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Implementing market segmentation into strategic decision-making: case of a transport company

Master's thesis

Examiners: Professor Pasi Luukka and Post-doctoral researcher Jyrki Savolainen

ABSTRACT

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Market segmentation is a vital part of a company's value creation process and strategic and tactical planning. In the recent decades, academic segmentation research has focused on the extraction of segments and technical details of market segmentation analysis instead on the strategic nature of segmentation, despite its significant and well-established role in strategic planning. The evolving analytical capabilities of companies and modern algorithms support the technical orientation of research domain. Despite the modern tools, most of the segmentation projects and their benefits remain short-lived. The successful implementation of a segmentation solution is a prerequisite for realizing its benefits, which emphasizes the importance of the topic of this study.

The objective of this thesis is to examine the segmentation from a strategic perspective through three different main themes: the selection of segmentation variables, the evaluation of segment criteria and the examination of implementation problems. The study investigates the factors that influence the application of segmentation in practice. The thesis consists of three parts: a theory chapter, which introduces the reader to the most important concepts for in-depth understanding, a comprehensive industry-specific literature review on the segmentation in train travel industry, and a qualitative research study based on the analysis of the state of segmentation in the case company through the three main themes. The qualitative research is based on data provided by the case company.

As a conclusion, the segmentation variables, segment criteria and implementation practices applied by train travel companies were found to be consistent and partly in line with theory following certain guidelines. Various segmentation variables were found to be largely well-identified, and the passengers have been successfully segmented with good results. Segment criteria were found to be based not only on statistical metrics but also on qualitative values, and even on intuition and subjective experience. The implementation practices were found to be inadequate as a result of both a literature review and the case study. As a result, certain discrepancies between theory and practical application were found. The study supports the observation that segmentation theory and practical application differ and that there exists a research gap related to the managerial implications of market segmentation study, to which this study aims to contribute.

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Segmentointi on oleellinen osa yrityksen arvonluontiprosessia ja strategista sekä taktista suunnittelua. Akateeminen segmentointitutkimus on viime vuosikymmeninä keskittynyt segmentoinnin strategisen luonteen sijaan segmentoinnin toteutukseen ja sen teknisiin yksityiskohtiin huolimatta segmentoinnin merkittävästä ja vakiintuneesta strategisesta asemasta. Alati kehittyvät analytiikkaratkaisut tukevat tätä teknistä suuntautumista. Huolimatta kehittyvistä työkaluista, suurin osa segmentointiprojektien hyödyistä jäävät lyhytaikaisiksi. Segmentointiratkaisun onnistunut käyttöönotto on edellytys sen hyötyjen realisoimiseksi, mikä korostaa tämän tutkimuksen tärkeyttä ja ajankohtaisuutta.

Diplomityön tavoitteena on tarkastella segmentointia strategisesta näkökulmasta kolmen eri pääteeman kautta: segmentointimuuttujien valinnan, segmenttikriteerien arvioinnin ja segmentointiratkaisun käyttöönoton ongelmien tarkastelun kautta. Tutkimuksessa selvitetään tekijät, jotka vaikuttavat segmentoinnin soveltamiseen käytännössä. Työ koostuu kolmesta osasta: teoriakappaleesta, jossa lukijalle esitellään tärkeimmät konseptit syvällisen ymmärryksen saamiseksi, kattavasta toimialakohtaisesta kirjallisuuskatsauksesta junaliikennealan segmentoinnista sekä laadullisesta tutkimuksesta, joka pohjautuu esimerkkiyrityksen segmentointiprosessin analysointiin kolmen pääteeman kautta. Laadullinen tutkimus perustuu yritykseltä saatuun dataan.

Tutkimuksen tuloksena havaittiin, että junaliikennealan yritysten käyttämät segmentointimuuttujat, segmenttikriteerit ja käyttöönoton toteutukset ovat yhtenäisiä ja osin noudattavan tiettyjä suuntaviivoja. Erilaiset segmentointimuuttujat havaittiin olevan pääosin hyvin tunnistettu ja matkustajia on onnistuttu segmentoimaan hyvin tuloksin. Segmenttikriteerien havaittiin pohjautuvan tilastollisten mittareiden lisäksi laadullisiin arvoihin, ja jopa subjektiiviseen kokemukseen. Segmentointiratkaisun käyttöönoton toteutuskäytänteet havaittiin puutteellisiksi niin kirjallisuuskatsauksen kuin esimerkkiyrityksen dataan perustuvan analyysin tuloksena. Analyysin tuloksena huomattiin ristiriitoja teorian ja käytännön soveltamisen välillä. Tehty tutkimus vahvistaa havaintoja siitä, että segmentointiteoria ja käytännön soveltaminen eroavat ja niiden välillä vallitsee tutkimustyhjiö, jota tämä tutkimus osaltaan pyrkii täyttämään.

