode of ground transportation, and air-side. The air-side includes choices about the airline, routing and departure time and date. (Hess, 2005) Before deciding which the airline, departure time and fare class, the decision maker is assumed to acquire and evaluate information about the air travel options and then select the alternative with the highest utility. The best option is a function of airline, trip and traveller specific factors and travellers are expected to make tradeoffs in terms of airline's level of service, the convenience of the flight schedule and fare levels including fare class specific service attributes. (Proussaloglou & Koppelmann, 1999)

2. REVIEW OF LITERATURE

This chapter explains the main theoretical areas in analysing airline passenger choice behaviour and describes earlier findings in the study area. There are two areas of interests namely the theory of utility maximization and airline marketing which form the surrounding for the thesis. The airline choice behaviour is analysed from the passenger's point of view where the passenger is considered as a rational decision maker. The passenger is then evaluating the airline-side which includes different options for the trip and includes several service features which have been planned by the airline marketing departments. The core of the analysis is then to study the middle area between the passengers and the airlines to give answers to the questions about the value and importance of airline service features. To explain the process more clearly, utility maximization theory is described explaining the passenger-side of the study. Airline marketing and service planning follow the utility maximization theory describing the airline-side. Finally, earlier studies and their findings are explained describing what is already known about the area between the passengers and the airlines.

2.1 Utility maximization theory

Underlying assumption when analysing utilities and choice behaviour is that when the passenger makes the decisions about the airline, she or he is expected to select an alternative which maximizes his or her utility. Varian (2003, pp. 54) writes in his textbook that utility as a concept was earlier "thought of as a numeric measure of person's happiness", but due to the conceptual problems of how to measure utility, the choice behaviour is now understood and described as consumer preferences where the utility is used to describe the preferences.

McKenzie & Lee (2006) write in their book that individuals behave rationally when they act to satisfy their needs and wants. McKenzie & Lee (2006, pp. 2) continues that "rational behavior is consistent behavior that maximizes an individual's satisfaction" and context of rational behaviour rests on three assumptions. First, individual has

preferences and can identify what she or he wants within the limits. Second, individual is able to order his or her wants from the most preferred to less preferred. “Third, the individual will choose consistently from these ordered preferences to maximize his or her satisfaction.” (McKenzie & Lee, 2006, pp. 2)

When consumers make a choice, they try to maximize their utility, or in other words, their well-being or pleasure subject to constraints the consumers’ have. Consumers have different types of preferences which guide them in the decision making process and the choice, or decision, is based on consumers’ tastes or preferences which determine the amount of pleasure people derive from the services they consume. (e.g. Perloff, 2009; Varian 2003; Pindyck & Rubinfield, 2009) Kopppelman & Bhat (2006) write, that generally a proposed framework for analysing decision making is that an individual first determines available alternatives, then she or he evaluates the attributes of those alternatives which are relevant to him or her, after which the individual uses a decision rule by which he or she selects the right alternative.

The utility maximization theory has strong theoretical background and has been used extensively in studying the decision making concepts of individuals. Kopppelman & Bhat (2006) write that the utility can be considered as value indicator to an individual and based on the utility maximization the individual will select the alternative which maximizes his or her utility. Kopppelman & Bhat (2006, pp. 14) continue and write about the utility maximization, that ”the utility function, U , has the property that an alternative is chosen if its utility is greater than the utility of all other alternatives in the individual’s choice set. Alternatively, this can be stated as alternative, ‘i’, is chosen among a set of alternatives, if and only if the utility of alternative, ‘i’, is greater than or equal to the utility of all alternatives, ‘j’, in the choice set, C.” Same reasoning is used also by Garrow (2010, pp.22) in her text book. In the choice-based conjoint experiment which will be explained more deeply in the methodology part, the respondents are required to choose one alternative from a set of four alternatives. The respondents are assumed to select the alternative which has the highest value or preference for them and using hierarchical Bayes estimation the utility levels for each respondent and each

attribute level will be estimated. The monetary value indicator for each service feature can then be calculated from these utilities.

2.2 Airline marketing and service features in matching supply with market needs

Airlines can create different combinations from five main groups of product features; price, schedule, comfort, convenience and image, and they may offer different combinations in different markets based on customer's needs in different geographical areas, routes, segments. Different segments will have different requirements in terms of the five groups of product features which makes the product planning rather complex. (Doganis, 2002) Roughly speaking, business passengers may prefer high number of frequencies with good arrival and departure times, high punctuality and fast check-in. However, the same person may have different preferences next month when he or she is a leisure traveler on the same route in economy class and may prefer lower prices more important, but the number of flights per day and seating comfort may not be so important any more. (Doganis, 2002) There are numerous examples from arrangements to gain more revenues as Air Baltic started to charge extra from check-ins at airports while offering customers internet check-in free of charge, Finnair plans to charge an extra fee for luggage, or some airlines which charge extra for in-flight meals or alcoholic drinks.

Introducing new product alterations to gain more revenues or to decrease amount of costs is very promising option for airlines since, as mentioned by Giovanni Bisignani, IATA's Director General and CEO (IATA, 2010), "Revenue improvements will be at a much slower pace than the demand growth that we are starting to see. Profitability will be even slower to recover and airlines will lose an expected US$5.6 billion in 2010," As there is ever-increasing level of competition and pressure to develop new service concepts (Moreno, 2006), there is also increasing need to know about consumers' preferences and how they are changing so that airlines could make competitive moves and predict how a change in one or more service attributes will affect demand as it does not make sense to make unprofitable decisions and because in service factory type

businesses, such as airlines, changing a product on trial and error basis can be very costly.

The product planning process itself is affected by overall marketing strategy. Also, product planning should be done keeping profitability in mind when an airline is trying to attract and hold customers from selected market segments which are targeted. Also, in specific markets, product planning should be related to three factors: the market needs which have been identified through research for each market segment, the current and expected product features of competing airlines and the cost of different product features. When making adjustments to product features, the cost of the desired features of the new product should be balanced with what customers are prepared to pay for that feature. (Doganis, 2002) Therefore, this thesis will also include willingness-to-pay measures, but only a few features will included due to vast amount of features.

Proussaloglou & Kopplemann (1995, pp. 374) writes that, "a carrier can influence the share of traffic it attracts by implementing changes in service design, pricing, marketing, and promotional strategies." According to Doganis (2002), the airline marketing is about deciding what to produce and how to sell it and, at the same time, identifying and satisfying customer needs where the key is identifying markets and segments which can be served profitably. The decision about what to produce and how to sell it is about selecting a proper marketing mix, the 4Ps for each targeted market segment (Wensveen, 2007). In the airline business context, this means deciding the air services that should be offered in the market(s) and their product features in the air and in the ground.(Doganis, 2002) Different customers will have different needs and therefore different marketing mix is needed to each selected segment that the airline wants to serve. According to Wensveen (2007), the 4Ps consist of product, price, promotion and place and in planning them the decision makers should also take into account uncontrollable variables such as cultural and social differences, political and regulatory environment, economic environment, existing competitive structure and resources and objectives of the company.

Schön (2007, pp. 1) writes that "the decision of an airline about its service offering is a challenging task as it involves various decisions at the interface of operations and marketing: which origin-destination (OD) markets to serve, over which routes, and at which departure times (schedule design), at which price and other ticket conditions (pricing/fare product design), and what aircraft type to assign to each of these flights (fleet assignment)." The airlines have large number of service alternatives from which they must or can decide to bundle a service offer for different markets and most often the markets are segmented at least into two separate segments, business and economy. (Wensveen, 2007) In any case, product planning and deciding what products to offer in each targeted market segment should be based on market needs, the product features of competitors and the cost of different product features, and selected product combinations and as a consequence the product planning itself should support the overall marketing strategy of the company. (Doganis, 2002 & Shaw, 2004) In addition to large number of available product features to select from, the airlines can also target many different segments.

Generally, airlines segment markets based on trip purpose, the length of journey, and country & culture of origin (Shaw 2004) and make rough separation between the first class, business class and economy class (Wensveen, 2007) or, in markets where first class service does not come into question, between business and economy class (Doganis 2002). This study focuses on markets between Finland and Germany and none of the airline offer first class service on these routes. However, the economy class on these routes may still be further segmented into personal, pleasure travel (Wensveen, 2007), holiday and visiting friends or relatives segments. These can be further segmented into short and long haul and length trips (Wensveen 2007 & Doganis, 2002), and student and migrant segments (Doganis, 2002).

Although it is reasonable to segment the market based on trip purpose, further segmentation is needed (Doganis, 2002) and therefore the airlines need more information about customers on each route. Segmentation can be made more precise based on passengers' age, sex, income, occupation, flying experience or frequency of travel (Doganis 2002, Wensveen 2007), the stage of life cycle, size of family (Doganis,

2002). Also, the market can be segmented based on peak, non-peak and shoulder seasons, day of the week (Wensveen, 2007), number of persons in the travel group and time of the booking (Doganis, 2002). There are more factors which affect the buying behavior, and the more airline knows about the customers, the easier it is to plan and target services and products to meet the needs of specific segments. Also, it is easier to plan advertising, promotion and sales activities, such as where to advertise and which things to emphasize, if more is known about the customers travelling on each route. In addition, by knowing size and characteristics of each segment on each route, precision can be increased in forecasting future demand and better product planning can be made when specific combinations of price and other product features can be planned for each segment. (Doganis, 2002) Wensveen (2007) writes that airlines should find most important and significant segments, study what they would like to buy and, after that, select target markets which best suit company's objectives and capabilities.

2.3 Range of service features in air passenger transportation

After having selected the most promising segment and knowing customers' needs, the airline is more able to design proper product feature combinations for each segment and to match supply with demand. Business segments may require or wish high frequency of daily flights, high punctuality and high number of destinations, good access to airport and high seat availability and, if the airline is targeting to serve that segment, the airline should plan its business class product accordingly.

Wensveen (2007) and Shaw (2004) write in their textbooks, the airline product consists of several features, which may be modified to meet the segments needs. Some of the features are interrelated as the frequency of flights will affect all the segments and therefore lots of trade-offs may be needed in planning profitable product combinations for each route. The airline product or service consists of several parts such as safety, on-time performance, convenience in terms of airport proximity and seat availability, the frequency of departures, the size of the network, in-flight cabin services, aircraft type and the image of company which can all affect the customer buying behavior. Doganis

(2002) writes that airlines can affect their image through advertising, promotion, logos, colors, the design of their facilities and lounges, and the quality of the staff service. At the ground level, ticketing and baggage handling as well as quality of the service in terms of courtesy and efficiency in contacts with passengers may also be reasons why some customers select one airline over another. (Wensveen, 2007) Also, as mentioned by Lee & Luengo-Prado (2004), the friendliness of the crew can be used to differentiate the service from competition.

The airport in terms of location, service at the airport as the number of check-in desks and lounges are also decision variables in product planning. (Shaw, 2004, Doganis, 2002) Business passengers may be offered priority check-ins in addition to lounges. (Doganis, 2002) Some airlines, focusing on the low-cost strategy, may decide not to offer luggage transfer for the connecting flight or to offer possibility to take any luggage to aircraft belly for free. In-flight cabin services may be altered and consists of food, drinks, magazines and movies depending on the type of route. However, service on long haul routes usually includes more services in comparison to short haul routes.

There are also differences between first, business and economy classes on seating configurations, level of service, quality of food (Shaw, 2004, Wensveen, 2007), restrictions or freedom to make changes on time or route of travel in addition to general fare levels and conditions, and travel duration limits. (Doganis, 2002) Higher the fare level paid by a certain customer, better the service he or she requires and receives. Passenger in higher cabins may be entitled to larger selection of in-flight service such as food, drinks, magazines and movies whereas the economy class passenger is usually offered a very standardized service package.

Minimum and maximum stay requirements, advance purchase conditions are general ways to restrict business customers from buying the economy class passengers (Shaw, 2004) and price of the ticket can be expected to vary along with the restrictions. Economy class passengers in the lowest price classes usually face the toughest restrictions as they are also expected to make more trade-offs with price and general service level. The decision about the baggage restriction policies is also part of planning

the service features. (Wenseen, 2007) Economy-class passengers also have more limitations when it comes to baggage restrictions that how many kilograms the baggage can weight, how many baggages are allowed and how much is charged for excess weight. Some low-cost airlines charge if the passenger wants any baggage to the belly of the aircraft.

When planning the place of the 4Ps, the airlines should decide their distribution strategies so that product reaches customers at right time and place in each targeted segment. (Wensveen, 2007) This may include having own sales agents and offices, phone contact center, general travel offices with access to GDS i.e. general distribution systems, or internet including own pages and internet travel pages such as Ebookers. According to Shaw (2004), point-of-sale service is also part of the air transportation product. The airline may decide to offer ticket purchase only at the internet as done by some low-cost airlines, but legacy carriers have usually arranged the ticket distribution also through traditional travel offices in addition to internet sales. Shaw (2004) write that offices themselves can affect the customers' purchasing decision. Therefore airlines should consider the exact locations of the offices, their interiors as part of their overall marketing strategies.

When it comes to in-flight service, airlines can decide what kind of food and bar services they offer and usually the level of food varies between 1st, business and economy classes. Some airlines offer food which is included in the ticket price, whereas some airlines charge extra fees for food. Also, alcohol drinks can be complementary or available for extra fee. Entertainment, including movies, magazines, radio, TV or telephone, also varies among airlines and type of aircraft used and route. (Wensveen, 2007, Doganis, 2002) Depending on the route and general regulations, it is possible to offer tax-free shopping on international routes (Wensveen, 2007) When purchasing new aircraft, the airlines can decide the type of aircraft and the interiors for the aircraft. In addition, the airline should decide the individual space for each compartment while also considering economical issues. More the passengers have individual space, in terms of seat pitch and width, less will be the capacity of the aircraft meaning that unit costs per passenger carried increases. (Doganis, 2002, Lee & Luengo-Prado, 2004) Lee &

Luengo-Prado (2004, pp. 378) continue that "higher unit costs can potentially be overcome if passengers value extra seat pitch enough to pay a premium for it. There is no guarantee, however, that passengers—even if they are aware of the difference in seat pitch—are willing to pay a fare premium relative to other carriers for this added element of in-flight service quality."

According to Doganis (2002), schedule-based product features, decided by the airline are the points to be served and routing where the airline decides, which destinations to serve and whether to offer direct service between the destinations or service with incremental stops. Airlines can increase the number of destinations served by buying more aircraft, but nowadays it is popular to establish interline agreements, knows as code-sharing, with other airlines to increase the number of destinations. (Wensveen, 2007) Depending on the amount of passengers on specific route, an airline also has to decide the amount of frequencies to the destinations and their timings. (Doganis, 2002) Business travelers may prefer high number of frequencies and destinations, morning flights and high punctuality rate, but the decision always depends on how economical or strategically important is it to add another frequency to the destination.

According to Doganis (2002), price is the most important product feature, which airlines must decide and according to Wensveen (2007), it is the easiest way affect demand and match supply with demand. Differential pricing, which has also created a need for revenue management, can be used, as written by Wensveen (2007), to offer products with different prices to segments based on customers' willingness-to-pay to maximize revenues. As the price is one of the most important factors in deciding which airline to choose, the airlines must put lots of efforts on pricing. Doganis (2002) writes that airlines must ensure that their prices are competitive in comparison to their competitors. Also, each segment and class is offered different prices and the airline must decide departure time limits, advance purchasing limits when working with differential pricing. Without the limits, the airline may be faced with revenue dilution if high paying customer, who would be willing to pay the price of the higher class, have access to buy purchase discounted tickets. (IATA, 2008)

2.4 Air passengers' air carrier choice process

Proussaloglou & Kopplemann (1995, pp. 372) writes that demand for air travel is a reflection of "travelers' decisions about their destination, their carrier preferences, their departure and arrival times, and their willingness to pay for different fare classes with associated service levels and restrictions." Therefore, Proussaloglou & Kopplemann (1995) argue, it is critical to understand forces which affect the demand in order to effectively make decisions regarding operations, pricing, yield management, and marketing or promotional strategies. Measuring the factors at the market level can help in effective decisions regarding "route structure, expansion to new markets, fleet size and composition, and the level of carrier service by origin market and city pair". (Proussaloglou & Kopplemann, 1995, pp. 372)

As described by Hess (2005), the field of air transportation from topical and methodological angle is one of the most interesting domains for analysing travel behaviour. Accurate information and forecasts are needed for transportation planning due to the unstable financial situation of the industry, the long-term nature of the policy changes. Policy changes are especially long-term on governmental level. In addition, the industry is still evolving as consequence of market entrance of low-cost airlines, introduction of new alterations such as alliances and diminishing role of traditional travel agencies, and these forces are then changing the behaviour of the passengers and the market. When making choices about the airlines for their itineraries, travelers are expected to make trade-offs. Predicting market level demand relies on forecasting growth in population, employment and economic activity, but in short term airlines rely on measuring travelers' trade-offs among carrier service levels, ticket prices and restrictions, schedule convenience and quality of carrier service. (Proussaloglou & Koppelmann, 1995) If an airline can measure the trade-offs made by the traveler among service attributes, the airline can use the information in designing strategies for influencing travelers' choice and the airline's market share. The information can also be used to make more prediction about the airline demand and assess how service changes, pricing, marketing, or promotional strategies impact airline's market share.

(Proussaloglou & Kopplemann, 1995) Also, as written by Carrier (2008), it is crucial for the airline to know customers' choice behavior and then use the knowledge in decisions related to network structure, schedule planning, pricing and revenue management. Carrier (2008) adds that analysis of the choice of fare product is needed to support pricing strategies.

Hess (2005) writes that, in broader context, general travel choice can be considered to include three upper-level decisions. These interrelated decisions, including destination, timing and main mode of travel are influenced by external factors and may include sub-choices. Trip timing can be influenced by limitations imposed by work commitments and choice of destination can influence the mode choice decision as some locations may not be reached by all or only one mode of transport. In terms on sub-choices, the main mode choice dimensions can contain sub-choices such as itinerary and fare-class if public transportation is used, and destination dimensions may also include choices made about travelling to more than one destination. In addition, as argued by Pels et al. (2001), when passengers are making their air travel choices, they jointly decide their preferred airport and airlines. The passenger may make the choice based on frequency of service, ticket price and airport tax and accessibility. This would suggest that airline can be chosen over another, not because their service would be that much better, but because the airport of the other airline is preferred more by the passenger. Airline marketing, network planning and scheduling decisions include the choice which destinations to serve and to which airport the airline flies. Weight should be given passengers' preferences and the services offered by the airport to the passengers should be evaluated, but still the airline can not affect the service decisions made by the airport.

In addition to the three upper level dimensions of travelling, Hess (2005) writes about air travel choices as being more complicated, being also strongly interrelated and including high number of sub-choices. Hess (2005) describes the choice of outbound return journey to include three main categories; origin-side, destination-side and air-side. Passengers' origin-side decisions include the choice of departure airport and mode of transportation used to get to the chosen airport. The complexity of the decision depends on the area of residence since passengers' living in or near the cities may have

easy access to several airports whereas passengers living on less populated areas may have only one airport within decent proximity. When considering the journey to the airport, Hess (2005) writes, that decision of the mode of transportation is influenced by the available modes of transportation, their routes, and preferences of the passenger. As at Helsinki-Vantaa Airport, the passengers arriving by their own cars, also have to decide what type of parking service to purchase. Trade-off can be made among the distance from the parking area to the terminal and the cost of parking.

The destination-side of decision, as argued by Hess (2005), the passengers has to decide the destination airport and the ground mode of transportation. The passengers may have less knowledge about the destination-side options including the geographical location of destination airports and the available travel modes out from the destination airport. Relating to the subject of this thesis, Frankfurt am Main can be considered to have two airports, the main airport near the city and secondary airport Hahn. The main airport near the city can be accessed from the city easily, but the Hahn airport is far away from the city and can't be accessed by rail for example. The passengers having limited information about the differences between their options may end up paying higher amount of money to reach the destination although the air tickets themselves may be much more inexpensive to the Hahn airport.

Having made decision of traveling by air to a certain location, the passengers have to decide the air-side dimension described by Hess (2005), which can be divided into three sub-choices. The passenger has to decide which airline or airlines and which routing to choose and there can be several airlines offering the service on the route with direct or indirect flights including flights requiring the change of aircraft and flights with stopovers. In terms of in-direct flights, the passenger can decide the number of connections and the connection airports. Also, the passenger has to decide departure time and date. (Hess, 2005) The departure time and date choice can be considered as being very strongly inter-related with the choice of the airline at least on the routes where each airline operates only on some days of the week.

The air-side dimension described by Hess (2005) and can be mapped as done by Lu & Tsai (2004) who have described the passengers' air travel decision making process shown in Figure 1 below. Lu & Tsai (2004) write that many factors affect the passengers' air travel choice. The framework can be seen so that the service features designed by the airline are on the left hand side. Then, passengers' satisfaction, frequent flyer membership and trip purpose affect the choice which the passenger will make. This framework, as will be described in the next chapter, is quite limited as there are even more factors that affect the airline choice.

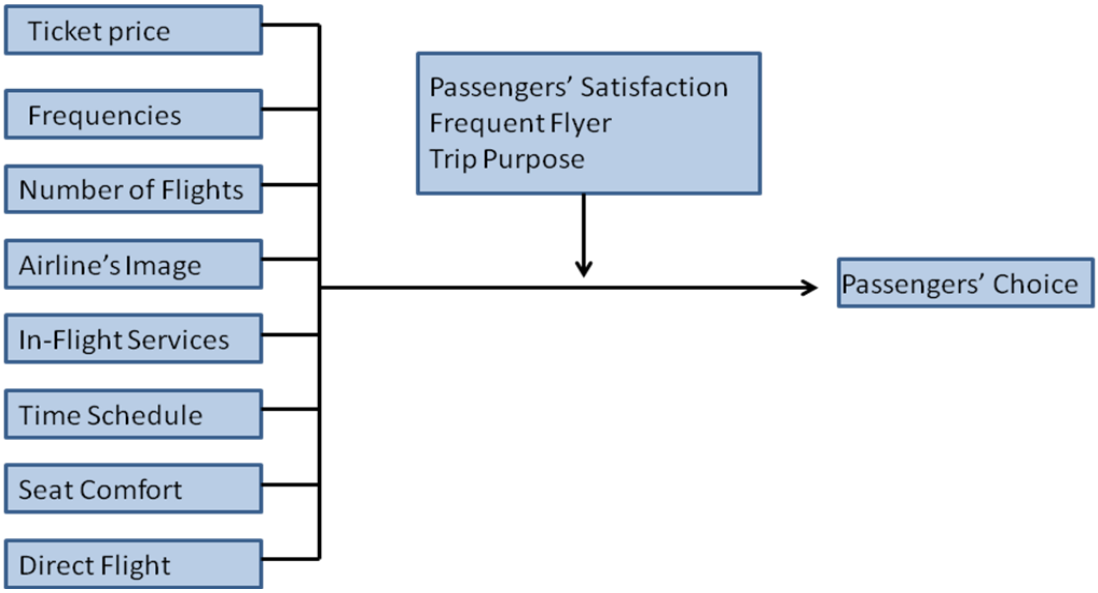

Figure 1. Conceptual framework for air travel choice. (Lu&Tsai 2004, pp. 87)

Similarly to Lu & Tsai (2004), Proussaloglou & Koppelmann (1999) have proposed a framework, as depicted in Figure 2 on the next page, to map customers' decision making process in airline choice process, which can be used to study individuals' choice behavior regarding the choices of carrier, flight and fare class. Due to the differences in group buying process, this model may not be used in studying how groups make choices. It is also worth mentioning that when an individual passenger make ticket purchase in traditional travel office, the decision process is influenced by the clerk and therefore the process can be more straightforward. Airlines pay commission for travel offices and, as a consequence, the buyer may not be given all information about available air travel alternatives.

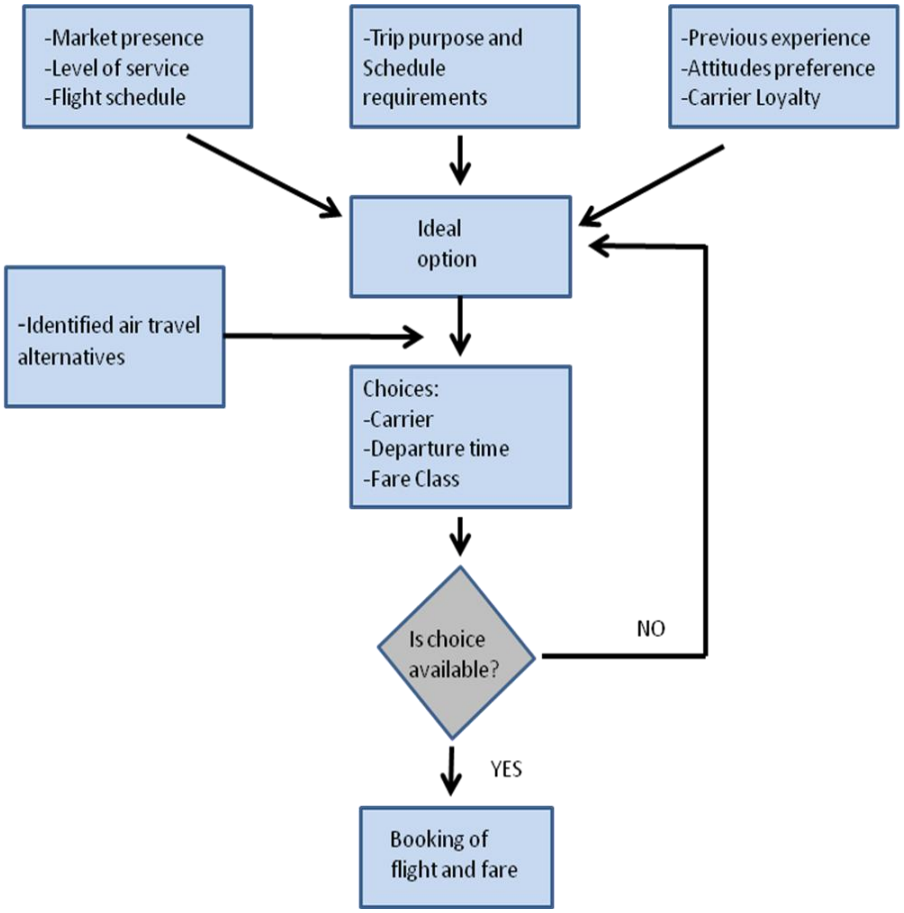

Figure 2. Travel choice framework (Proussaloglou & Koppelmann (1999)

Shown in Figure 2, Proussaloglou & Koppelmann (1999) presented three-dimenstional choice context for passengers' decision about their air carrier. The ideal option for a traveler and the option with the highest utility, as depicted in Figure 2 by Proussaloglou & Koppelmann (1999), is a function air carrier, trip and traveler specific factors. Dimensions of carrier service attributes include overall presence of carrier in origin market, its overall service quality, reputation and its frequent flyer program. Carrier's presence in the market can be considered to include carrier's overall level of service to range of destinations, its local media exposure, it local name recognition and its ties with local travel agencies. Proussaloglou & Koppelmann (1999) continues that quality of service and reputation can reflect on-time performance, safety record and terminal and onboard amenities of a specific airline. In addition, membership in frequent flyer

program can be considered to reflect loyalty, which has an influence on passengers' air carrier choice.

Proussaloglou & Koppelmann (1999) write about the second dimension, the flight schedule attributes, that air carriers should develop a schedule that meets the passengers' preferences about the departure time as well as possible. Activities the passenger will do at destination and their timings will affect the departure and arrival times which the passenger prefers. The measure of schedule delay, as proposed by Proussaloglou & Koppelmann (1999) and Lijesen (2006) can be used to quantify the convenience of certain flight in comparison to the optimal schedule to a passenger and the information can then be used in decision whether to offer direct or connecting flights to the destination. The third dimension, fare class attributes, include the level of fares, advance purchase requirements, travel restrictions, terminal and onboard amenities, penalties for ticket cancellations force passengers to make tradeoffs in their choices. (Proussaloglou & Koppelmann, 1999)

The frameworks described by Proussaloglou & Koppelmann (1999) and Lu & Tsai (2004) for analyzing passengers' decision making both describe the decision making process flow by showing (a) the side of airline service offering including different service features, (b) the side of decision maker and his or her personal characteristics. The decision of airline is interplay between these two concepts and the utility which the decision maker derives from different alternatives determines which airline she or he will select as the passenger will select the alternative with the highest utility (Ben Akiva and Lerman, 1985). Proussaloglou & Koppelmann (1999) are more precise as they provide decision making steps, but their weakness is the lack of decision of not to travel at all. The passenger may decide to stay at home if satisfactory price levels are not available and therefore may not go back to evaluating new ideal option. Lu & Tsai (2004) do not limit this option out. Lu & Tsai (2004) describe the passenger-side to include passenger's satisfaction which is similar to previous experience described by Proussaloglou & Koppelmann (1999) because the satisfaction can be considered as being formed through experience. Also, frequent flyer membership mentioned by Lu & Tsai (2004) is similar to carrier loyalty from Proussaloglou & Koppelmann (1999)

because FFPs are used to induce passenger loyalty. Finally, both Lu & Tsai (2004) and Proussaloglou & Koppelmann (1999) have trip purpose of one variable. However, Lu & Tsai (2004) do not emphasize other passenger-specific preference shown by Proussaloglou & Koppelmann (1999). The preference can affect and have been found to have an effect on the decision.

Proussaloglou & Koppelmann (1999) write that air travelers can access information about air travel from travel agents and other sources after which they identify their options based on their previous travel experience. Other sources of travel information can be friends, travel magazines and Internet. Internet has actually moved more power to the customers and customer can take a bigger role in comparison to the earlier time when ticket distribution was mostly done through travel agencies. Now customers can inexpensively access to information about ticket and hotel prices of their preferred service provider and their competitors'. (IATA, 2008) After identifying their options, customers consider their carrier and fare class preferences and then evaluate their options to select the most attractive carrier, flight, and fare combination. The customer is considered, according to Proussaloglou & Koppelmann (1999, pp. 195) "as a rational decision maker who actively searches for options that satisfy his/her air travel plans, evaluates the identified options, and selects the option with the highest overall utility that satisfies his/her individual scheduling constraints." As was described in the last chapter, the airline product consists of several product features and as a result, when the customers are assumed to choose travel option which maximizes their utility, they are forced to make tradeoffs in their decision making if the most preferred alternative is not available. The passenger is expected to make tradeoffs among carrier's overall service, convenience of carrier's flight schedule in addition to the fare levels and service attributes of each fare class. (Proussaloglou & Koppelmann, 1999) On the other hand Moreno (2006), writes that the choice is a trade-off among the cost of flight, the frequency of flight and airline performance.

This thesis focuses on analyzing determinants of airline choice and the importance of selected service features on selecting a particular airline. However, it can be concluded based on Hess (2005) and other writers that the area of focus and study regarding this

thesis is limited to narrow area of passenger decision making as a whole. The range of choices made by the passengers even for a single trip is large and very inter-related to other areas of travel decision making. Although this thesis focuses on decisions made regarding the airline, it should be kept in mind that the airline choice may be affected by decisions which the passenger has done earlier because it can be that the passenger first decides his/her destination before deciding which airline to use. On the other hand, passengers who are very loyal to one airline or keen to travel with the lowest possible cost, first may look at the schedule and then decide their destination. As written by Hess (2005), the choices of airports, airlines, routings and ground-level transportation are inter-related. For example, a decision made about airline has an effect on the other three decisions and vice versa. As a result, it can be seen that this thesis has very limited focus when considering the whole decision making process done by a traveler.

2.5 Factors affecting the choice of air carrier based on earlier studies

Air travel demand in general and airline choice has been widely studied and it is important for the airline to know which factors affect passengers' choosing process on different markets. As it will be discussed in this chapter, there are lots of factors which affect passengers' choice of airline and relative importance of each feature in comparison to other features varies from study to study. Doganis (2002) writes about key features, displayed in Table 1, that price is the most important feature, but there several features affecting the airline choice. Doganis (2002) also noted that the importance can vary depending on several other factors. For some segments, such as business travellers, the schedule-based features including frequency and number of connections may have higher importance than for leisure travellers. In addition, the importance of comfort-based features, in Table 1 from Doganis (2002), can be considered to increase in value when the flight distance increases. Convenience features can be considered to relate to seat availability and how easy it is for passengers to access reservation and ticketing services. Image features described by Doganis (2002) are result of airline's marketing activities.

1. Price	Fare levels and conditions
2. Schedule-based features	Points served and routings Frequency Timings Connections Punctuality
3. Comfort-based features	Type of aircraft Interior configuration Individual space On-board service Ground/Terminal service Airlines lounges In-Flight Entertainment
4. Convenience features	Distribution/reservation systems Capacity management policy Seat availability
5. Image features	Reputation for safety Branding FFPs/Loyalty schemes Promotion and advertising Market positioning

Table 1. Key features affecting airline choice (Doganis, 2002)

Albers et al. (2005) have also written about the importance of different service features for passengers. Albers et al. (2005) wrote that in addition to the important product features in selecting an airline and beyond the choice of the most preferable flight connection, additional factors influence passengers' choice of airlines. The choice can be considered as being based on criteria containing service, price, punctuality, security, number of flight destinations, frequency of flights, easiness of transfer connections, alliance policy and reservation service.

Alamdari (1999) studied the importance of several product features for airline passengers displayed in Figure 3. When comparing business and leisure segments, it can be seen that leisure segment's decision is influenced by in-flight entertainment (IFE), previous experience, price and seating comfort more than business segment. On the

other hand, business segment values all other features more important than leisure segment.