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This thesis concludes my studies in LUT and marks the beginning of a new chapter in my life. I start my journey into professional working life with mixed feelings of enthusiasm and sadness; the happy student life in Lappeenranta is a door especially hard to shut and leave behind. Luckily the memories, the friendships and maybe even some wisdom will stay with me. I am truly grateful for all the things I've learned and the great experiences I've had. I'd like to thank all the people I've studied, worked and had fun with, and all the teachers in LUT for your dedication and commitment to teaching. My special thanks go to all my friends who I was lucky enough to meet in Lappeenranta. My life would be much more boring without you guys.

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ABBREVIATIONS

4 Ps = Price, Product, Place, Promotion

KPI = key performance indicator

STP = segmentation, targeting, positioning process

1 INTRODUCTION

Market segmentation is the process of splitting and classifying consumers into different groups, which are characterized by sharing a similar set of needs (McDonald & Dunbar, 2013, p.9). Market segmentation is widely researched since product differentiation set the foundation for new kind of value creation and made it possible to a company to reach customers with different preferences. Customers in the same market segment share a comparable set of needs and attributes, which enables the use of targeted marketing activities and unique value propositions when correctly exploited.

The forefather of market segmentation, Smith's (1956) plea was for new segmentation bases, data analysis techniques and for generally putting market segmentation at the heart of strategic decision making. Failure to understand the importance of market segmentation is the principal reason for failure to compete effectively in the markets. (McDonald & Wilson, 2011)

Although the strategic aspects and rationales were identified and addressed at an early stage of market segmentation evolution, most of the academic literature has dealt with the technical aspects of market segmentation study in the recent decades, such as the pure act of identifying segments or defining and selecting segmentation bases. As important as these tactical operations are regarding the success of a segmentation study, market segmentation should be tied to the overall goals and strategies of a firm (Wedel & Kamakura, 2000, pp. 336-337). The gap between the academics and practitioners – the research and implementation of segmentation – has widened (Quinn & Dibb, 2010).

One of the key findings of Quinn and Dibb's (2010) study was that the managerial relevance and implementation of market segmentation study were reported to be more concerning themes than the focus on segmentation variables and techniques. Another finding was that while the needs and interests of practitioners of segmentation were changing, the research priorities have not changed remarkably in the past 30 years. (Quinn & Dibb, 2010, pp. 1241-1242)

According to Quinn and Dibb (2010), the key concerns of management are the lack of easily applied models and the lack of evidence of the financial benefits of segmentation. Market segmentation is seen as expensive, risky and time-consuming with little added value. Integrating segmentation research into strategic decision making have not been fully answered by academics. The vast majority of the literature focuses on statistical methods of extracting the segments, rather than on a strategic approach to segmentation (Thoeni, Marshall, Campbell, 2016, p. 2195).

Strategical segmentation has emerged as a topical management problem. Today, when considerable progress has been in the technical area of market segmentation and research, the problem is not anymore in how to find segments, but in how to manage them (Wedel & Kamakura, 2000, pp. 336-337). To this day, technological advancements, decreased cost of computing and better analytical capabilities have driven the evolvement of market segmentation. This has led to a point where the managerial aspects and strategic implications have lost ground in the research domain (Wyner, 1995). According to Christensen et al. (2005), less than 10% of new products succeed, meaning over 90% of new products fail. In a statistical coincidence, only 10% of the marketing plans over the last 35 years contained proper segmentation plans, meaning 90% did not. Yankelovich & Meer (2006) found out in their study that while 59% of executives had recently carried out a major segmentation project, only 14% reported that the outcomes had real value to them.

Yet the market segmentation is seen as one of the most critical and important data-based business activities. Cronin & Hightower (2004) conducted a management survey to examine the role of marketing in public transport organizations in the United States. Their management study revealed that market segmentation was found very useful tool by the respondents - 89 % of respondents reported using segmentation strategies. Based on the segmentation information, business decisions are made, and strategies are formed that apply to all the different functions of the company, such as marketing, product development and pricing. A company may have several internal and external systems in place, from which the data obtained must first be processed, aggregated, and analyzed to draw conclusions for strategic decision making. How to

find and or create customer segments from this enormous data amount, segments that serve multiple segments, has become the key question for companies across all industries.

The higher we go in the organization's hierarchy, the more data is being re-aggregated to provide the latest, essential information to the executive level. Despite the still ongoing trend of customer-centric business, this information does not usually include customer segments. While the organization may indeed act cross-functional, segment information is not fully utilized in strategic decision making during an era in which ever-evolving analytical applications offer companies new opportunities to analyze customer data and turn it into relevant business decisions. The organization structure has evolved around a product or demographic-specific areas, rather than customer segments.