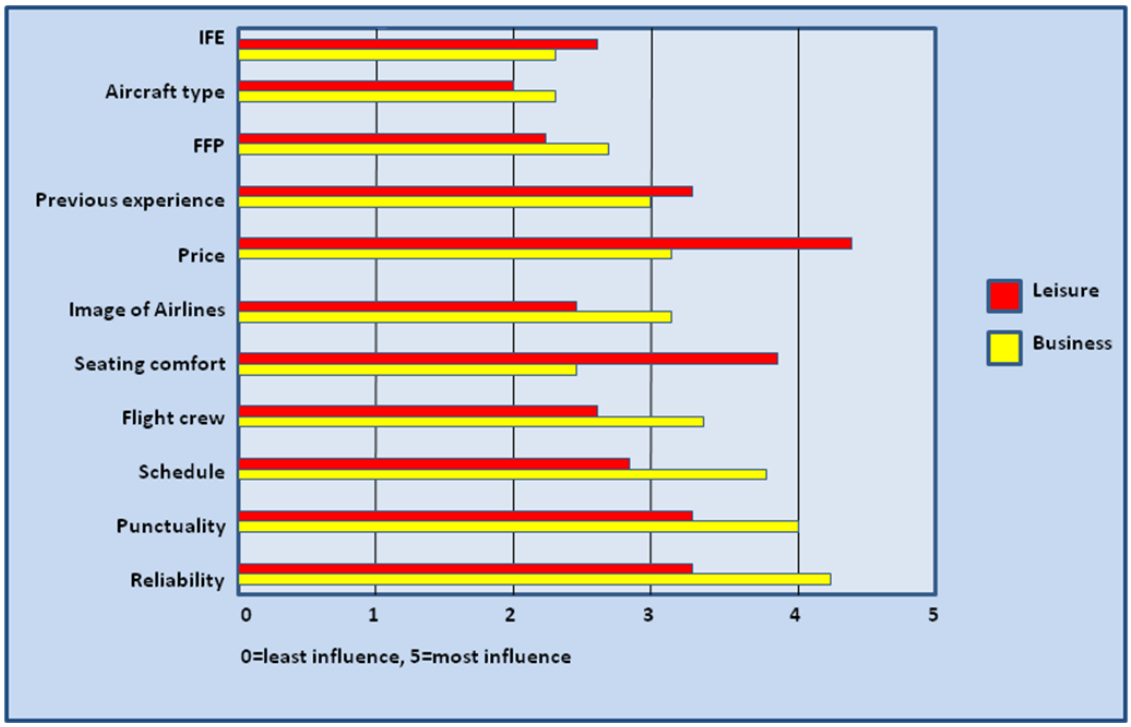

Figure 3. Influence of service features. (Alamdari, 1999)

In addition to Alamdari (1999), Lu&Tsai (2004) have made a study about important service feature for airline choice. As shown in Table 2, the results of Lu&Tsai (2004) show that there are differences among the segments in terms of importance of different service features. Opposite to Alamdari (1999), it was found out that business travelers value seating comfort higher than non-business travelers. Business segment values safety, schedule and seat comfort whereas the order of importance for leisure segment is schedule, safety and price.

Importance of factors affect the passengers' choice decision			
Affecting factors	**Importance ranking**		
	Total	**Business Passengers**	**Non-Business Passengers**
Schedule of time table	1	2	1
Safety	2	1	2
Ticket price	3	4	3
Seat comfort	4	3	6
Airlines' image	5	5	5
Punctuality	6	9	4
In-flight service	7	10	7
Frequent flyer member	8	8	8
Reservation & check-in service	9	7	9
Aircraft type	10	6	10

Table 2. Important product features (Lu & Tsai, 2004)

Following three chapters focus on other studies about the importance of airline service features. The topic has been researched by many others and the results differ even in terms of the most important feature. There are several features affecting the choice as shown by Doganis (2002), Lu & Tsai (2004) and Alamdari (1999) and following chapters are categorized keeping in mind the choice-based conjoint experiment and further analysis of the data. The explanation of the earlier results will start with the ticket price. Price of the ticket is one of the variables in the choice experiment, because otherwise it would not be possible to analyze willingness-to-pay measures and therefore the price can be considered as one entity in following categories. Second chapter includes all other airline service features which have analyzed in the earlier studies. Finally, the research questions focus on trying to find out differences among respondents in terms of the importance of service features and third chapter will focus on those aspects.

2.5.1 Ticket price

Proussalaloglou & Koppelman (1995) found that fares were more important for non-business travellers than business travellers. For non-business travellers, the low fares were most important factors explaining the air carrier choice. In addition, Moreno (2006) used conditional logit to analyze airline choice in Sao Paolo Metropolitan region. It was found out, quite understandably, that lowest fare explains the airline choice better than the highest fare. The importance of the ticket price has been noted also by Moreno (2006), Loo (2008), Lu & Tsai (2004), Pels et al. (2001), Yoon et al. (2006) and Marcucci & Gatta (2009).

In terms of passenger preferences, Hensher et al. (2001) discovered that fare has significant effect on choices. Hess et al. (2006) studied US domestic market by MNL model and found out that air fare is the most important explaining factor in airline choice. Also, Bieger et al. (2007) has found out that fare is most important feature for intercontinental flights in business and economy classes. Hess et al (2007) studied airport choice and found out that ground-level distance and FFPs are important in airport choice, but air fare is the most important.

2.5.2. Level of service

Market presence of the carrier is one of the important decision variables. (Hess, 2007) Proussalaloglou & Koppelman (1995) found that market presence, described as level of service in the markets, name recognition, level of advertising, have positive impact on carrier choice, but so does also schedule convenience. Proussaloglou & Koppleman (1999) studied the importance of several factors and their results show that carrier market presence, estimated as number of possible destinations from departure airport, has strong effect on choice. Features related to service level have been found in some studies as being more important than price. Proussalaloglou & Koppelman (1995) found that derived utility was found to increase with better level of service described as share of flights in the market, and offered convenience is more important for travellers than

low fares and on-time performance in general. Gilbert & Wong (2003) argue that schedule is more important than price and Lu & Tsai (2004) found out that two most important decision variables are schedule of timetable and safety. On the other hand, Marcucci & Gatta (2009) write that frequency is the most important variable.

According to Chin (2002), an airline attracts more passengers in comparison to its competitors if it can offer shorter elapsed time defined as including airport access time, flight time, waiting time and boarding time. The influence of travel time has been also noted by Moreno (2006) and importance of access time to airport by Hess & Polak (2005), Fruichichi & Koppelmann (1994) and Loo (2008). Moreno (2006) found that direct flight frequencies explain the choice better than total flight frequency. Direct flight option has been mentioned by Bieger et al. 2007, who found out that the number of stops comes as second most important decision variable after the fare. Also departure and arrival times are more important than number of daily flights.

Frequent-flyer programs are also part of airline's overall service. Proussalaloglou & Koppelman (1995) created a conceptual framework to analyze air carrier demand and applied it to study air carrier choice. They used individual traveller approach to find and measure the relative importance of factors which have an influence on air travel demand in Dallas and Chicago markets. Proussalaloglou & Koppelman (1995) found out that membership in frequent-flier program has very strong impact on carrier choice and its market share. The importance is even greater for frequent travellers in comparison to less frequent travellers. Also, Hess et al. (2006) found out that FFP membership matters more for business travelers than for leisure and visiting friends and relatives markets. Business travelers are willing to pay more in order to fly with airline where they have elite or standard FFP membership. However, Chin (2002) found that FFP has an effect on choice, but the effect is not as big as scheduling convenience.

FFPs have been established to increase customer loyalty and, according to Yoon et al. (2006), the purchase of tickets is affected by customer loyalty. Carlsson & Löfgren (2006) write that passenger face switching costs when they want to change to competitor's product and FFPs help to keep the passenger although the competitor's

service would be equal in attractiveness Proussaloglou & Koppleman (1999) studied passengers' WTPs and found out, that FFPs are important factors and leisure travelers who only participate in FFP program are willing to pay 7$, lower-frequency travelers 18$ and high-frequency travelers 26$ more to fly with carrier in whose FFP they belong to. The importance of FFPs has also been noted by Moreno (2006), Gilbert & Wong (2003), Lu & Tsai (2004) and Hess (2007).

The importance of in-flight service has been mentioned by Chin (2002), Gilbert & Wong (2003), Park et al., (2005) and Lu&Tsai (2004). Also, Doganis (2002) points out that importance of seating comfort and in-flight services increases with the increase in flight distance. However, Alamdari (1999) studied the importance of in-flight entertainment which is only part of in-flight services, and found out that it is not a primary factor although its importance increases on long haul flights. Collins et al. (2007) studied travellers' choice from the UK and Switzerland to Australia and New Zealand. Travellers are willing to pay 122,63AUD to get personal TV screens instead of having shared screens and 218,04AUD to get on demand TV. If seat pitch would be increased from 31 inches to 34 inches, the travellers would be willing to pay 211,92AUD for that change. Also air fare, flight time in addition to video on demand possibility and seat pitch were found to have large impact on airline choice. Contrary to Collins et al. (2007), Alamdari (1999) writes that passengers would not be prepared for in-flight entertainment to an extent that it would cover the costs of the systems even on long haul flights.

Aircraft type, which partly dictates the level of seating, and in-flight service features, such as seat comfort defined as legroom, armrest, personal seating room, affect passengers' choice behavior. (Lu&Tsai, 2004) Balcombe et al. (2009) used stated choice approach to study travellers' willingness to pay for in-flight service and comfort and found out that travellers are willing to pay rather large premium for better service. The study was focused on the charter airlines and flights of 4-5 hours. Altogether 586 responses were gathered and the results show that are willing to pay premium for increased leg room and increased seat width. Also, if food is removed from the service concept, the travellers expect the price to go down. Older respondents were found to

have higher WTP for seating comfort than younger. On the other hand, Lee & Luengo-Prado (2004) studied whether travellers are willing to pay more for increased seat pitch. The study included two different programs, American which increased seat pitch in the whole airplane and United which increased the seat pitch only on the first 6-11 rows. The study could not find evidence that travellers would be willing to pay more for American's program, but United's program was successful. United's success may be explained by the fact that business travellers, usually seated in the first rows, are willing to pay more for increased seat pitch whereas economy class passengers will mostly select the most inexpensive option.

Espino et al.(2008) studied Gran Canaria – Madrid route which is operated by Iberia, Spanair and Air Europe. Altogether 310 responses were gathered and results show that WTP for wider leg-room was 34 euros in comparison to base fare. If cold sandwich was changed to hot food, the customers are willing to pay premium of five euros for the change. In comparison, if the same cold sandwich is changed to a'la carte, then the customers are willing to pay premium of 11 euros. Also, Pereira et al. (2007) used stated preference choice game and conditional logit model to find out factors which determine airline choice in Madeira-Oporto route. They found out that WTP for food service vary between 11,95 and 15,68 euros from "no food" service to complementary food services. Hess (2008) did a research where the focus was on the domestic UK trips and WTP was found to vary from 45,60 dollars to 58,57 dollars from one stop flight to direct flight. Also, WTP for flight time reduction was found to vary from 16,83 dollars to 19,81 dollars per every hour. Collins et al. (2007) made a stated choice study for trips from the UK and Switzerland to Australia and New Zealand and tested 12 different models. WTP for a reduction of number of stops varied between 19,36 AUD and 96,83 AUD per each stop. WTP for reduction in flight time varied from 29,63 AUD to 119,05 AUD per hour.

2.5.3 Traveller characteristics and the joint choice of airline and airport

According to Moreno (2006), Turner (2003) studied passenger profiles and their selection criteria in airline choice on Gatwick-Schiphol routes. They focused on passengers of EasyJet (EZ) and British Airways (BA) and found that EasyJet passengers are mostly leisure travellers, younger than BA travellers, do not participate so much in FFPs, come from different occupations and fly less frequently in comparison to BA customers. BA customers, on the other hand, fly mostly on business purposes, are older than EZ customers and more often participate in FFPs. 97% of the EZ passengers considered fare as important, 75% indicated flight timings and 33% considered frequency important. 85% of the BA passengers considered timings as important, 26% mentioned FFP, 25% reliability and 17% frequency. Also, Hess & Polak (2005) studied airport choice in San Francisco bay area and found out that there is high heterogeneity among travelers' tastes. When selecting an airport, there is high sensitivity to access time, fare and frequency of flights in general but in different segments value different types of services.

Hess et al. (2006) found out that travelers are not so sensitive to on-time performance with longer flights. In terms of fare sensitivity, higher personal income seems to result in lower price sensitivity, but for holiday travelers the price sensitivity increases with flight distance. Holiday and VFR segments also have high willingness to increase access time to airport in order the get lower fares. This point, in my opinion, is one issue why low-cost carriers can still attract passengers although they are quite often flying to quite remote airports. Moreno (2006) write that airline age is more important for older travellers than for juniors. This result may, at least in my opinion, have its roots in the differences between the age groups when it comes to the general attitudes towards air travel. Earlier, the airline themselves had very strong reputation and air travel was considered as luxury. Nowadays, however, the juniors have grown up into a world where air travel is considered more as a commodity and, as a result, the older airlines do not posses so glamorous image in juniors' minds any more.

Purpose of the trip can also affect the relative importance of service features. (Gilbert & Wong 2003) Bieger et al. (2007) write about their findings that airline brand and number of daily connections are a little bit more important for business than leisure travelers. Palmer & Boissy (2007), write that generally price, punctuality and schedule are most important variables for leisure segment. After these variables come seating comfort, reliability, previous experience, schedule, flight crew, in-flight entertainment, airline's image, FFPs and aircraft type. Proussaloglou & Koppleman (1999) writes that leisure travelers have been found to be more price elastic in comparison to business travelers. Often, as written by Doganis (2002), price is usually the most important decision variable to visiting friends and relatives and leisure segments. Generally, business travellers value time and frequency of service, whereas price is more important for leisure travellers. (Pels et al., 2001) Business passengers consider access time to airport with high significance. (Hess & Polak 2005) One destination can be served with two destination airports as Finnair offers services from Helsinki to both Bromma and Arlanda airports in Stockholm. Bromma is situated closer to city centre than Arlanda and flights to Bromma have been marketed as a better option for business travellers. In addition to access time to airport, there are also other service features which vary based on the trip purpose.

Based on Pels et al. (2001), it has been found that access time to airport, airfare and maximum number of seats available are significant variables for leisure segment. Access time, frequency of service, number of seats available, fare are important variables for business travelers in San Francisco area. Pels et al. (2001) argue that airport and route choices are affected by travel time to airport, frequency and airfare. Usually, leisure segment is more sensitive to cost and business is more sensitive to schedule convenience. In addition, Hess et al. (2006) found out that business travelers are willing to pay a premium for direct flight opportunity, reduced delay and reduced access time to airport than holiday and VFR segments. Also, Chen & Wu (2009) studied routes between China and Taiwan and found out that non-business travelers are willing to make more trade-offs with service attributes and fares in comparison to business travelers.

Hensher et al. (2001) write that FFP membership has an effect, but also increased household income increased the probability that the trip would taken. In business segment, gender, income level and duration of stay affect the importance product features (Warburg et al., 2006), where women are less price sensitive than men and low income households are more price sensitive. Warburg et al. (2006) also write about business passengers that passengers who stay shorter time at the destination are more sensitive to arriving at destination airport close to their desired arrival time. Although Walburg et al. (2006) studied business segment, there is reason to expect the duration and income level would affect the importance of product features.

Finally, there are also other factors which affect the importance of the service features, but have been more seldom found. These are image (Lu & Tsai, 2004, Park et al., 2005), ethnic group and nationality (Gilbert & Wong, 2003), airline nationality (Moreno, 2006), passengers' satisfaction with airline (Lu & Tsai 2004), friendliness and helpfulness of employees and correct handling of baggage (Gilbert & Wong, 2003). So, there are several factors which have been found out having effect on the choice behavior of a single passenger. Many of the studies have found out contradicting results, which can be due to the different markets researched. The price seems to be one of the most important variables and very often even the most important variable. The reason for the differences in results can be caused by (a) the market, (b) the structure of the research. Some markets are more competitive and customers have easier access to information in more developed markets. In markets where internet has good penetration, the customers have easy access to information and can compare price levels, which may cause the importance of price to be higher. In comparison, in markets with more tickets being bought from the traditional offices there are more service aspects involved in the buying process and therefore the importance of price may be decrease. The competitive environment may also affect the importance levels. Some markets are still regulated including price levels and therefore passengers and respondents may not be used to and have not learnt to consider the price or other service features important. Also, the length of the trip has been found to have an effect on the importance of service features. Price has been found to decrease importance with in-flight service becoming more important on long-haul flights. In addition, the airline choice is impacted also by other services. A

route from Helsinki to Oulu has more competition with more airlines operating on the route in addition VR which offers fast travel time between the cities. On the route to Oulu the importance of price may be different from the route to Rovaniemi, which is served by fewer airlines and without VR offering competitive prices with the fastest trains. Structure of the research may also be the cause of contradicting results. Choice-based conjoint measurement can accommodate only few service features and therefore all the features are not being examined against each other.

2.6 Application of theory of choice in the airline industry

This thesis is related to airline marketing by providing information and studying the importance of service features to the travellers travelling by air between Helsinki-Vantaa Airport and Germany. The results will be useful in marketing decision related to product design, but as scheduling is very essential part of the airline product, the results also have implications for airline scheduling activities. The results will be most applicable to airline business, but can be used to some extent in travel industry in general including travel agencies and airport planning. Although travel agencies often combine hotel and airline services into one package, knowing the relative importance of service features may help to make proper combinations of hotel and air travel services. Also, airport planning, in terms of facilities and services, may benefit from the results as information about importance of different airport services are studied to a small extent.

The two main theories contributing to this thesis are airline marketing and product planning concepts in addition utility maximization theory. The utility maximization theory is currently widely used in studying consumer choice behaviour. Roughly, it can be said that the thesis area of study consists of airline and its actions, and consumers and their actions in relation to the airline marketing, which are then analysed using the utility maximization theory and related analysis methods including discrete choice modelling methodologies depicted in Figure 4 below.

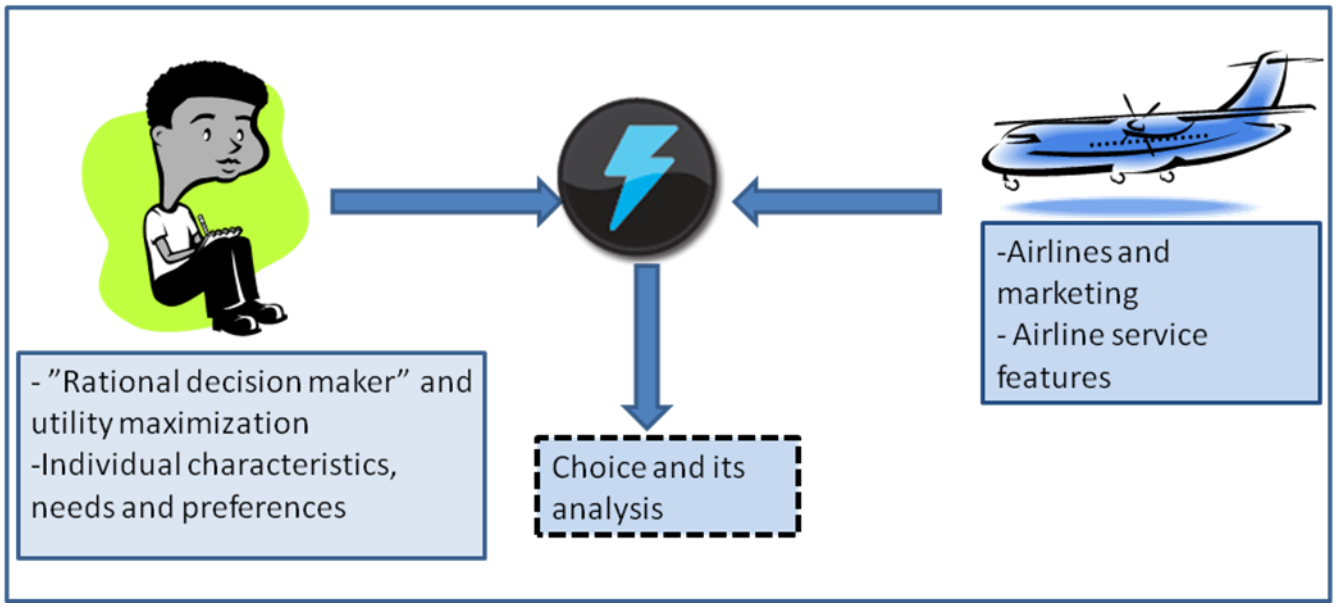

Figure 4. Analysis framework

According to Garrow (2010) and Kopppelman & Bhat (2006), the decision concept can be divided into four parts. The first is the decision maker who can be individual, group or institution. Regarding area of this thesis, in air travel the decision can be made by an individual traveller, by group, or by a corporation when it comes to business travelling. In normal situation decision makers face different types of choice situations and they may have different preferences for service attributes and therefore decide to select different alternatives than other. (Garrow, 2010 and Kopppelman & Bhat, 2006) Also, two individual may have different income levels and may therefore value different parts of the service differently. The second concept is the alternatives faced by the decision maker. The alternatives form a choice set and individual makes choice among a set of available alternatives which are limited by the environment resulting in so called universal choice set. (Garrow, 2010 and Kopppelman & Bhat, 2006) Third concept is the attributes of alternatives. Alternatives in a choice set consist of attributes which determine how attractive an alternative is for a decision maker.

Fourth concept, according to Garrow (2010) is the decision rule which includes four different categories; dominance, satisfaction, lexicographic and utility. This thesis follows Kopppelman & Bhat (2006) and focuses on utility choice as it enables, in

comparison to the other three rules, to study trade-offs done by the decision makers in the choice process, and, as written by Garrow (2010), to measure the value of each attribute to the decision maker.

Based on the literature review, the passengers on the routes from Helsinki to Germany are expected to value price, direct flight option, punctuality of the flights, reliability and safety of the airline and schedule of the airline quite high. The best indication of these are derived from the works of Alamdari (1999) and Lu & Tsai (2004) who have analyzed the importance levels using high number of service features. Although many have written about the importance of FFPs, Alamdari (1999) and Lu & Tsai (2004) write that FFPs are still relatively less important. In terms of the WTPs, passenger may be expected to pay some 5-15 euros for complementary food service. It is hard to think of WTP for a direct flight since only Hess (2008) and Collins et al. (2007) can provide some ranges, but the markets of those studies have been different from Helsinki-Germany routes. Collins et al. (2007) studied long-haul route and the WTPs may not be applicable directly to Helsinki-Germany routes. Based on Collins et al. (2007) and Hess (2008) the range for WTPs, when applied to Helsinki-Germany routes with current flight times, can be anything from 60 euros to 260 euros. However, Hess (2008) analyzed the UK domestic market which is more similar to Helsinki-Germany market and based on his results, the WTP for direct would be 60-75 euros. However, the UK domestic markets may be more competitive and the passengers may have more other options than only by air which could decrease the WTP measure. Finland and Germany divided by the sea, so driving a car is not competing against air travel as it is in UK domestic market. Finally, some passenger characteristics such as age and income can be expected to influence the importance level of service attributes.

3. METHOD OF RESEARCH

The methodological part of the study included two main parts. First, information was gathered about the market in question to help planning realistic choice-based conjoint experiment for the respondents. Second, respondents were recruited at Helsinki-Vantaa Airport to give answers at airtravel2010.fi and total of 196 responses were gathered. The research was aimed to find out how important are airline service attributes for travellers and hot the importance levels differ. To answer this, the responses were analyzed using several different analyses including t-test, ANOVA, cluster analyses. Overall importance ratings were calculated from Likert scale part of the questionnaire. In order to calculate WTPs, hierarchical Bayes estimation was used to estimate utility levels for each individual. Also, cluster analysis methodology was then applied to utilities to find out passenger groups with similar type of WTPs.

3.1 Air passenger market between Helsinki-Vantaa airport and Germany

The passenger market between Helsinki-Vantaa Airport and Germany is the busiest market in Finland in terms of amount of passengers. However, due to lack of point-to-point information, it is not possible to relate the importance of the routes more precisely. An airplane flying from Helsinki to some destination in Germany may carry passengers from and to several different markets due to the hub-and-spoke network structure of the airlines. Helsinki-Vantaa Airport, for example, is a hub for Finnair and Blue1, and as a result Finnair's airplane from Helsinki to Germany may carry passenger coming from, for example, Asia or other parts of Finland. Also, when Lufthansa's airplane is flying from Frankfurt am Main to Helsinki, it may carry only handful of point-to-point passengers between the cities. Frankfurt am Main is Lufthansa's hub and it combines passenger traffic from all other Lufthansa's destinations, and, as a result, a passenger travelling on Lufthansa airplane from Frankfurt am Main to Helsinki may have started their journey from Asia, North or South America, Africa or any other place.

As shown in Table 3, the route between Finland and Stockholm had the most passengers in 2009 and was followed by other major European hubs namely London, Copenhagen, Frankfurt, Paris and Amsterdam. However, Germany with its five destinations is the most important country in terms of traffic amount.

DESTINATION	PASSENGERS	DESTINATION	PASSENGERS
Stockholm, Sweden	938 395	Milan, Italy	143 359
London, Great Britain	790 587	Teneriffa, Spain	140 164
Copenhagen, Denmark	604 665	Madrid, Spain	138 884
Frankfurt, Germany	536 188	Beijing, China	138 312
Paris, France	459 197	Prague, Czech Republic	131 634
Amsterdam, Netherlands	416 599	Kansai Osaka, Japan	131 610
Munich, Germany	316 678	Chania, Greece	127 131
Riga, Latvia	284 171	St.Petersburg, Russia	125 220
Bangkok, Thailand	242 040	Warsaw, Poland	124 573
Oslo, Norway	241 103	Tokyo, Japan	121 303
Las Palmas, Spain	227 473	Antalya, Turkey	116 564
Dusseldorf, Germany	207 897	Hamburg, Germany	116 200
Brussels, Belgium	180 890	Manchester, Great Britain	113 876
Budapest, Hungary	180 084	New Delhi, India	112 063
Vienna, Austria	180 014	Moscow, Russia	106 984
Berlin, Germany	177 685	Istanbul, Turkey	103 506
New York, U.S.A.	177 155	Rhodes, Greece	103 016
Rome, Italy	162 735	Phuket, Thailand	95 151
Zurich, Switzerland	161 593	Bremen, Germany	86 420
Malaga, Spain	156 048	Vilnius, Lithuania	76 406
Hong Kong	152 831	Incheon, Korea	71 874
Göteborg, Sweden	152 823	Geneva, Switzerland	71 669
Tallinn, Estonia	152 503	Nagoya, Japan	68 555
Shanghai, China	148 736	Bergamo, Italy	66 198
Barcelona, Spain	148 653	Lisbon, Portugal	58 361

Table 3 . Number of passengers, whole Finland 2009. (Finavia, 2010, pp.14)

When considering only Helsinki-Vantaa Airport traffic, Stockholm is again the most important airport in terms of traffic volumes, see Table 4 on the next page. Top 18 cities include four German destinations, but the fifth German destination, Hamburg, remains among the least important destinations in place 39.

DESTINATION	PASSENGERS	DESTINATION	PASSENGERS
Stockholm, Sweden	737 902	Hong Kong	152 831
Oulu, Finland	590 577	Göteborg, Sweden	152 782
London, Great Britain	652 210	Tallinn, Estonia	148 745
Copenhagen, Denmark	548 011	Shanghai, China	148 736
Frankfurt, Germany	439 806	Barcelona, Spain	146 939
Paris, France	437 814	Milan, Italy	141 316
Amsterdam, Netherlands	408 474	Beijing, China	138 312
Munich, Germany	316 226	Kansai Osaka, Japan	131 610
Rovaniemi, Finland	245 739	Prague, Czech Republic	131 415
Oslo, Norway	240 582	Madrid, Spain	130 387
Bangkok, Thailand	240 290	St.Petersburg, Russia	124 990
Kuopio, Finland	220 104	Warsaw, Poland	123 193
Dusseldorf, Germany	207 852	Tokyo, Japan	121 303
Vaasa, Finland	205 567	Hamburg, Germany	115 849
Brussels, Belgium	180 307	Joensuu, Finland	113 594
Budapest, Hungary	179 779	New Delhi, India	112 063
Vienna, Austria	178 369	Ivalo, Finland	108 463
Berlin, Germany	177 373	Chania, Greece	106 639
New York, U.S.A.	177 155	Moscow, Russia	106 408
Riga, Latvia	173 184	Istanbul, Turkey	103 123
Kittilä, Finland	170 466	Antalya, Turkey	97 163
Las Palmas, Spain	167 880	Kemi-Tornio, Finland	94 300
Rome, Italy	162 735	Teneriffa, Spain	92 614
Zurich, Switzerland	157 499	Jyväskylä, Finland	92 123
Malaga, Spain	155 615	Phuket, Thailand	85 865

Table 4. Number of passenger, Helsinki-Vantaa 2009. (Finavia, 2009, pp.18)

At the time of making the market study in Arpil 2010, there were 42 daily direct flights offered to and from Helsinki-Vantaa Airport and Germany meaning 21 flight from Helsinki-Vantaa to Germany and 21 flights from Germany to Helsinki-Vantaa. During weekends less direct flights were offered. The operating airlines were Air Berlin, Blue1, Finnair and Lufthansa. Direct flights to Berlin were offered by Air Berlin, Finnair and partnership between Blue1 and Lufthansa. Düsseldorf was operated by Air Berlin and Finnair, Frankfurt am Main by Finnair and Lufthansa, and Hamburg by Finnair. However, when considering passengers' choice process, there are also other airlines offer services between Helsinki-Vantaa Airport and Germany. Airlines such as SAS, Air Baltic, Air France, KLM and others also offer services on these routes either on code-share basis or then via their own hubs. For example, by first flying from Helsinki

to Stockholm and then taking another flight from Stockholm to Germany does not increase the flight time dramatically and thus the airlines not offering direct service between the cities can also be considered as important competitors. The respondents were asked the name of the airlines to see which airlines were used by the respondents, see questionnaire in Appendix 1. In addition, the respondents were asked whether they had chosen direct flight or flight with stops to get more understanding about their buying and travel behavior.

Flight times to five German destinations, when using direct flight are shown in Table 5 below. The travel times when change of aircraft is needed in some other hub increase the travel time depending on airline's schedule and transfer times at the airport. For example, the shortest flight time with one stop is four hours between Helsinki and Frankfurt am Main, and 3:20 hours between Berlin and Helsinki so the flight time increase with one intermediate stop is 1:20 in these cases.

Flight times	
Düsseldorf	2:25 hours
Frankfurt am Main	2:40 hours
Hamburg	1:55 hours
Berlin	2:00 hours
Munich	2:35 hours

Table 5, flight time to German airports. (Finavia, 2009, pp.22-23)

In terms of market positioning, there are traditional full service providers or national carriers, such as Lufthansa and Finnair, offering services on the routes. Also, there are low-cost carriers, such as Air Baltic and Air Berlin, who have positioned themselves to target the segments with higher price sensitivity or lower service expectations. So, it can be said that the market between Finland and Germany includes many competitors and passengers have many options when choosing their service provider.

3.2 Air fares on routes between Finland and Germany

A short sub-study was made to find out price level on routes between Finland and Germany and the results will be used in determining price attribute levels in the choice-based conjoint analysis. The collection of price information took place on 6th of March 2010 and lasted six hours in total. Internet travel office page, www.ebookers.fi, was used in collecting the data instead of airlines' own web pages because it enabled wider scope of possible fares. Ebookers enabled at the same to collect information about the prices of direct flights and non-direct flights. Altogether, 1200 different prices were collected about fares for return trips from Helsinki to Germany and back. Time frame from April to September was decided because by using that time frame, it was possible to collect information regarding fares very close to the departure date, but also fares which some early bookers will pay. Airlines use differential pricing when air fare increases as the departure date comes closer. For every month, 20 departure dates were drawn in addition to travel durations which lasted from 1 to 21 days. For each date and duration combination, the most inexpensive direct and non-direct price was searched making 40 different prices per month per destination. The draws of departure time and travel durations were done by Microsoft Excel RANDBETWEEN-function. The prices of the most inexpensive direct and non-direct fares are quite comparable as the same departure date and travel duration were used for both trips. In addition to 1200 different prices from Helsinki to Germany, 290 price points were gathered for the same departure dates and trip durations for flights from Germany to Finland. This was in order to study whether prices differ depending on the direction of travel.

It was found out that air fares, reported in Tables 6 and 7 on the next page, on the selected routes vary to a great extent. Average fare for a trip Helsinki-Germany-Helsinki is 215,10 euros and for Germany-Helsinki-Germany 210,57 euros. The route between Helsinki and Hamburg has only one airline, Finnair, offering direct service and there the average fare is the highest 264,60 euros. The lowest fares are on Berlin route which has three competitors, Finnair, Blue1 and Lufthansa. For the use of state preference choice analysis, it can be said that same price attribute may be used for both

directions since the differences based on the trip direction are modest in comparison to the planned price differences among the price attribute levels.

	Berlin	Düsseldorf	Frankfurt am Main	Hamburg	München
Average all	172,21 €	209,94 €	207,18 €	264,60 €	221,57 €
St.dev. All	47,71	55,63	68,09	79,61	65,37
N	240	240	240	240	240
Avg. Direct	181,51 €	220,40 €	198,06 €	323,65 €	223,16 €
St.dev. Direct	60,00	69,32	88,83	68,81	79,71
N	120	120	120	120	120
Avg. Stop	162,92 €	199,48 €	216,30 €	205,55 €	219,98 €
St.dev. Stop	28,22	34,49	35,41	31,03	47,15
N	120	120	120	120	120

Table 6. Air fares for trips Helsinki-Germany-Helsinki

	Berlin	Düsseldorf	Frankfurt am Main	Hamburg	München
Average all	191,46 €	200,39 €	205,78 €	242,04 €	213,20 €
St.dev. All	49,59	45,94	64,27	57,30	50,19
N	58	58	58	58	58
Avg. Direct	191,54 €	208,01 €	197,05 €	279,12 €	215,94 €
St.dev. Direct	60,27	43,43	79,68	46,71	54,33
N	29	29	29	29	29
Avg. Stop	191,37 €	192,78 €	214,51 €	204,96 €	210,46 €
St.dev. Stop	37,06	47,86	43,60	40,68	46,48
N	29	29	29	29	29

Table 7. Air fares for trips Germany-Helsinki-Germany

Due to revenue management practices, the prices shown above may not actually be the prices which the respondents have paid. The prices above include also last-minute prices for departures close to the data gathering date and the respondents who have purchased their tickets well in advance have paid less than the averages for their tickets. In order to estimate how realistic the prices in the choice sets were for the respondents, the ticket price was asked and 140 of the respondents provided that information.