The art of segmentation is becoming more complex due to the increased analytical competence of companies and the large amount of available data (Bayer & Taillard, 2013). Since modern analytical tools and know-how are generally available to utilize information derived from data, business decision-makers are experiencing record-high pressures to keep their customers satisfied. The winner of the race is a company who manages to utilize market segmentation data the best. Data and analytics are seen as a shortcut to growth and increased profitability as these tools are considered to fix deep-rooted managerial problems by lines of code.

This study aims to raise awareness about the managerial problems of a segmentation study. The findings of the research are used to understand better the strategic rationales of segmentation study and to evaluate the effect of the choices made in an early stage of segmentation project on the outcome in terms of the results' utilization degree for decision making. The study investigates how companies conduct customer segmentation and compares it to relevant literature. The main focus of this study is to identify problems companies face when implementing segment information into decision making across the organization.

Prior research of segmentation focuses mostly on different segmentation techniques, technologies and other tactical aspects of market segmentation. The purpose of this study is not to evaluate the best segmentation algorithm but to study the managerial side of market segmentation activity and to find out why, despite the latest tools, long-term benefits of market segmentation are not achieved and why otherwise defined and precise segments cannot be fully exploited to the strategic decision making.

1.1 Research objectives and scope

This thesis was conducted on behalf of a case company operating in the train travel industry. The case company is a large transportation company serving millions of customers every year and offering them train travel services. The case company has heavily invested in developing its services and management towards a more customer-oriented approach lately. Global megatrends, such as digitalization, urbanization and environmental friendliness are the key drivers of business development, offering a huge potential for the case company to improve its operations and increase its market share inside the travel industry.

The case company has decided to pursue growth by utilizing market segmentation. The case company aims to reach a state where the segmentation information would guide the strategic decision making, offering much-needed information for service development, pricing, marketing and overall strategy formulation. The main challenge is that the case company does not know their market segment or the value potential of different passenger groups. This thesis aims to provide a framework to help the case company to develop segmentation plans by focusing on three main problem-topics: the choice of segmentation variables, the evaluation of segment criteria and the implementation of segmentation solution. The main objectives are to recognize challenges related to these concepts and recommend improvements on how to overcome those challenges.

The case company started a segmentation project together with a third-party partner in spring 2020. The project aimed to find and establish customer segments with the

help of internal and external interviews, surveys and data analysis. This thesis is related to this particular project to study what was done, how it was done and how to do better in the future. The scope of this study is formed around the problems experienced by the case organization, which are related to managerial issues, more than the lack of know-how on the technical aspects of the market segmentation process.

This study contributes to existing research by providing new insights from the strategic point-of-view in terms of linking the segmentation tasks, such as the selection of segmentation base, to the bigger picture of strategic decision making. Capturing the potential benefits of segmentation study is linked to how well the results can be implemented into part of strategic decision-making so that strategic plans can be formed, and actionable decisions can be made. This study approaches the above-mentioned topic with the following research problem:

How to identify and implement customer segments into strategic decision making?

The case company does not know how to utilize market segments in strategic decision making. To solve and find answers to the set problem, the following research questions are formed.

RQ1. What different market segmentation bases exist for train passengers and how these market segmentation bases can be combined to support strategic decision-making?

RQ2. What are the criteria for a good segment and how evaluate the quality of segments in the travel industry?

RQ3. What are the strategic reasons for doing segmentation in train travel and how the segments can be implemented in strategic decision making?

The first research question aims to study how a company can combine multiple segmentation bases and find the most suitable way how different segmentation

methods can be combined when using more than one segmentation variables as a segmentation base. The second research question aims to assess what criteria a company should use to justify the choice of segmentation bases and evaluate the quality of segments and overall segmentation solution. The third research question focuses on examining the strategic nature of market segmentation and the problems related to the implementation of segmentation solution. The strategic nature of market segments guides the whole research, but it is especially studied through the third research question.

The scope of this study is to focus on the selection of segmentation bases, the evaluation of segment criteria and the implementation phase of the segmentation process. This choice is later justified by prior literature and research of market segmentation, where it is stated that the selection segmentation variables and bases should be indeed related to the overall aim of market segmentation study and hence is directly related to the implementation, management and strategic decision making.

The segmentation process consists of multiple tasks, but only these stages are reviewed and studied. This study does not address the data analysis phase of the segmentation process, meaning that further research on data processing, segment extracting, or precise algorithms are not included in the analysis. By answering the research questions, this thesis aims to provide an extensive analysis of the current state-of-art of market segmentation in the case company, provide recommendations and overview of how the challenges faced by the case company could be addressed and solve related to the market segmentation.

1.2 Methodology and data

This study is carried out using qualitative research methods. Methodologically this thesis is divided into two sections. The theoretical framework introduces the concept of market segmentation and its strategic implications to the reader including also the three main research themes of the study; segmentation variables, segment criteria and implementation. The theoretical framework aims to help the reader to understand the strategic complexity of the market segmentation domain. Next, an extensive literature

review focuses on the introduced themes from the point of view of train travel, providing a detailed description about the utilization of market segmentation and application of different segmentation variables, criteria and the best practices of implementation. Together these two chapters form the first section of the research.

The empirical section begins with describing the research data and background of the study before proceeding into the actual analysis. The proprietary data provided by the case company is analysed to form a picture of the current state and challenges of the application of market segmentation in the case company.

Relevant scientific literature and proprietary data provided by the case company are used as research data. The employment period in the case company, during which the segmentation project was initiated, can also be considered a data collection method, as well as the observations and the experiences gained during the employment period and participation in the segmentation project. The state of market segmentation in the case company has been described with the help of the information obtained during the employment and data provided by the case company. Also, series of phone calls, emails and meetings were held during the research.

1.3 Structure of the report

This thesis consists of six chapters. In the first chapter, the topic of the study is introduced to the reader and the research objectives are presented. The second chapter focuses on building the theoretical framework by presenting the relevant concepts of market segmentation to the reader. The third chapter delves into more detail on the selection of segmentation variables, evaluation of segment criteria and implementation of segmentation solution in train travel. At the beginning of the fourth chapter, the methodology of the literature review is presented. The third chapter includes also a summary of the findings of the literature review. In the fourth chapter, the choice of research methods is justified, and the research methodology is more widely presented as well as the research process. The fifth chapter analyses the state of market segmentation of the case company and the challenges faced based on the data and presents the results. The final chapter, the sixth chapter, answers the

research questions, presents the findings of the analysis and the conclusions. Also, the discussion, suggestions for further research along the limitations of the study are presented. The structure of the study is presented in **Figure 1** below.