3.3 Population and sampling

The target population consists of travelers who travel from Helsinki-Vantaa Airport to German airports and do not continue their trip further by airplane. The respondents should have experience about the choice process and therefore respondents were recruited at Helsinki-Vantaa Airport. At the airport, the respondents were randomly selected. However, the population was further limited to ensure that the choice experiment would be applicable to their expected decision making process. In order for a passenger to qualify, he or she had to be a non-business segment traveler as a business traveler may not be the decision maker and the price attribute would not be realistic. For example, trips with the same day return are priced higher than normal economy class fares. The respondents were asked the purpose of the trip as shown in Appendix 1 so that business travelers could be removed from the analysis.

As this thesis focuses on decision making analysis, program groups, school groups or group travelers in general were excluded as it would be challenging to find out the decision maker and the decision making process may have been strongly affected by the other members. Also, during the data collection period, Germany hosted ice-hockey world championships and the tournament tourists were left out from the data as they may not reflect the average composition of the market. Limitation was not based on gender although it turned out that it was extremely challenging to find out male respondents willing to take part in the study. In order to avoid limitation based on the language, the survey was made available in three languages, Finnish, German and English. The English version of the recruitment letter and questionnaire can be found in Appendix 1.One another practical limitation was the avoidance of not disturbing handicapped persons or very old people who had problems with luggage. This limitation biases the results to some extent as the person with limited mobility may very heavily prefer direct flight option on the choice game. Altogether 196 completed answers were received. As written by Sawtooth (2010), normal sample sizes for conjoint studies range from 150 to 1200 so the collected sample size is at the lower end of general sample sizes. However, the sample size is still good when considering limited time and budgetary resources.

3.4 Data collection

The data collection was conducted during the first two weeks of May 2010 at Helsinki-Vantaa Airport and it took around 170 hours to reach enough respondents. In total 397 recruitment leaflets were delivered, but the recruitment reached more potential respondents as one leaflet per pair or small group was given. The number of delivered leaflets was not distributed evenly as 207 Finnish, 159 German and 31 English leaflets were delivered. If the respondent mentioned that she or he did not have Internet, paper versions were then made available. However, after having said *no*, the candidates also did not want paper versions and as a result no paper versions were delivered even though the postage fee had already been paid.

The survey was downloaded onto established domain and website www.airtravel2010.fi from where the respondent could select Finnish, German or English version based on his or her preferences. The cost of the website was about 70 euros making it very attractive for thesis surveys as general free websites do not provide enough technical adjustment capabilities which are required by the choice experiment design. Additional costs were 160 euros paid to German translation and 200 euros for the travel gift voucher to attract respondents.

The survey consisted of four parts as shown in Appendix 1 and the respondents were given recruitment leaflets, also shown in Appendix 1, in three languages. In the first part of the survey, the respondents were asked details about their current trip and the goal was to ask as many questions as possible, but due to the length of the choice-based questions, the number of questions had to be limited to 8 questions, see Part 1 in Appendix 1. The second part included general questions how important different attributes are in decision making. The answers were given on 5-Stage Likert scale, shown in Appendix 1 and question 9, and the options were “not important”, “not very important”, “don’t know”, “quite important” and “very important”. Altogether 13 different service features were included in the questionnaire shown in part 2 of Appendix 1. These features were chosen based on the earlier studies and which features have been found in those studies. Weakness of the question is that it would had been

beneficial to test whether the order of the features affect the importance rating, but it was not possible include random ordering of the features in the Sawtooth software.

The third part of the questionnaire included 12 different choices where respondents had to choose one of the travel options or none-option. Two of the choices were fixed and the same to all respondents and ten of the choice sets were randomly generated by the software. One example of the choice game is shown in Figure 5 below. The fourth part of the questionnaire focused on getting demographic information about the respondents, see Part 4 in Appendix 1. The questions included some very basic questions about the gender, age, education, nationality and place of residence, household, and amount of travelling per year.

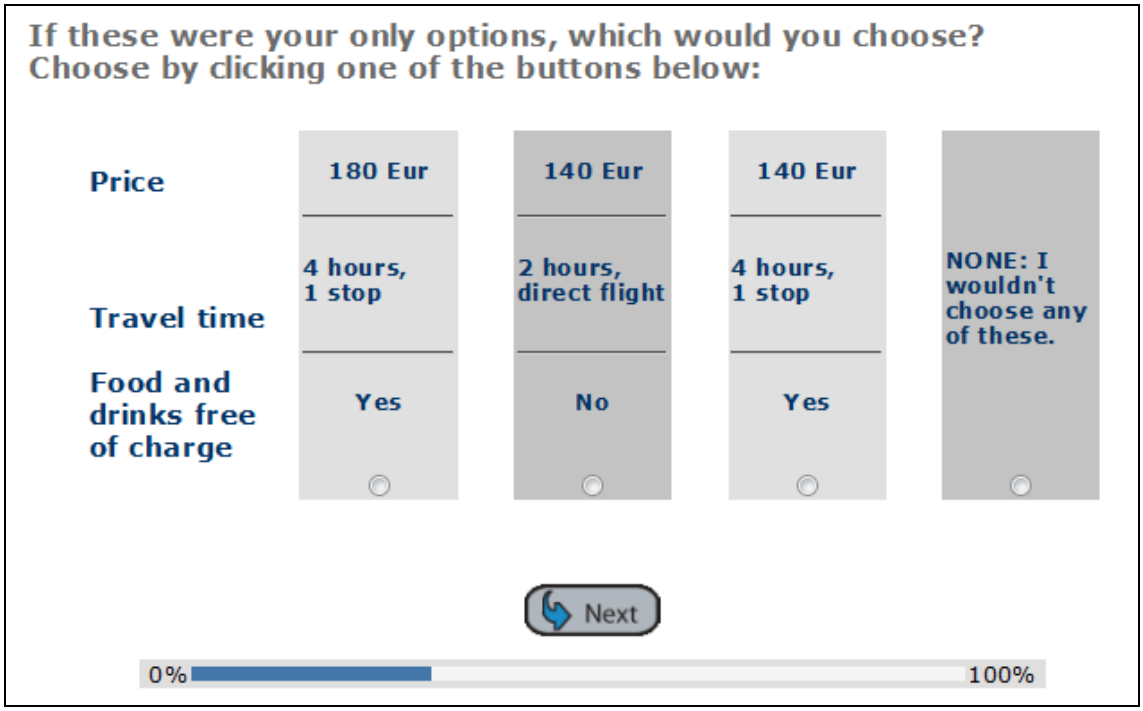

Figure 5. The choice game window.

The collection of the data was changed as it became clear after nine days of recruitment that some passenger types were very hard to recruit. An announcement about the study was made at three internet sites, namely Suomalaiset.de which is forum for Finns living in Germany, the forum of Deutsch Finnische Gesellschaft e.V. which is organisation providing information about Finnish culture to Germany, and Saksalaiset.fi which is

forum for Germans living in Finland. The reasoning for recruiting respondents from these places was that it was very hard to find travellers who have chosen indirect flight. Other Internet sites were avoided to minimize mischief. In a hub like Helsinki-Vantaa, there are hundreds of possible connections which people can make and only the minority of the people were flying from Finland to Germany as point-to-point travellers. Also, more answers from males were needed as male gender is at least equal in proportion to females, but males were extremely hard to recruit. Especially Finnish men aged 20-40 years. When recruitment was done in the Internet only people who have recently travelled on the routes from Helsinki-Vantaa to Germany were asked to respond. As mentioned by Balcombe et al. (2009) who contacted respondents only via Internet only on one major web site, the Internet provided the most cost effective way to generate enough big sample size.

People at the forums also very likely fulfilled the most important selection criteria which people at other Internet sites would most likely not have fulfilled. The people have gone through a choice process similar to the study and have experience about making similar choices. Finnair operates the highest number of flights from Finland to Germany, but due to severe rush hours at Finnair's terminal, it was hard to contact people flying with Finnair as there are tens of flights to destinations in Europe, Asia and North America. The reason for the difficulty is that during the rush hours lots of flights arrive at the airport after which travelers transfer to connecting flight. For example, before the flight departs from Helsinki to Germany, flights arrive from Asia, Finland and other cities and the flight to Germany receives the transfer passengers and a result only minor part of the travelers sitting on the airplane from Helsinki to Germany are actually travelling from Helsinki to Germany only.

Advantage of the Internet based survey and recruitment is that people do not have to stop for 15 minutes, which they would not like to do during rush hours. The disadvantage is that people easily forget to respond and travelers flying back home to Germany can be expected to give better response rate than travelers who are beginning their trip from Helsinki. If the recruited person will have a long vacation, she or he may well forget to response and for this reason Finnish people were targeted slightly more

than Germans. The disadvantage of the Internet in comparison to asking respondents to answer at the airport with the help of a laptop computer is that response rate may be lower. However, having laptop at the airport would exclude some travelers from the sample since some travelers do not spend time near the boarding gate, but instead use the available services at the airport and come to the boarding area just before it opens leaving not enough time to give an answer. Also, the boarding area may be congested due to other departing flights. The response time is about 15 minutes and assuming that travelers arrive at the boarding gate one hour before the departure, the maximum of four responses could be gathered by single departure.

Some people who are just beginning their holidays may not be willing to stop for 15 minutes and people travelling in a group may not be willing to be separated from their group. Also, parents travelling with small children may not have 15 minutes extra time and therefore giving the response at home may be a better alternative. If the passenger is travelling on the route for the first time and if the responses are given at the airport before the first flight, then there is possibility that based on the first experience the passengers will change his or her choice behaviour. For example, if that passenger had chosen a non-direct flight, but finds non-direct flight very unpleasant, then it is better to give the response after the experience of the service as it better reflects the future intentions than the first choice.

Although paper versions were made available, it was decided not to use it as the main collection method. Each respondent will get different choice game and therefore managing the paper version would become very difficult. The printed versions included 12 pages of paper plus the recruitment leaflet. Two choice sets were fitted on one page so choice game required six individual pages per respondent. Also, typing the answers manually to the system would take time as respondents face different choice sets.

3.5 Reflections about the data collection at the airport

The collection period at the beginning of May was not time when lots of people would be travelling from Helsinki to Germany, but some general issues were discovered. The travelers behave calmly when they arrive at the airport, but they are much harder recruited to the study once they get into the first queue. Travelers are also more nervous after the check-in and on their way to the security check. It was much easier to recruit respondents before the check-in than after it. There are three different rush hours at Helsinki-Vantaa and it was very easy to see that during rush hours people were much more tense.

Small groups of two to four persons were also asked to take part in the study and normally the first traveler was asked. If she or he was willing, then also the others wanted to take part. However, if the first person did not want to take part, then also the others did not. Time of the day also had effect on the success of recruitment. It was much easier to find interested candidates very early in the morning when the airport and it was much harder to find candidates during the noon and afternoons. Understandably, people arriving somewhat late at the check-in were also hard to recruit. There was also one part of the market which was hard to recruit. It is hard to describe the group, but generally male passengers and passengers with lower education are less open to academic research than people who higher education. Some travelers who had more time and wanted to discuss more about the study had themselves done research earlier and were more willing to take part. It also seems that people who have chosen a foreign airline are more open to take part in the study than people who have chosen their national carriers. For example, Finns flying with Finnair and Germans flying with Lufthansa or Air Berlin were somehow more reluctant than Finns flying with Lufthansa or Air Berlin. Finnish males were somehow quite reluctant to take part in the study. A strong exception to the rule was done by males who were travelling with school aged or older children. The recruitment tactic was altered to get answers from Finnish males. If a Finnish couple was travelling, then the female would be asked first to open the discussion about the research. It seemed that it was much easier for the males to say *no* even before anything particular was asked from them. By asking the female first, the

discussions succeeded much better after it became clear the researcher was there to make a study and to sell or to promote some products.

3.6 Choice-based conjoint analysis

The goal of this thesis is to study passengers' decision making and, as there was no revealed preference, RP, data available, this thesis used stated preference data gathered from the passengers in the form of survey. Usually, as written by Hess 2005, revealed preference data has been used in air travel choice behavior. The revealed preference data is constrained to collect information only on existing alternatives. (Hensher et al., 2007 in their textbook) For example, as written by Hess et al 2006, it is very hard to analyze the effect of FFPs on the choice is RP data is used. Louviere et al. (2009) write in their textbook that there are many ways how stated preference can be made. The respondents may be asked to choose one option, state their likes or dislikes about certain option, make complete rankings how different alternatives are preferred, ask to state their preference in terms of likelihood choice of each alternative. Louviere et al. (2009) continue that stated preference, SP, method can produce information which is consistent economic theory, but the weakness of the SP is that the respondent may act differently in the real situation in comparison to their answers given in the choice questionnaire. However, Louviere et al. (2009) write, SP data is especially useful and rich in analyzing tradeoffs.

Hess et al. (2006) write about the advantages of SP that data enables to collect information about the alternatives which the decision makers face when they make the choice. It is possible, to some extent, but hard to calculate the alternatives faced by the decision makers if RP data is used. Louviere et al. (2009) and Hensher et al. (2001) also write about the advantages of SP data that it can be used in forecasting demand for a new product, new product features or change of product feature levels. Louviere et al. (2009) continue that RP data can not reveal or forecast demand regarding the change of some attribute if the attribute has been on the market for long time or if the attribute is the same on the whole market. Also, RP cannot forecast the demand for non-existing

products e.g. new product due to a technology change. Carrier (2008) add, that SP data provides flexibility to model new non-existing alternatives and enables the collection of demographic information. According to Carrier (2008) the problem of SP is that the respondents face a limited set of alternatives which do not compare to the wide range of alternatives faced in the real decision situation.

According to Andersson (1998), the discrete choice analysis can be used to analyze passengers' utility for a particular product alternative. Generally, Teichert et al. (2008) write that in SP the respondents are asked to state their preference about hypothetical situations and using the collected data it is possible to estimate utility functions and forecast purchasing behavior based on the estimated parameters. Marucci & Gatta (2009) describe the SP methods that the alternatives are given as package which include different attributes and attribute levels such as price, travel time. The analyst has built up hypothetical alternatives so that effect of individual attribute and their levels can be estimated. The alternatives can be built using principles of design of statistical experiments. (Anderson et al. 1992) Hensher et al. (2001) add that by systematically varying the combinations of alternatives, individual preference functions can be built and forecasts can be made about the potential switching to the new product offerings. The alternatives given to the respondents should be understood by the respondents, be realistic and be close to the experience which the respondents have faced. (Marucci & Gatta, 2009, Espino et al., 2008) At the end, when the responses have been collected, the data is analyzed to get quantitative measures about the importance of different attributes and attribute levels.

The construction of the SP experiment itself is a tradeoff. Balcombe et al. (2009) write that it is important to think about the relevant attributes to the decision making, but also keep in mind the available time limits and sample size. If the amount of attributes and attribute levels is increased, then the needed sample size also increases and it takes longer time to collect enough responses. Rose et al. (2006) write about the planning phase that when establishing attributes and attribute levels for an SP experiment, the analyst should seriously consider the candidate attributes. The analyst should avoid the

inclusion of irrelevant attributes and exclusion of relevant attributes within the choice set.

Hensher (2007) described a general procedure to plan a SP experiment. The first task is to refine the problem and the second task is to refine the list of alternatives. The analyst should list every possible alternative for a decision maker and then cull the list to manageable amount of alternatives if the amount of alternatives is large. Concerning this study, the decision maker can decide to use direct service, non-direct service or not to travel at all. In addition, the decision maker may also use boat to travel to Germany. However, the analysis focuses on analyzing tradeoffs among direct and non-direct service and therefore None-option is made available for respondents if any of the alternatives is not favorable as shown in Figure 5 on page 45. Hensher (2007) write that after having listed all alternatives, the analyst should determine the attributes, attribute levels and attribute level labels for the selected alternatives. As discussed earlier, there are many different attributes which affect the choice of air travel and it would be impossible to include all relevant attributes. The measurement unit of attribute levels can be for example on ordinal or metric scale. Hensher (1994) writes in his book that it is easier to use metrics but sometimes attributes such as comfort must be given on ordinal scale. Also, Hensher (1994) write, that the analyst should decide the number and magnitude of attribute levels and if the attribute exists in the market, then the levels should be as they are in the real markets and be believable. As written in Chapter 3.2, a sub-study was made to reflect the prices in the matket. The last task, according to Hensher (2004), is to consider statistical design which includes different factorial designs used. Sawtooth software enables the use of random choice set generation and will be used in this study. Hensher et al. (2007) writes, that the analyst also has to decide whether to do labeled experiment which would include e.g. brands or unlabeled experiment.

Hensher et al. (2001) write that generally in transport literature there less than nine treatment combinations given to the respondents and that normal range is from two to four. Marketing studies often have 16-32 treatment combinations and psychological studies several hundreds. Hensher et al. (2001) found out that four treatment

combinations are too few and that 16 tasks are sufficient although results improve with 24 and 32 treatment combinations. For this thesis, it was decided to ask 12 treatment combinations to keep completion time of the survey feasible. Many background questions will be asked from the respondents making the duration of the questionnaire already 10-15 minutes. Two of the treatment combinations are fixed and the same for all respondents to estimate the reliability of the choice experiment. The remaining ten of the treatment combinations were randomly generated by the Sawtooth software.

The stated choice experiment of this thesis was decided to unlabelled or generic. The reason for the decision is that the market between Finland and Germany has so many operators offering direct or non-direct service that it would be very demanding to make the experiment practical. Finnair, Blue1, Lufthansa and Air Berlin offer direct flights and other airlines such as AirBaltic, KLM, SAS offer non-direct service and if all these brands would be included in number of needed choice sets and number of alternatives in each choice set would exceed the capabilities of the respondents and computer software. Also, as only some of the airlines fly to each destination, many different experiments would be needed to make the experiment realistic.

The chosen attributes to be studied are price, flight time and type of flight, and availability of complementary food. As discussed earlier, the price of the flight seems to be the most important attribute explaining the choice and therefore to avoid the exclusion of relevant alternatives the price variable was decided to be shown as the first variable in the choice sets. As written by Hensher et al. (2007), if attribute levels are chosen outside the existing values, it should be done very carefully. In order to make the price variable realistic and not too high for the respondents, a sub-study was made as explained earlier. The market with the lowest prices was the Berlin market and, assuming that the leisure travelers make a reservation well in advance and at least one month before the departure date, the price attribute was decided to be prices of 140 euros and 180 euros. The price difference should not be too large in order to analyze tradeoffs made, but the difference still should be relevant. The average prices of all direct from Helsinki to Germany was 229,35 euros and of all non-direct flights 200,85 euros. However, the price difference of 30 euros was considered relatively small and in

order to make sure that the price attribute would have enough weight on the choice the price difference was raised to 40 euros. As mentioned by Louviere et al. (2009), the unbalanced design where attributes have unequal number of levels should be avoided where possible. The number of levels was decided to be two as the other attributes were discovered to ideally have two levels.

The second attribute was selected to be flight type. The competition on the routes is not only on direct service operators as there are also non-direct service operators. There are many alternatives to choose from depending on the schedule requirements of passengers. As shown in Table 5 on page 40, the direct flights to Germany vary from two to 2:40 hours and the other attribute level was chosen to be *2 hours – direct flight.* The shortest travel durations for non-direct flights are 4 hours so the second level for the flight type attribute was chosen to be *4 hours – one stop*.

The third attribute was decided to be the availability of food and drinks free of charge. This reason for selecting this attribute is that recently many airlines have made alterations to the availability of free food, but Lufthansa, for example, has decided to offer complementary food and drinks. On the other hand, Finnair decided not to offer warm meals anymore and now the meal is a deli-type snack. Also, Finnair started to charge extra for alcoholic drinks. Food and drinks represent a cost to airlines and in order to cut costs as the ticket prices are decreasing it would be important for the airlines to know the relative importance of this attribute. The levels for the attribute are *Yes* and *No* and example of the attribute's appearance is shown in Figure 5 on page 45.

3.7 Multinomial Logit analysis

Loo (2008) writes that the most used model in analyzing choice behavior has been Multinomial Logit model as it is relatively easy to compute. However, the weaknesses of the MNL model rest on the assumption that the distribution of the error term is assumed to be distributed along Gumbel distribution. According to Sawtooth (2008), the MNL model is good to gain understanding about the collected CBC data, but Latent

Class or HB estimation should be used in order to gain better understanding about the population, achieve more precise results and avoid the IIA property.

Koppelman & Sethi (2000, pp.213), write about the IIA property states that "the relative probability of choosing any pair of alternatives is independent of the presence or attributes of any other alternatives." An example of the IIA property is given by Koppelman & Bhat (2006) who explain the paradox of red bus and blue bus. Here a commuter who is going to work has his or her own car and blue bus alternatives with the choice probabilities of 2/3 for the auto and 1/3 for the blue bus making the ratio 2:1. Then, the bus operator introduces a red bus, which is exactly equal to blue bus except the color and normal assumption would be that same people choose the car, 2/3, and the red and blue busses will share the remaining passengers, 1/6 for both, as the red bus should not influence the choosing of the car. The problem with MNL is that the ratio would stay 2:1. If the color does not matter to the people the ratio between the busses would be 1:1, which would result in the probabilities for ½ for the car, ¼ for blue bus and ¼ for the red bus so the probability of choosing a care declines when a new alternative is introduced which is identical to the existing alternative. Sawtooth (2008) writes that add-on modules of the Sawtooth software called Latent Class and HB can help to resolve this problem with the basic MNL model. The HB estimation has become the major estimation method. In this study, MNL results are used to estimate the strength of interaction effects.

3.8 Hierarchical Bayes Estimation

In this thesis estimation of individual utilities is fully depended on the software provided by Sawtooth. As a result, methodology explained in this chapter also relies heavily on Sawtooth software material. Hierachical Bayes, HB from this point on, is the more advanced estimation method in comparison to logit and latent class methods. Latent class which estimates utilities and identifies segments with similar utility levels would provide enough information for this thesis, but latent class estimation was not available. As a consequence, individual level utilities were estimated using HB and then

derived utilities were used after normalization to group respondents with cluster analysis.

Johnson (2000) writes that HB is called hierarchical because it is operating on two levels. At the upper level the part worth utilities of individuals are analyzed by assuming multivariate normal distribution. At the lower level HB assumes logit model which was described in Chapter 3.7. Utility of a certain alternative is given by summing up the part worth utilities of the attribute levels of each alternative and the probability that certain individual will choose some alternative can be calculated by dividing alternative's utility by sum of utilities of all alternatives in the choice set. Howell (2009) writes that CBC/HB module of Sawtooth Software creates individual-level utilities, number representing the attractiveness of product features for respondents, which are then used to segment the respondents in this study. Howell (2009) continues that the HB estimates how the utilities of an individual are in relation to other utilities of other respondents. Because estimating individual utilities from limited amount of information which is provided by conjoint tasks is very hard, HB has a method based on the rules of the probability to find the utilities from that data. At the beginning of the estimation process, HB assumes a sample average of zero and then estimates individual utilities based the assumption of average of zero. Then, after the HB have calculated individual utilities for all respondents, HB calculates new average and continues the process for thousands of times to find out the utilities for each individual. According to Johnson (2000), the utility value for each individual is the average of vectors of part worths of last several thousands of iterations.

3.9 Cluster analysis

A cluster analysis was conducted to find out customer groups with similar type of utilities. Lehmann et al. (1998) write that cluster analysis is a common name for different techniques by which set of object are divided into clusters. Malhotra & Birks (2007) write in their book that, the objective of a cluster is to divide objects, which are respondents in this study, to relatively homogenous groups and once one object or

respondent is put into one cluster it can't belong to another cluster. Euclidian distance was selected to reflect a measure of similarity to cluster the respondents. Euclidian distance is square root of the sum of the squared differences in values of each variable. Also, a non-hierarchical clustering method called k-means was selected. According to Malhotra & Birks (2007), in k-means clustering, the number of clusters is selected in advance and objects are allocated to one seed based on the distance to the centroid. In this study, cluster analysis was done from 2 to 6 clusters and then the best solution was chosen for both utility-level results and results gained about preferences measured with Likert-scale.

To decide which amount of the clusters is the best solution, it was decided to use CCC (cubic clustering criterion) pseudo F-statistics. According to Schmidt & Hollensen (2006), pseudo-F measures the density of the clusters and higher value is preferred and according to Lim et al. (2006, pp 508), CCC is a comparative measure describing the "deviation of the clusters from the distribution expected if data points were obtained from a uniform distribution". Here also, higher CCC value is preferred.

3.10 T-Test and ANOVA analyses

T-test is based on Student's t statistics where the means of two groups is analyzed to find whether the difference is statistically significant. It is assumed that the variable follows normal distribution and H_0 is that the means are equal. (Malhotra & Birks, 2007) ANOVA is an extension of T-Test and is conducted to analyze the variance of means between more than 2 groups. For example, it is possible to find out whether groups differ on some aspect. ANOVA is used to examine differences in the mean values of dependent variables, which are on metric, interval or ratio scale such as Likert scale, and independent variables such as age groups. (Malhotra & Birks, 2007) In ANOVA variance is examined for dependent variable and based on the variation it can be evaluated whether a difference exists. H_0 is that independent factor does not have effect on dependent factor. In other words, Churchill & Iacobucci (2005) write in their

textbook that H_0 is that population means are equal. If it is found out that the means differ significantly, H_0 is rejected which means that the means of the dependent variable differ in the classes of the independent variable.

3.11 Willingness-to-pay measures

One of the main goals of this study is to find out how much more the respondents would be willing to pay for increases in service levels. In this case, the service levels are the attributes of travel time, direct or non-direct service, and the availability of complementary food and drinks. Based on Orme (2001) and Pinnel (1994), with qualitative attributes, the WTP can be obtained by calculating how much the change in the price reflects the chance at the utility to find out how much one utility change is in monetary value. According to Hensher (2007, pp. 358), "in simple linear models, WTP measures are calculated as the ratio of two parameter estimates, holding all else constant. Provided at least one attribute is measured in monetary units, the ratio of the two parameters will provide a financial indicator of WTP."

3.12 Reliability and validity of conjoint studies

In total 12 choice experiments were asked from respondents out of which two were so called fixed or holdout tasks. Two holdout tasks are not included in estimating utilities, but they are used to measure validity and reliability. Johnson & Orme (2010) write that it is also possible to identify and remove inconsistent respondents with the help of holdout tasks. According to Orme & King (1998), the reliability of conjoint experiment refers to getting consistent results in repeated trials and validity refers to achieving accurate predictions. The holdout tasks can be used in checking how well conjoint utilities can predict answers to observations not used in utility estimation and it is desirable that the conjoint utilities could as accurately as possible predict the holdout task answers. The term of holdout hit rate is used to measure the percent of correct predictions. Sattler et al. (2010, pp. 324) write that hit rates "assess the extent to which a

model estimated with the choice tasks designed for part-worth estimation correctly predicts an individual respondent's observed choice behavior in the holdout task.” Following Sattler et al. (2010) the hit rates in this thesis are also calculated by assuming that respondents will choose the alternative which gives them highest utility. After utilities had been estimated for each individual and had been normalized, utility levels for each alternative in each choice set was calculated. Finally, the hit rate was calculated to find out that in how many cases in the fixed tasks the respondent had chosen the alternative with the highest utility. The fixed tasks were designed so that respondents were required to make the strongest possible level of tradeoffs. Assuming the level of importance of the attributes, the fixed tasks were designed to show maximum number of variation in the choices among respondents and would reflect groups which have high preferences towards different attributes.

4. ANALYSIS AND RESULTS

4.1 Descriptive statistics of the sample

Altogether 196 responses were received from the respondents. 30 of the respondents stated that their purpose of the travel was work and these respondents were removed from the data. The sample consisted of 38,6% males and 61,4 % females with an age structure where 15,6% of the respondents belonged to age group 15-24 years, 57,2% to 25-44 years and 26,5% to 46-69 years. In terms of nationality, 42,7% of the respondents were Germans, 51,2% were Finns and the rest 6,1% had a different nationality. As Table 8 shows, most of the respondents had flown with Air Berlin, but Finnair and Lufthansa had been used by many of the respondents. In total, 93,38% of respondents had flown with Air Berlin, Finnair or Lufthansa. These three airlines also offer most of the direct flights between Finland and Germany. In addition, 83,1% of the respondents had chosen direct flight and only 16,9% had chosen flight with one stop.

	Number of respondents	Percentage
AirBaltic	1	0,60 %
Air Berlin	61	36,75 %
Blue1	3	1,81 %
Finnair	46	27,71 %
Lufthansa	48	28,92 %
SAS	2	1,20 %
KLM	2	1,20 %
Ryanair	1	0,60 %
Czech Airlines	1	0,60 %
Other	1	0,60 %
Total	166	100 %

Table 8. Respondents' airlines

Short flight distance between Finland and Germany enables short trips or weekend travelling, but the majority of the travelling lasts 4-7 days with the share of 51,2% and

trips lasting one to three weeks are also popular with the share of 32,5% of the respondents, see Table 9.

	Number of respondents	Percentage
1-3 days	20	12,0 %
4-7 days	85	51,2 %
1-3 weeks	54	32,5 %
more than 3 weeks	7	4,2 %
Total	166	100,0 %

Table 9. Trip durations

Also, as shown in Table 10, respondents made their reservations generally earlier than three months prior to the departure. Most of the respondents, 44,4% had made their reservation one to three months before the departure. Only 1,2% of the respondents did not remember when did they made their reservation.

	Number of respondents	Percentage
1-7 days	13	7,8 %
8-30 days	22	13,3 %
1-3 months	87	52,4 %
4-6 months	34	20,5 %
7-9 months	7	4,2 %
more than 9 months	1	0,6 %
Don't remember	2	1,2 %
Total	166	100,0 %

Table 10. Time of reservation prior to travelling.

The price levels for the choice game were selected to be 140 euros and 180 euros and the goal was to make the choice game as realistic as possible. Respondents were asked to provide the ticket price and 140 out the 166 respondents stated the amount. The average ticket price of the respondents was 177 euros. The average price is in the price range of 140-180 euros and therefore the choice game has provided realistic prices in choice game. The distribution of the prices paid, shown in Figure 6, shows that the selected price range has been quite realistic for the respondents although for some

respondents the price range has been high as 43 out of 140 respondents have paid 100 euros or less for their tickets.

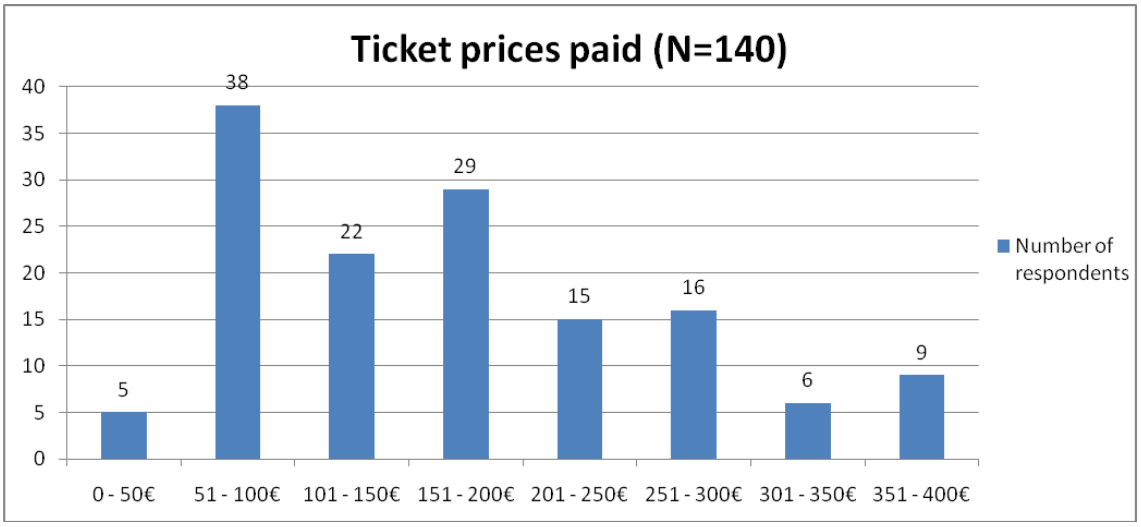

Figure 6. Ticket prices of the sample respondents

4.2 Importance of airline service attributes

Second part of the survey was dedicated to find out importance of airline service attributes to the respondents. The respondents were required to state the importance of 13 different service attributes. The results, shown in Table 11 on the next page, the low price of the ticket is the most important attribute for the respondents followed by direct flight to the destination, safety reputation of the airline, punctuality of the flights and suitable flight departure time. The price is the most important variable as expected based on the literature review. The third variable used in the choice analysis, free food and drinks, was only 9th most important attribute, which can be explained by the short flight distance to Germany. Frequent-flier points, seat width and airline name were considered as the three least important service attributes.

Service attributes	Not important	Not very important	Don't know	Quite important	Very important	TOTAL	Relative importance
Low price of the ticket	1,8 %	1,8 %	1,2 %	29,5 %	65,7 %	100 %	1
Direct flight to the destination	1,2 %	10,2 %	3,0 %	30,7 %	54,8 %	100 %	2
Safety reputation of the airline	3,0 %	4,8 %	7,8 %	28,9 %	55,4 %	100 %	3
Punctuality of flights	1,8 %	6,6 %	4,8 %	50,0 %	36,7 %	100 %	4
Suitable flight departure time	2,4 %	18,1 %	6,0 %	43,4 %	30,1 %	100 %	5
Speed of check-in	3,0 %	15,7 %	11,4 %	50,6 %	19,3 %	100 %	6
Number of daily flights	19,3 %	41,0 %	8,4 %	24,7 %	6,6 %	100 %	7
Size of the leg room	21,7 %	44,6 %	8,4 %	18,7 %	6,6 %	100 %	8
Free food and drinks	22,3 %	40,4 %	7,8 %	24,1 %	5,4 %	100 %	9
Airline terminal	21,7 %	30,1 %	14,5 %	24,1 %	9,6 %	100 %	10
Seat width	24,7 %	44,0 %	10,8 %	16,3 %	4,2 %	100 %	11
Name of the airline	27,7 %	33,7 %	7,2 %	27,7 %	3,6 %	100 %	12
Possibility to gain frequent flyer miles/points	40,4 %	30,1 %	7,2 %	18,7 %	3,6 %	100 %	13

Table 11. Importance of service attributes. (N=166 for each row)

As it was explained in the literature review, there are many factors which may affect the importance of attributes to certain respondents. T-test and several ANOVA tests were performed to investigate how the preferences differ on routes between Finland and Germany based on respondent demographic information and other variables. First, T-test was performed to analyze whether gender affects the importance of service attributes. Results in Table 1 of the Appendix 2, show that female respondents value more the direct flight option, safety reputation, punctuality of the flights and speed of check-in than male respondents. The only service attribute which males value significantly more than females is the size of the leg room. Also, based on Table 2 in the Appendix 2, the respondents who have paid less than 200 euros for their ticket differ from the respondents who have paid more than 200 euros in terms of suitable flight departure time, preference for direct flight and in terms of punctuality of flights where the passengers who have paid more value the attributes more.