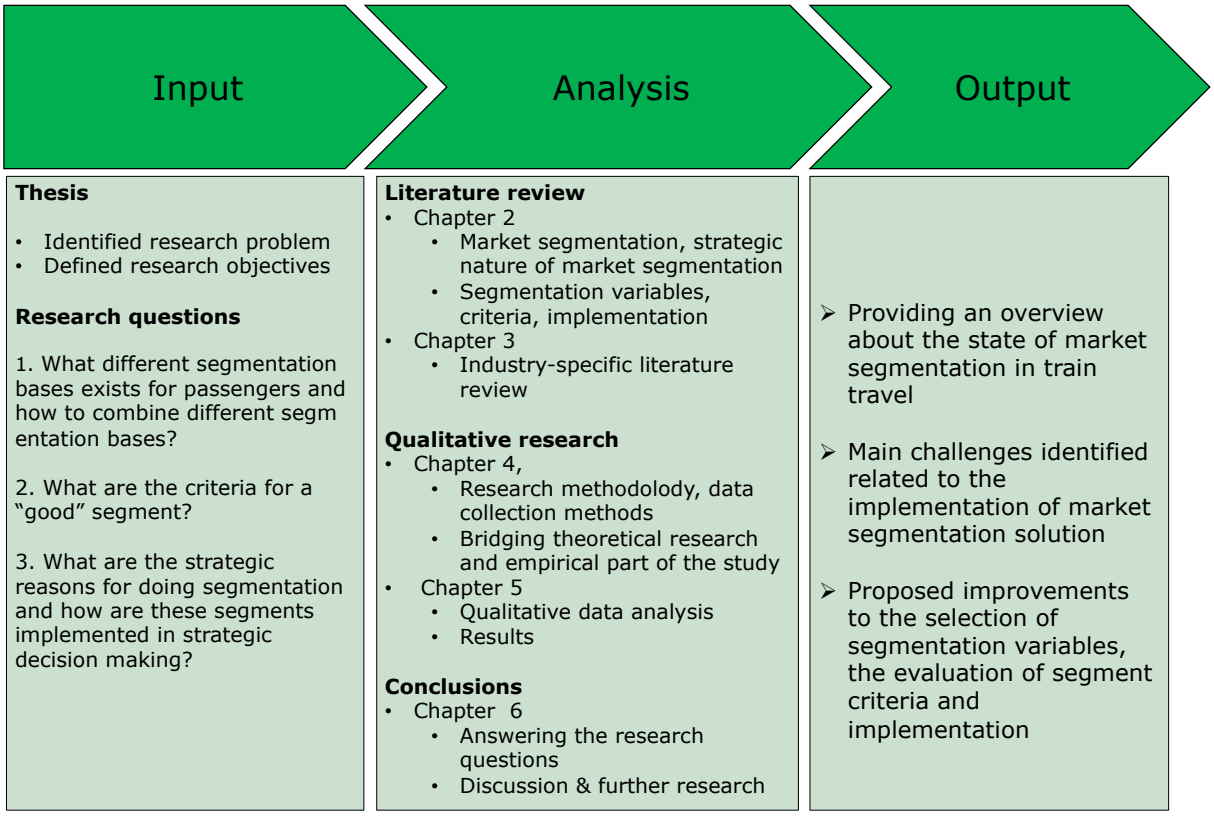


Figure 1. The research process of the study

Figure 1 visualizes the research process and steps of this thesis. First, the research problem and research objectives are set based on the discussions with the case company and previous studies in the domain. Three research questions are formed to help to solve the research problem. The second phase focuses on building the theoretical framework based on scientific research literature and articles. The analysis phase includes a comprehensive literature review about segmentation in the train travel industry, an industry-specific for this particular thesis. The analysis phase includes the qualitative empirical study. The research process and research methodology are introduced in Chapter 4. Chapter 4 justifies the choice of research method and acts as a bridge between the theoretical research and empirical research study. In Chapter 5, the actual empirical research is conducted. The research data is analysed and the results are presented. The final chapter, Chapter 6, focuses on

answering the research questions based on the results and provides conclusions. The outputs of this study are the recommendations and overview of the market segmentation domain in the train travel industry.

2 THEORETICAL FRAMEWORK

This chapter presents the theoretical framework of this study on market segmentation and its strategic implications. The purpose of this chapter is to first introduce the concept of market segmentation and then focus on the different segmentation bases and the criteria for market segments. After this, the strategic nature of market segmentation is presented and evaluated.

2.1 Market segmentation concept

Traditional market segmentation theory has been widely researched since the concept was introduced by Smith (1956) during a time when companies began to develop segment-wise strategies regarding their products and services. Unlike product differentiation, which was based on extensive use of advertising and promotion aimed at the whole market, market segmentation made it possible to a company to find new markets by targeting different marketing activities to different groups of consumers. The concept of market segmentation was based on the general observation that the market consists of smaller, homogeneous groups of consumers. (Smith, 1956)

Consumers still have different tastes when it comes to buying products and services. For instance, some of us prefer to travel in business class for better service and others settle for economy class to travel cost-efficiently. In addition to unique needs, products or services are bought by consumers with different characteristics, such as age, location and attitudes (Kotler & Armstrong, 2017, p. 213; McDonald & Dunbar, 2013, p. 34; Kumar, 2004, p.30).

Although every consumer is unique to some extent, consumers belonging to the same market segment share comparable response towards a company's marketing efforts. In addition to marketing and advertising, consumers belonging to the same market segment have similar responses to certain product features or prices. These same preferences can also concern specific distribution channels. These marketing activities are related to the marketing mix of 4 Ps, a set of competitive tools of marketing –

product, price, place and promotion. (Brotspies & Weinstein, 2019; Kumar, 2004; Keller & Kotler, 2016, p. 268; Smith,1956)

Therefore, companies can identify different groups of buyers by identifying the differences between them and then evaluate the business opportunities present in each group (Brotspies & Weinstein, 2019). Based on these differences, a company may develop new targeted products and customer processes, differentiate products and prices or provide different service to different customers (Storbacka et al, 1999, p. 39). Unfolding the business potential of each segment is done by evaluating other variables of a segment and trying to predict the purchasing behaviour of customers belonging to a specific segment based on them (Storbacka et al, 1999, p. 39). After a successful segmentation study, a company can decide which potential segment or segments to target and how (Brotspies & Weinstein, 2019; Keller & Kotler, 2016, p. 31).

A market segmentation study aims to find out which segment or segments offer the greatest business potential (Weinstein, 2004, p. 5). Another goal of market segmentation is to achieve strategic objectives, for example, a higher return on investment and market share (Mahajan & Jain, 1978, p. 341). The concept of market segmentation suggests that segment-wise strategies allow better alignment between customer needs and the company's offering; increased customer satisfaction drives long-term competitive advantage (Smith, 1956; Pierce & Morgan, 1993, p. 124).

Market segmentation has a number of both short-term and long-term benefits. The long-term benefits are related to increased profitability, market share, sales and customer satisfaction. More specifically, a company can learn more about their customers, their position in the market and their organizational strengths and weaknesses with the information gathered during a segmentation study. Besides, market segmentation helps to allocate resources cost-effectively when the needs of customers and marketing mix preferences of certain segments are known (Dolnicar, Grün & Leisch, 2018, p. 3; Weinstein, 2004, pp. 15-16).