Household income did not significantly affect the importance of the ticket price attribute, but it was found out that income affects the importance of flight departure time where respondents with higher monthly income than 3901 euros give significantly higher importance the attribute in comparison to respondents with household income less than 3900 euros a month.

ANOVA analyses were done with variables with more than two levels. The results are shown in the Appendix 2 under variance analyses regarding the variables and service attributes where significant differences on some service attributes were found using different dependent variables. Fisher's Least Significant Difference was conducted to be able to see which of the differences between dependent variables' categories are significant. Number of annual business trips was found to have significant effect on the importance of number of daily flights and the possibility gain frequent-flyer points. Respondents flying more than four business trips a year give significantly higher importance for the two attributes in comparison to respondents who do not make business trips. Also, respondents flying more than four business trips consider number of daily flight more important than respondents who travel one to three trips a year. Another tested variable was number of annual leisure or holiday trips and it was found out that respondents who travel six or more trips a year give significantly higher importance than any other groups for the number of daily flights.

The importance of service attributes was also analyzed using ANOVA with educational level, age group and prior purchase time and the results are shown in Appendix 2. The purchase time of the ticket measured as time before departure has an effect on how respondents value lower price of the ticket and airline name. The respondents who purchase their tickets one to seven days before the departure give significantly less importance on ticket price, but more importance on the name of the airline. Age group has an effect on how the respondents value lower price of the ticket, suitable flight departure time, direct flight to the destination and airline terminal. Here the difference is the age group of 45 years or older which gives less importance to the low price, but more on the airline terminal than younger respondents. In terms of suitable flight departure time and direct flight to the destination, the age group of 15-24 years gives

significantly less importance in comparison to 25-44 and over 45 years age groups, which do not differ significantly. Finally, ANOVA results in Appendix 2 show that educational level was found to have impact on low price of the ticket, size of the legroom, seat width and name of the airline attributes. Respondents who have vocational school give less importance to price, legroom and seat width in comparison to respondents who have secondary school background or higher. There were only five respondents with elementary or comprehensive school background and no statistical difference was discovered. People with university and polytechnic education give less importance to airline name than others, but the difference is significant only against the respondents with secondary school or matriculation education.

4.3 Analysis of utilities and interaction effects

When performing logit analysis, only the interaction terms which improve results significantly should be included. The significance of the interaction effects can be analyzed by first studying two-way measures and then by performing a 2 log-likelihood tests. (Sawtooth, 2010B) There were two possible interactions with price and time of travel, and with time of the travel and free food with significance level of $p< 0,01$. A "2 log-likelihood" test was made to find out whether the inclusion of interaction terms would improve the results. Based the results, it was decided not to include interaction terms because probability that they would improve the results is low, see Appendix 3 for detailed information about the 2 log-likelihood test.

Logit analysis was run for all 166 respondents with the percent certainty of 58.70175 and based on the importance calculations shown in Table 12 below, the travel time attribute is more important than the price attribute. The importance must be considered by taking into account the price range which was 140 euros to 180 euros, because the importance of price increases if the price range or level is increased. However, in the situation where the respondents face prices of 140 euros and 180 euros with the same travel time options, the travel time is more important for the respondents than the price difference of 40 euros.

			Range	Importance
Price	140 €	180 €		
Utility	1,24806	-1,24806	2,49612	32,1 %
Travel time	Direct flight, 2 hours	1 Stop, 4 hours		
Utility	2,06699	-2,06699	4,13398	53,2 %
Food	Yes	No		
Utility	0,57004	-0,57004	1,14008	14,7 %
		Sum	7,77018	

Table 12. Importance of choice game attributes

In order to build clusters with similar utilities, HB analysis was run. The HB estimation, results shown in Appendix 5, achieved RLH of 0,84441 indicating high goodness of fit. The best possible RLH is 1 and in this case the minimum is 0,25. (Sawtooth, 2008) After estimating individual utilities using random tasks, the fixed choice tasks were used to calculate the reliability and validity. Knowing the utilities for each individual and for each attribute level, total utility gained from each alternative of the fixed tasks was calculated. Based on the utility maximization, the respondents should have chosen the alternative with the highest utility. The holdout hit rates were 81,92% and 87,95% showing good level of predictability in comparison some other hit rates for example Meisner & Decker (2009) with 70,69% and 68,97% , Baumgartnet & Steiner (2007) range from 62% to 94% and Satttler et al. (2010) range from 65,8% to 88,1%.

4.4 Cluster analysis

Using the utilities from HB analysis, cluster analysis was conducted to discover customer groups with similar preferences in terms of analyzed choice-based conjoint experiment attributes. Right number of clusters was analyzed by using different number of clusters between two and six and then comparing Pseudo-F and CCC measures. Clustering the respondents into three clusters was found to be the best alternative as Pseudo-F measure peaks at three clusters solution, see Table 13 below. CCC measure

also increases substantially from two to three clusters and after three the CCC measure increases only marginally.

	Number of clusters				
	2	**3**	**4**	**5**	**6**
Pseudo-F	184,96	454,1	345,14	331,01	323,68
CCC	0,501	20,747	21,824	22,89	23,937

Table 13. Cluster analysis results

According to Malhotra & Birks (2007), insights into interpreting and profiling clusters can be found by looking at the cluster centroids which are the mean values of certain object of each cluster. The biggest cluster includes 104 respondents, see Table 14 below, and the cluster receives very high utility level 0,60193 from direct flights and can be considered as the most time sensitive cluster of three clusters. The time sensitive cluster, cluster 1 represents majority of the travelers with proportion 62,65%. In contrast to cluster 1, the cluster 2 with the proportion of 22,30% of the respondents does not value direct flight as important, but has higher importance for lower price reflecting higher price elasticity. Although cluster 2 has the highest price elasticity, the respondents also value free food and drinks more than other groups. Cluster 3 with the proportion of 15,05% of the respondents is very similar to cluster 1 in terms of price, travel time and free food and drinks. However, cluster 3 received high positive utility from None-option and this reflects conditional and more demanding behavior in comparison to cluster 1 so that if the choice set has not provided good alternative the cluster 3 is more likely to choose None-option. In summary, there are three clusters in the market; a time sensitive cluster with 62,65% of the respondents, a price sensitive cluster with 22,30% of the respondents and a time sensitive, but conditional buyer cluster with 15,05% of the respondents.

		Cluster means						
		Price		Travel Time		Free food and drinks		
Cluster	N	140 €	180 €	Direct flight, 2hours	1 Stop, 4 hours	Yes	No	NONE
1	104	0,24046	-0,24046	**0,60193**	-0,60193	0,09942	-0,09942	-0,35117
2	37	**0,32994**	-0,32994	0,25000	-0,25000	**0,12761**	-0,12761	-0,75544
3	25	0,23155	-0,23155	0,52500	-0,52500	0,09145	-0,09145	**0,49979**

Table 14. Cluster means

Clusters can be further analyzed by using variables which have not been used for clustering, for example demographic or product use data. Using discriminant or one-way ANOVA, it is possible to identify variables which significantly differ between clusters. (Malhotra & Birks, 2007) Cross-tabulations were made using several variables in order to find out differences between three clusters, see Appendix 5. Household income level was not found to have effect on the importance rating analysis, but income level has an effect in which cluster the respondent belongs to. 48,7% of the price sensitive cluster respondents belong to the lowest income group whereas only 12,5% of the respondents in the time sensitive cluster belong to the lowest income group. 78,4% of the price sensitive cluster respondents' household earn monthly less than 3900 euros. In terms of time sensitive and conditional buyers, 72% of the respondents belong to the lowest two household income groups whereas with time sensitive clusters 46,2% belong to two lowest income groups and 53,8% to the two highest income groups.

Age of the respondents is also one of the explanatory variables as shown in Appendix 5. Price sensitive group includes more younger respondents from 15-24 years with 32,4% of the cluster respondents. Time sensitive cluster and time sensitive, conditional buyers' cluster have less respondents in the youngest age group and more respondents in the oldest group, 45 year or more, than the price sensitive cluster. In terms of type of flight and price paid for the ticket, the price sensitive cluster had 37,8% of the respondents who had chosen a flight with at least one stop and 90,6% of the respondents had paid less than 200 euros for the ticket. In comparison to the other two clusters, only 10,6% and 12% had chosen trip with one or more stops. Also, in the time sensitive cluster

43,2% had paid more than 200 euros for the ticket, and in the time sensitive and conditional buyer-cluster 25% had paid more than 200 euros. There were variables where statistically significant difference was not detected and these were number of business or leisure trips per year, gender, education level, how many days prior the tickets had been purchase and duration of the trip. The results did not support Gilbert & Wong (2003) that the purpose would have effect on the importance.

One goal of this thesis was also to find out willingness-to-pay measures for the selected service attributes. For all the 166 respondents, the average WTP for direct flight versus non-direct flight was 97,94 euros and for free food versus no free food was 19,55 euros. WTP measures for three clusters are given in Table 15. The clusters 1 and 3 are willing to pay 111,53 euros and 125,55 euros extra for a direct flight of 2 hours in comparison to one-stop flight with the duration of 4 hours. This value is very high when considering the price interval used which was from 140 euros to 180 euros. The cluster 2 is very price sensitive cluster and willing to pay only 38,42 euros more for direct flight lasting 2 hours than one-stop flight of 4 hours.

		WTP for direct flight	WTP for free food
Cluster	%	Average Eur	Average Eur
1	62,65%	111,53	17,98
2	22,30%	38,42	20,09
3	15,05%	125,55	24,51

Table 15. WTP measures for clusters

5. SUMMARY

5.1 Summary of the results

This study was conducted to find out how passengers in the non-business segment value different airline service attributes on the routes between Helsinki-Vantaa Airport and Germany. The study was started by looking at the range of possible product features in the airline business and by going through earlier studies about the airline choosing process including the stages involved in the process and main factors affecting the choice behaviour. The choice process was described to give wider picture of the whole study area, but the choice process itself was not studied. Also, the airline choice process was found to be quite complex and many different factors affect that which airline the customer chooses. Next, utility theory and its application to the airline industry were described to clarify the idea behind the choice-based conjoint experiment. In order to make the choice-based conjoint analysis more realistic and thereby to get more precise results from the analysis, a sub-research was conducted to study the current market, fares and schedules being the focus point.

Altogether 166 answers were analyzed after responses from 30 business travellers were decided to withdraw. First research question was focused on measuring how important different service features are for the passengers and how the level of importance varies among passengers. The main findings of the study include importance of several airline attributes and WTP measures for two attributes in passenger segments. Based on the importance measures which were measured for 13 different attributes using a Likert-scale questionnaire, the most important attribute was found to be low price followed by direct flight and safety. Price has been the most important variable also e.g. by Alamdari (1999), Proussalaloglou & Koppelman (1995), Bieger et al. (2007), Hess et al (2007), (Pels et al., 2001) and Hess et al. (2006). Punctuality, suitable flight departure time and speed of check-in were also considered important by majority of the respondents. Against Lu & Tsai (2004) who found out that the two most important decision variables are schedule of timetable and safety, safety was found as the third most important feature and suitable flight departure time as the fifth most important feature. Also,

Marcucci & Gatta (2009) write that frequency is the most important variable, but in this study the number of daily flights is only the seventh most important feature.

Balcombe et al. (2009) had found that older respondents had higher importance for seating comfort than younger, but although age had effect on value lower price of the ticket, suitable flight departure time, direct flight to the destination and airline terminal, the results do not show that age would have significant effect on importance of seat width and leg room. Bieger et al. (2007) found out that the number of stops comes as the second most important decision variable after the fare and this is also supported by the results with direct flight option being the second most important feature. Also, as Bieger et al. (2007) found out, departure and arrival times were found as being more important than number of daily flights.

Frequent-flier points, name of the airline and seat width were considered less important by the respondents. Alamdari (1999) had found out that price, seating comfort, punctuality and reliability and the four most important attributes. The results support Alamdari (1999) in terms of punctuality and reliability, but size of the leg room and seat width were found to have less importance and the difference can be explained route distance as Alamdari (1999) focused on the long haul flight where seating comfort is likely to be more important. Also, Palmer & Boissy (2007) have written that generally price, punctuality and schedule are the most important variables for leisure segment and that the least important are airline's image, FFPs and aircraft type which are supported by the results of this thesis except aircraft type, which was not measured. Although Proussaloglou & Koppelman (1995) had found FFP to have significant effect on the choice, the results support Alamdari (1999) and Lu & Tsai (2004) whose results show that FFP is not one of the most important variables. Proussalaloglou & Koppelman (1995) had found out that importance of FFP is higher for frequent travellers, and this is supported by the results as passengers making 4 or more business trips a year, have significantly higher importance for FFP points than passengers who do not make business trips.

Second research question was aimed to find out WTP measures for service features and investigate whether WTPs vary among passengers. Second part of the analysis was concentrated on analyzing utilities and investigating the clusters of respondents with similar utility levels for the analyzed attributes. After that, the clusters were named, their composition was analyzed and WTP measures were calculated. Composition of the clusters is affected by the level of household income as time sensitive cluster includes more high income level passengers than the other two clusters thus supporting the results from Warburg et al. (2006) and Hess et al. (2006) who found that low income households are more price sensitive. Also, the composition of age groups differ in the clusters as the price sensitive cluster includes more younger passengers in comparison to the clusters 1 and 3 which include more older respondents. In addition, type of flight and price paid for the ticket has an effect on which cluster the respondent belongs to. Passengers who have paid less for their tickets also belong to the price sensitive cluster and have more often chosen a flight with a stop.Warburg et al., (2006) had found out that where women are less price sensitive than men, but gender was not significantly variable in this study with cluster formation in a sense that more men would belong to the price sensitive cluster.

Finally, WTP measures for the direct flight and free food and drinks were calculated. On average, passengers are willing to pay 97,94 euros more to get a direct flight with the duration of 2 hours in comparison to one stop flight with the duration of 4 hours. Also, the willingness to pay for free food and drinks was 19,55 euros in comparison to a situation where food and drinks are not free. The results support the findings of Pereira et al. (2007) who found out that that WTPs for food service vary from 11,95 euros to 15,68 euros from “no food” service to complementary food services. Also, Balcombe et al. (2009) reported WTP of 31 euros from “no food” to meal service. However, Espino et al. (2008) have found lower results with WTP of 11,39 euros from “no free food” to “hot food +drinks” .

WTP measures for three clusters, shown in Table 16 below, does not vary considerable in terms of free food, but the price sensitive cluster has very low WTP for direct flight.

The other two clusters are willing to pay 111,53 euros and 125,55 euros more to get direct flight which is very high amount considering that the 140 respondents who gave their ticket price had paid 177 euros on average. There is only Hess (2008) and Collins et al. (2007) who have also included travel time WTPs in their studies. Hess (2008) studied the UK domestic trips where WTP was found to vary from 45,60 dollars to 58,57 dollars from one stop flight to direct flight and the WTP for flight time reduction was found to vary from 16,83 dollars to 19,81 dollars per every hour. Also, Collins et al. (2007) studied trips from UK and Switzerland to Australia and New Zealand and tested 12 different models. WTP for a reduction of number of stops varied between 19,36 AUD and 96,83 AUD per each stop. WTP for reduction in flight time varied from 29,63 AUD to 119,05 AUD per hour. In this light, the WTPs of this study can be considered realistic and supported at least by Hess (2008) and Collins et al. (2007) considering that the WTPs in Table 16 include one stop and 2 hours of extra travel time.

		WTP for direct flight, 2 hours vs. one stop, 4 hours	WTP for free food vs. no free food
Cluster	N	Average Eur	Average Eur
1	104	111,53	17,98
2	37	38,42	20,09
3	25	125,55	24,51

Table 16. WTP measures for the clusters

5.2 Managerial implications

The results of the study have implications for marketing and product planning. When designing new or changing existing airline service offers for the routes between Helsinki and Germany, this study provides useful information about the level of importance which different service attributes present for the passengers. The passengers, and demand as a result, will react differently to changes in various service attributes price being the most important variable. Passengers also value direct flight option, safety, punctuality, good flight departure time and the speed of check-in. Any change in these service attributes, especially on routes with high level of competition, will change

passengers' buying behavior and, if the level of service is decreased, the passengers are more likely to change their carriers. On the other hand, seat width, the size of the legroom, free food and drinks and possibility to frequent-flier points are not as important to the passengers and changes in these attributes will most likely have less impact on demand. Airline terminal and name of the airline neither seem to have high impact on which airline the passenger chooses.