Market segmentation has also costs associated as it requires substantial investment by the whole organisation in terms of time, capital and human resources. The risks of market segmentation are especially related to the implementation phase of segmentation strategy; the effectiveness of the segmentation study is directly related to the management's ability to implement its strategic implications. A segmentation study can be considered useless unless it is supported by all the different functions of a company (e.g. pricing, product development, marketing, finance and operations). The costs of failed segmentation study can also be realized when the monitoring of changing market dynamics and segments' development over time, are neglected. (Dolnicar et al., 2018, p. 8; Weinstein, 2004, pp. 16-20)

2.2 Market segmentation in strategic decision making

Market segmentation has an important role in strategic marketing management (Keller & Kotler, 2016, p. 57; Kotler & Armstrong, 2017, p. 34). Market segmentation is a component of the strategic value delivery process and part of the STP (segmentation-targeting-positioning) process (Kumar, 2004, p. 27). The STP process consists of assessing the needs of customers, selecting the target segments and determining the value propositions to meet these needs, communicating these value propositions internally and externally and monitor the value delivered (Keller & Kotler, 2016, p. 57; McDonald & Dunbar, 2013, pp. 3-4). **Figure 2** below illustrates the value delivery process of strategic marketing, in which market segmentation creates the foundation for value creation.

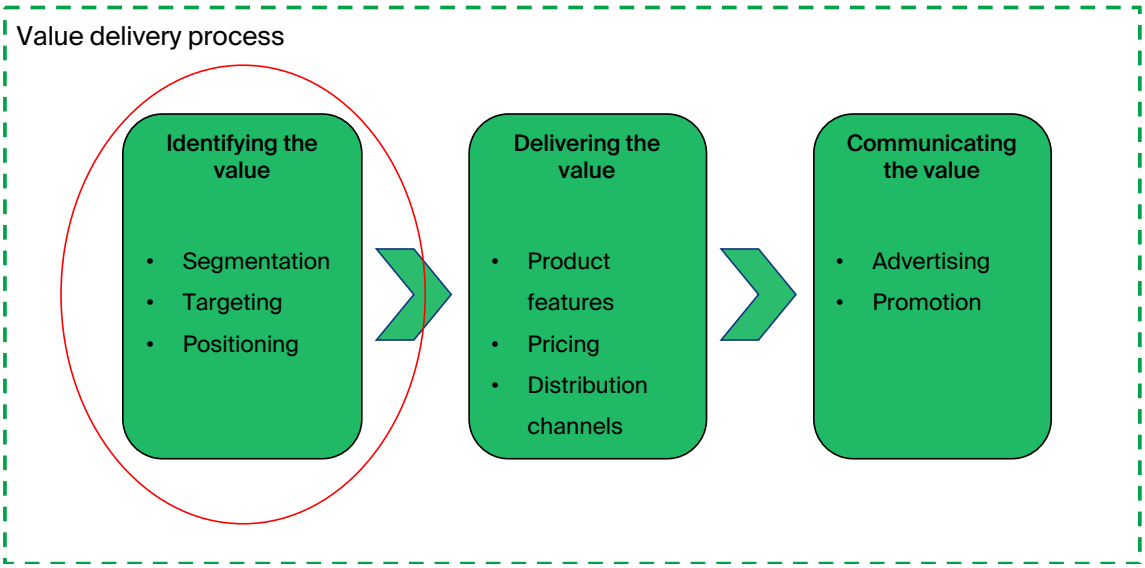


Figure 2. The value delivery process in strategic marketing (Keller & Kotler, 2016, p. 57; Kumar, 2004).

Marketing and marketing-related activities such as market segmentation, targeting and positioning, can be defined as a matching process where the final goal is value creation (McDonald & Dunbar, 2013, p.9). As illustrated in **Figure 2,** market segmentation is located in the first phase of company's value delivery process, being part of the STP process together with targeting and positioning (Keller & Kotler, 2016, p. 57). Identifying and choosing the value delivered is considered to be the first area to focus on regarding strategic marketing planning. This is done through market segmentation, targeting and positioning. Described as a process – a company segments the market, selects the most appropriate target segments and develops positioning strategies for its value offering (Keller & Kotler, 2016, p. 57). Based on the resulted strategies of the STP process, a company can develop tactical marketing plans with which it tries to attract selected market with the help of marketing mix activities of four P's and promote their value proposition (Kumar, 2004, pp. 10-11).

The last two phases of Keller & Kotler's (2106) value delivery process – delivering and communicating the value, have more of a tactical nature and are considered to be part of tactical marketing planning. When considering the way of delivering the value to the targeted segment, a company must examine product, price and place-related elements such as product features, pricing and distribution channels. Product or service features should be configured to answer and satisfy the benefits sought by customers, the

pricing should be adjusted regarding the purchasing power of the segment's buyers and profitability goals of the company and finally, the distribution channels should be determined per segment. The last phase of the value delivery process, communicating the value, includes advertising and promotion-related activities, meaning promoting the products or services provided in relevant channels to attract buyers of a certain segment. (Keller & Kotler, 2016, p. 57; Kumar, 2004)

To summarize, market segmentation can be seen as a tactical and strategic task by nature at the same time. Market segmentation is tied to company's both tactical and strategical planning considering tactical marketing activities and strategic value creation process (Dolnicar et al., 2018, pp. 22-25). **Figure 3** summarizes the relationship of market segmentation between strategic marketing planning and tactical marketing planning.

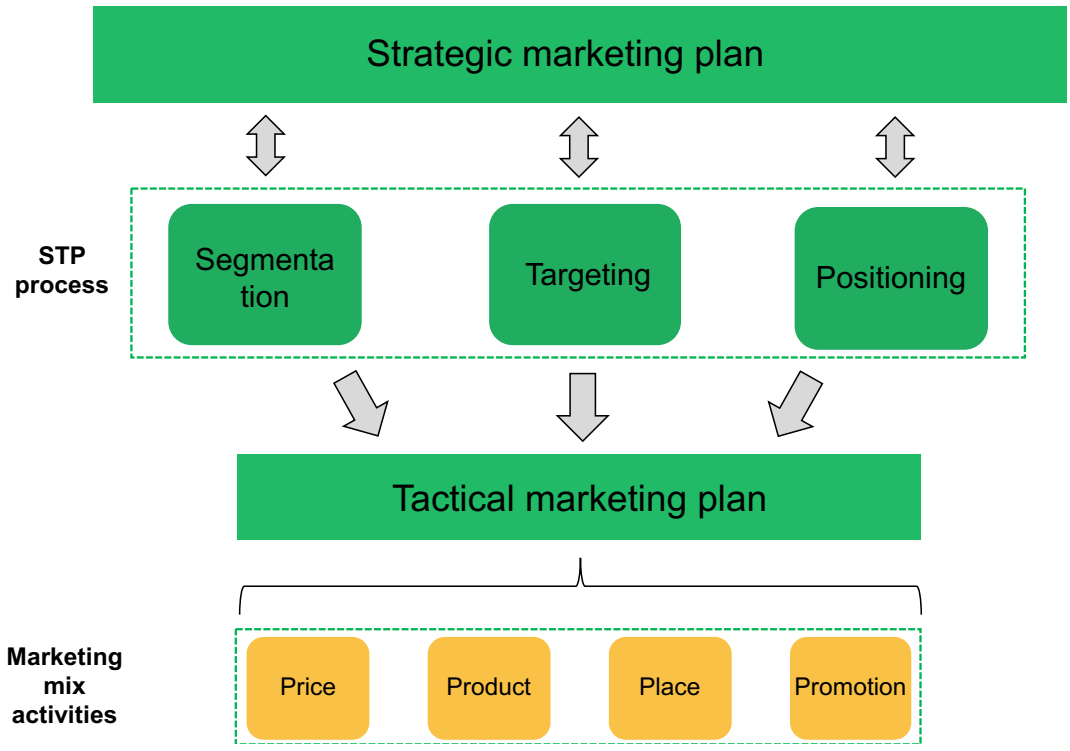


Figure 3. The strategic and tactical marketing processes and activities (Dolnicar et al., 2018; Keller & Kotler, 2016, pp. 59; Kumar, 2004).

A company's marketing process and market segmentation process are closely related and happening in symbiosis. McDonald & Wilson (2011) view market segmentation as

a part of a company's marketing process and position it at the beginning of the company's marketing process (**Figure 4**). Compared to Keller & Kotler (2016) value delivery process, McDonald & Dunbar (2013) incorporates the STP process as individual steps inside the marketing process; the mixture model has both strategical and tactical implications and it consists of the STP process, value delivery process and strategic marketing process altogether.