The WTP measures which were discovered are usable in product planning, pricing and competitive benchmarking. If an airline is offering a direct service and competing against one competitor with non-direct service, that airline can price their products 97,94 euros higher than the competitor, if the service offers of the airlines are otherwise valued evenly by the passengers. Entrance of second direct service operator to the market will most likely decrease the WTP, but in the sub-study about the current market prices the difference between the direct and non-direct service was calculated as being 75 euros on average on the Hamburg route with only one direct operator. The difference between direct and non-direct prices was found to be much less on more competitive routes. Finally, the WTP for complementary food and drinks was found to be 19,55 euros reflecting the situation where food and drinks are complementary versus the situation where there is no complementary food or drinks available. There are three different product alternations in use on routes between Finland and Germany consisting of full service by Lufthansa which offers warm meal and free drinks, medium-level service by e.g. Finnair and AirBerlin who offer some free snacks, but alcoholic drinks with extra charge, and no-frills service by Air Baltic and Blue1 with minimal free services. The medium-level service enables more possible alterations where only some part of the food service is free or that the level of food is either meal or snack, and it was not possible to include all possible variations into this choice-based study. However, the WTP measure is therefore fully applicable from changing the product from Lufthansa's service to low-cost service whereas the WTP from low-cost service to medium-level service is less than the 19,55 euros.

5.3 Suggestions for further research

Choice-based conjoint study has been widely used in the airline context and it is applicable to different markets as long as the choice experiment can be built realistic. In addition to collecting answers from respondents, the methodology can and have been applied to internet travel search engines context with revealed preference data enabling to study attributes. For example, in order to analyze airline's brand value for the markets between Finland and Germany with tens of different airlines operating themselves or via code sharing partners, the choice-based conjoint analysis becomes very challenging when one attribute has 10 or more levels. In terms of choice-based experiment, this study included only three service attributes with each having only two levels. As was discovered in the analysis of the importance of airline service attributes, there are many other attributes which are considered more important than the analyzed food attribute. Analysis of WTPs for other important service attributes such as safety reputation, punctuality, suitable flight departure may become challenging with approach used in this study. Most of the airlines have a good safety record, but due to possible stereotypes of foreign or low-cost airlines being less safe than national flag carriers such as Finnair or Lufthansa, it may be misleading to use levels such "very safe" or "less safe". Therefore it may be better to link safety reputation with real image of the airline so that image of the airline and its safety reputation are analyzed together. Punctuality of the flights and suitability of the flight departure time are much easier to specify to this type choice-based conjoint analysis.

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APPENDICES

APPENDIX 1

Recruitment letter

Aalto University School of Economics

DEAR RESPONDENT!

Thank you for having time and interest in giving your answer to this master's thesis and taking part in developing air travel services. Air travel and at the same time airlines are in the middle of radical change and it is very important for airlines to keep up with passengers' changing tastes and develop services, which match with the new and changed tastes towards air travel services. As a consequence, your response is very important in developing air travel services.

This research focuses on analyzing passengers' preferences for airline service attributes on routes between Finland and Germany. Aim of the research is to give broad picture of air passengers' preferences, find out what kind of services are important for the passengers, and what kind of services passengers want so that operating airlines could develop their services to match with your and your fellow passengers' needs and preferences thereby assuring as pleasant flight as possible.

You can find the research in Internet at www.airtravel2010.fi

Answering the questions takes about 10-15 minutes and all *the answers will be handled* confidentially so that individual respondents can't be recognized. If you have any questions relating to the research, please contact kari.ylioja@student.hse.fi

One of the respondents will win a travel gift voucher worth 200 €. Due to the technical limitations, there is room only for the first 250 respondents so be quick!

Thank you in advance for your valuable contribution to furthering science and development of air travel services.

Have a pleasant flight,

Kari Ylioja
Student and author of the research
Aalto University School of Economics

PART 1:

1. You fly/flew between Helsinki-Vantaa airport and Germany. Which is/was your departure- or destination airport in Germany?

   ☐ Berlin ☐ Düsseldorf ☐ Frankfurt am Main ☐ Hamburg
   ☐ Munich ☐ Other, which?_____

2. How much did the airline ticket cost?

   ☐ _____ euros (please state the amount in euros)
   ☐ I can not remember

3. Where did you make your ticket reservation?

   ☐ Airline internet site
   ☐ Internet travel agency (eg. eBookers, Expedia, Flug.de, Orbitz, Airlinedirect)
   ☐ Traditional travel agency
   ☐ Other place

4. What type of flight did you choose?

   ☐ Direct flight ☐ One intermediate stop ☐ Two or more intermediate stops

5. Which airline do/did you travel with between Finland and Germany?

   ☐ Air Baltic ☐ Air Berlin ☐ Blue1 ☐ Finnair
   ☐ Lufthansa ☐ SAS ☐ Other, which?_____

6. What is/was the purpose of your trip?

   ☐ Work ☐ Holiday or leisure ☐ Visiting friends and relatives
   ☐ Other

7. How long does/did your trip last?

   ☐ 1-3 days
   ☐ 4-7 days
   ☐ over 1, but less than 3 weeks
   ☐ over 3 weeks

8. How long before departure date did you make your ticket reservation?

- ☐ 1-7 days
- ☐ 8-30 days
- ☐ 1-3 months
- ☐ 4-6 months
- ☐ 7-9 months
- ☐ over 9 months
- ☐ I can not remember

PART 2

9. When buying an air ticket (between Germany and Finland), how important do you consider following attributes?

	Not important	Not very important	Don't know	Quite important	Very important
Low price of the ticket	○	○	○	○	○
Number of daily flights	○	○	○	○	○
Suitable flight departure time	○	○	○	○	○
Direct flight to the destination	○	○	○	○	○
Size of the leg room	○	○	○	○	○
Seat width	○	○	○	○	○
Free food and drinks	○	○	○	○	○
Possibility to gain frequent flyer miles/points	○	○	○	○	○
Name of the airline	○	○	○	○	○
Safety reputation of the airline	○	○	○	○	○
Punctuality of flights	○	○	○	○	○
Speed of check-in	○	○	○	○	○
Airline terminal	○	○	○	○	○

PART 4:

10. I am
    - ☐ Male
    - ☐ Female

11. My year of birth is _____.

12. My nationality is _____.

13. My current country of residence is _____.

14. Monthly gross income of my household are:
    - ☐ Under 900€
    - ☐ 901-1900€
    - ☐ 1901-2900€
    - ☐ 2901-3900€
    - ☐ 3901-4900€
    - ☐ 4901-5900€
    - ☐ 5901-6900€
    - ☐ Over 6900€

15. My educational level is
    - ☐ Comprehensive /elementary school
    - ☐ Vocational school
    - ☐ Secondary school graduate/ matriculation
    - ☐ University/polytechnic

16. I make leisure and holiday trips by air _____ times a year.

17. I make business trips by air_____ times a year.

APPENDIX 2

Differences among preferences

	Male		Female		Significance
Service attributes	Mean	St.Dev.	Mean	St.Dev.	
Low price of the ticket	4,41	0,94	4,63	0,64	0,081
Number of daily flights	2,65	1,26	2,54	1,22	0,55
Suitable flight departure time	3,67	1,1	3,89	1,14	0,22
Direct flight to the destination	4	1,17	4,45	0,86	0,0089*
Size of the leg room	2,7	1,29	2,27	1,13	0,0311*
Seat width	2,42	1,14	2,45	1,14	0,33
Free food and drinks	2,46	1,18	2,51	1,26	0,897
Possibility to gain frequent flyer miles/points	2,05	1,13	2,22	1,3	0,39
Name of the airline	2,28	1,2	2,57	1,29	0,15
Safety reputation of the airline	3,88	1,33	4,55	0,82	<0,0001*
Punctuality of flights	3,69	1,04	4,41	0,69	0,0003*
Speed of check-in	3,2	1,12	3,97	0,9	<0,0001*
Airline terminal	2,5156	1,31	2,81	1,3	0,95

* significance at 95% confidence interval

Table 1. Difference of importances based on gender

	Less than 200 euros		More than 200 euros		Significance
Service attributes	Mean	St.Dev.	Mean	St.Dev.	
Low price of the ticket	4,617	0,7912	4,4565	0,6221	0,2303
Number of daily flights	2,4681	1,2675	2,7609	1,2326	0,1974
Suitable flight departure time	3,5106	1,2247	4,2826	0,752	<0,01*
Direct flight to the destination	4,1596	1,1101	4,5217	0,7223	0,0222*
Size of the leg room	2,4362	1,2663	2,2391	1,058	0,364
Seat width	2,2766	1,1585	2,1522	1,0743	0,5422
Free food and drinks	2,4681	1,2243	2,4783	1,2426	0,9634
Possibility to gain frequent flyer miles/points	2,0745	1,2025	2,4565	1,3451	0,0918
Name of the airline	2,4574	1,2328	2,5	1,278	0,8499
Safety reputation of the airline	4,1702	1,0939	4,5	0,8882	0,0777
Punctuality of flights	4,0319	1,0102	4,3478	0,7369	0,0380*
Speed of check-in	3,6489	1,002	3,6304	1,1806	0,9231
Airline terminal	2,7553	1,2925	2,6304	1,3721	0,5996

* significance at 95% confidence interval

Table 2. T-Test. Difference of importances based on ticket price

VARIANCE ANALYSES

	Number of annual business trips		Number of daily flights		Possibility to gain frequent flyer	
		N	Avg	StDev	Avg	StDev
1	0 trips	95	2,4736	1,236347	1,9263	1,159989
2	1-3 trips	41	2,4146	1,2445	2,2439	1,9959
3	4 or more trips	30	3,166	1,08543	2,733	1,36289
			2,584	1,2366	2,1506	1,23885
	F		4,25		5,25	
	Significance (95%)		0,0158		0,0062	
	Significant differences		3 and 1, 3 and 2		3 and 1	

	Number of holiday or leisure trips per		Number of daily	
		N	Avg	StDev
1	0-1 trips	20	2,55	1,19
2	2-3 trips	74	2,42	1,19
3	4-5 trips	45	2,44	1,24
4	6 or more trips	27	3,3	1,17
	Total		2,58	1,24
	F		3,81	
	Significance (95%)		0,0114	
	Significant differences		4 and 1, 4 and 2, 4 and 3	

	Education level		Low price of the ticket		Size of the leg room		Seat width		Name of the airline	
		N	Avg	StDev	Avg	StDev	Avg	StDev	Avg	StDev
1	Compreh./elem. school	5	4,2	0,84	2,8	1,79	2,4	1,34	2,6	1,52
2	Vocational school	24	4,04	1,16	3,21	1,41	2,96	1,08	2,71	1,4
3	Secondary school/matricul.	36	4,69	0,75	2,33	1,35	2,31	1,35	2,89	1,41
4	University / polytechnic	101	4,64	0,61	2,28	1,08	2,16	1,02	2,24	1,11
	Total		4,55	0,77	2,44	1,21	2,31	1,14	2,46	1,26
	F		5,04		4,34		3,34		2,87	
	Significance (95%)		0,0023		0,0057		0,0208		0,038	
	Significant differences		3 and 2, 4 and 2		3 and 2, 4 and 2		3 and 2, 4 and 2		4 and 3	

	Age groups		Low price of the ticket		Suitable flight departure time		Direct flight to the destination		Airline terminal	
		N	Avg	StDev	Avg	StDev	Avg	StDev	Avg	StDev
1	15-24 years	26	4,78	0,51	3,23	1,11	3,85	1,26	2,58	1,32
2	25-44 years	95	4,61	0,72	3,81	1,16	4,33	0,96	2,4	1,2
3	45 years or more	45	4,31	0,95	4,13	0,97	4,42	0,92	3,4	1,35
	Total		4,55	0,77	3,81	1,13	4,28	1,01	2,7	1,26
	F		3,58		5,57		3		10,03	
	Significance (95%)		0,0302		0,0046		0,0526		<0,0001	
	Significant differences		3 and 1, 3 and 2		3 and 1, 2 and 1		3 and 1, 2 and 1		3 and 1, 3 and 2	

	Prior purchase time		Low price		Airline Name	
		N	Avg	StDev	Avg	StDev
1	1-7 days	13	3,923	1,5525	3,307	1,4936
2	Over 1 week, <3 months	109	4,59633	0,66832	2,339	1,17236
3	More than 3 months	44	4,6363	0,61345	2,5	1,32067
	Total		4,554	0,7746	2,4578	1,258
	F		4,95		3,58	
	Significance (95%)		0,0082		0,03	
	Significant differences		3 and 1, 2 and 1		3 and 1, 2 and 1	

APPENDIX 3: A 2 log-likelihood test

	Log-likelihood	Difference to main effects	Estimated parameters	Additional parameters	2 x difference	P-value from Chi-Square table
Main effects	-950,37544		7			
Price x Time and Time x Free food	-949,90265	0,47279	15	8	0,94558	>0,99
Price x Time	-950,32627	0,04917	11	4	0,09834	>0,99
Time x Food	-949,96471	0,41073	11	4	0,82146	>0,90

APPENDIX 4

CBC/HB Build Process (18.1.2011 14:23:09)

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Attribute	Coding	Levels
Price	Part Worth	2
Travel time	Part Worth	2
Free food	Part Worth	2

The number of parameters to be estimated (including 'None') is 4.

Build includes 166 respondents.

Total number of choices in each response category:

Concept	Number	Percent
1	511.0	30.78%
2	542.0	32.65%
3	497.0	29.94%
NONE	110.0	6.63%

There are 1660 expanded tasks in total, or an average of 10.0 tasks per respondent.

==========

Preliminary iterations	10000
Draws used per respondent	10000
Total iterations	20000
Skip factor for log file	100
Number of respondents	166
Parameters per respondent	4
Total task weight	1.00

No constraints in use

Random draws not saved

Variables are effects-coded

No covariates in use

Prior degrees of freedom	5
Prior variance	2.00
Target acceptance rate	0.30
Random seed used	3395

Iteration	Jump Size	Acceptance	Pct. Cert.	RLH	Avg Var	Param RMS
100	0.74700	0.31928	0.81645	0.77534	3.75438	3.10879
⋮	⋮	⋮	⋮	⋮	⋮	⋮
20000	0.57167	0.33735	0.87801	0.84441	26.14848	7.38358

This session did 20000 iterations in 70 seconds.

APPENDIX 5

		CLUSTERS		
Number of Business trips per year		Time sentitive-cluster	Price elastic-cluster	Time sensitive, conditional - cluster
0 trips		57,7	51,4	64,0
1-3 trips		21,2	32,4	28,0
4 or more trips		21,2	16,2	8,0
		100%	100%	100%
N=	166			
χ^2=	3,9832			
d.f.=	4			
p=	0,408			
Number of leisure trips per year				
0-1 trips		11,5	18,9	4,0
2-3 trips		46,2	40,5	44,0
4-5 trips		25,0	27,0	36,0
6 or more trips		17,3	13,5	16,0
		100 %	100 %	100 %
N=	166			
χ^2=	4,1539			
d.f.=	6			
p=	0,6559			
Gender				
Male		34,6	46,0	44,0
Female		65,4	54,1	56,0
		100 %	100 %	100 %
N=	166			
χ^2=	1,8474			
d.f.=	2			
p=	0,397			

Monthly household income					
Under 1900€			12,5	48,7	24,0
1901-3900€			33,7	29,7	48,0
3901-5900€			33,7	16,2	4,0
Over 5901€			20,2	5,4	24,0
			100 %	100 %	100 %
	N=	166			
	χ^2=	30,2876			
	d.f.=	6			
	p=	<0,0001			
Age groups					
15-24 years			9,6	32,4	16,0
25-44 year			61,5	48,7	52,0
45 or more years			28,9	18,9	32,0
			100 %	100 %	100 %
	N=	166			
	χ^2=	11,2583			
	d.f.=	4			
	p=	0,0238			
Type of flight					
Direct			89,4	62,2	88,0
1 or more stops			10,6	37,8	12,0
			100 %	100 %	100 %
	N=	166			
	χ^2=	14,9609			
	d.f.=	2			
	p=	0,0006			
Price paid for ticket					
>200€			56,8	90,6	75,0
<200€			43,2	9,4	25,0
			100 %	100 %	100 %
	N=	140			
	χ^2=	12,81			
	d.f.=	2			
	p=	0,0017			

Level of Education					
Comperehensive/elementary/ vocational/secondary school			32,7	51,4	48,0
University/Polytechic			67,3	48,6	52,0
			100 %	100 %	100 %
	N=	166			
	χ^2=	4,954			
	d.f.=	2			
	p=	0,084			
Purchase of ticket days prior					
1-7 days			23,1	21,6	12,0
more than week			76,9	78,4	88,0
			100 %	100 %	100 %
	N=	166			
	χ^2=	1,4945			
	d.f.=	2			
	p=	0,4737			
Purpose of the trip					
Holiday or Leisure			41,3	35,1	32
Other			58,7	64,9	68
			100 %	100 %	100 %
	N=	166			
	χ2=	0,978			
	d.f.=	2			
	p=	0,613			
Duration of the trip					
1-7 days			63,5	59,5	68
more than one week			36,5	40,5	32
			100 %	100 %	100 %
	N=	166			
	χ2=	0,473			
	d.f.=	2			
	p=	0,789			