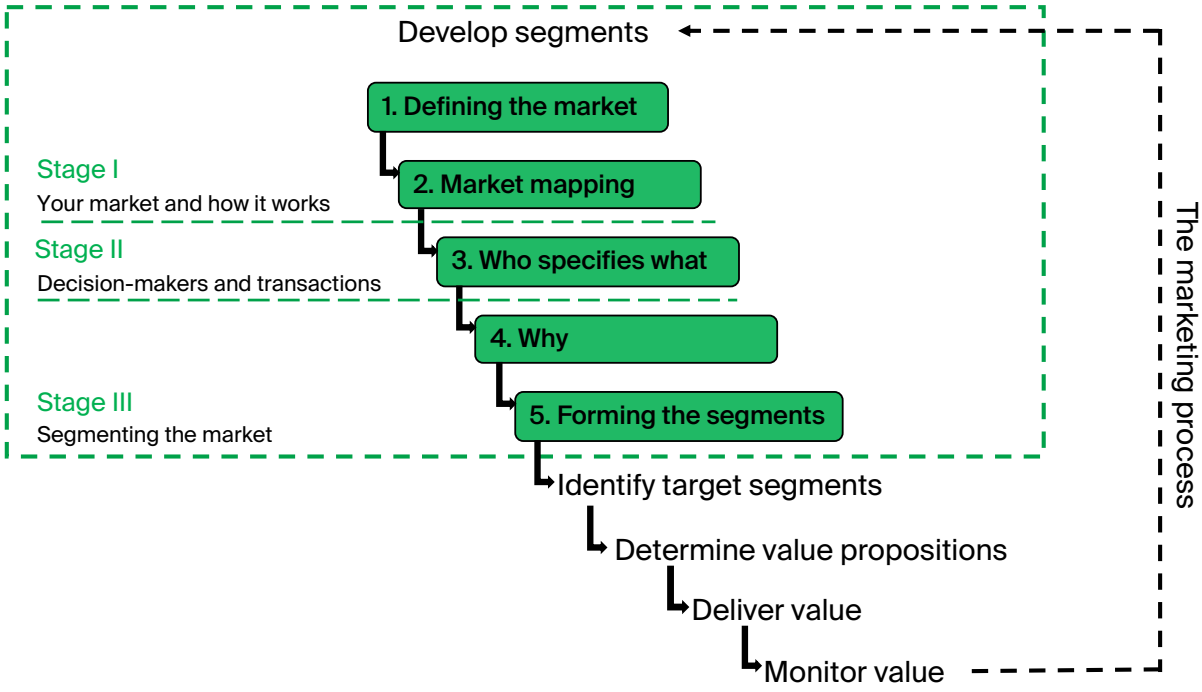


Figure 4. Positioning market segmentation process into company's marketing process (McDonald & Wilson, 2011, p. 106; McDonald & Dunbar, 2013, p.5,15).

The segmentation process depicted in **Figure 4** includes five steps; defining the scope of the segmentation study, mapping the market offering inside the study's scope, choosing the segmentation bases, understanding the needs and benefits sought of segments related to the marketing mix of 4P and finally forming the segments. Noticeable is that many tasks precede the actual act of forming the segments, and outside the segmentation process, the rest of the STP process, targeting and positioning have been included in the model as part of marketing process (**Figure 4**). According to McDonald & Wilson (2011), the marketing department should be considered to be responsible for understanding the value, determining the value propositions and monitoring the value (McDonald & Wilson, 2011, p. 39). Delivering

the value is related to the tactical marketing mix activities of four Ps, and thus is the role of the whole company (McDonald & Wilson, 2011).

Keller & Kotler (2016) present the value delivery process as a very forward-moving process, without including any feedback process (**Figure 2**). However, monitoring and measuring customer segments and the value delivered have been found crucial in modern business ecosystems (McDonald & Wilson, 2011; Kumar, 2004). Kumar (2004) emphasizes the iterative nature of the segmentation process based on the general observation that new data is generated at ever-fasting speed; new data reflects the changes in consumer behaviour as well as the changes in the underlying fundamentals of segments or even in the overall market, which should be addressed by the management. This particular process is prone to changes and may lead to misinterpretations if the segments are not adjusted according to the new data.

The described context of marketing planning process related to market segmentation is important to understand when considering the strategical nature of market segmentation. One of the most important strategical choices, the choice of segmentation variables is discussed next.

2.3 Selection of segmentation bases

The selection of segmentation base is one of the most important strategic decision regarding a segmentation study. There exist several ways to segment consumers. The market segments may differ in terms of demographics (age, gender, location) and socio-economic (education, profession, income level) factors. Demographics and different socio-economic factors are the most common segmentation variable as they can be easily collected via customer surveys and CRM systems. These variables are also used to describe the calculated segments when profiling the final segments. Other variables types include psychographics (attitudes, motives, lifestyle) and behaviour information – for example, some of us prefer to visit physical stores and some of us prefer to exploit online shopping platforms. Psychographics may reveal information behind customers' observed behaviour and behavioural segmentation focuses on reverse-engineering the customers' motives and background from their behaviour.

(Dolnicar et al., 2018, pp. 39-45; Keller & Kotler, 2016, p. 238, 268; McDonald & Dunbar, 2013, pp. 11-14; Weinstein, 2004, pp. 61-130; Wedel & Kamakura, 2000, pp. 7-16; Storbacka, Blomqvist, Dahl, Haeger, 1999, p. 39; Wind, 1978)

All aforementioned segmentation bases are compiled in **Figure 5** below, which follows the division made by Kumar (2004). According to Kumar (2004), segmentation variables can be generally classified into two distinct categories: identifier and response variables. Identifier variables focus on describing the customers' different characteristics, aiming for segments that consist of groups of customers with similar characteristics, who behave differently in response to marketing mix variables of price, product, place and promotion. This is also the basic principle of a priori segmentation. Market segmentation based on response variables focuses instead on the behaviour of different groups of customers. The overall goal is then to see if segments with similar customer profiles share similar behavioural patterns. This particular approach is called a posteriori segmentation. Demographic and other identifier variables can be also used to describe segments formed with a posteriori methods in detail (Keller & Kotler, 2016; Kumar, 2004, p. 30; Wedel & Kamakura, 2000, pp. 17; Wind, 1978)

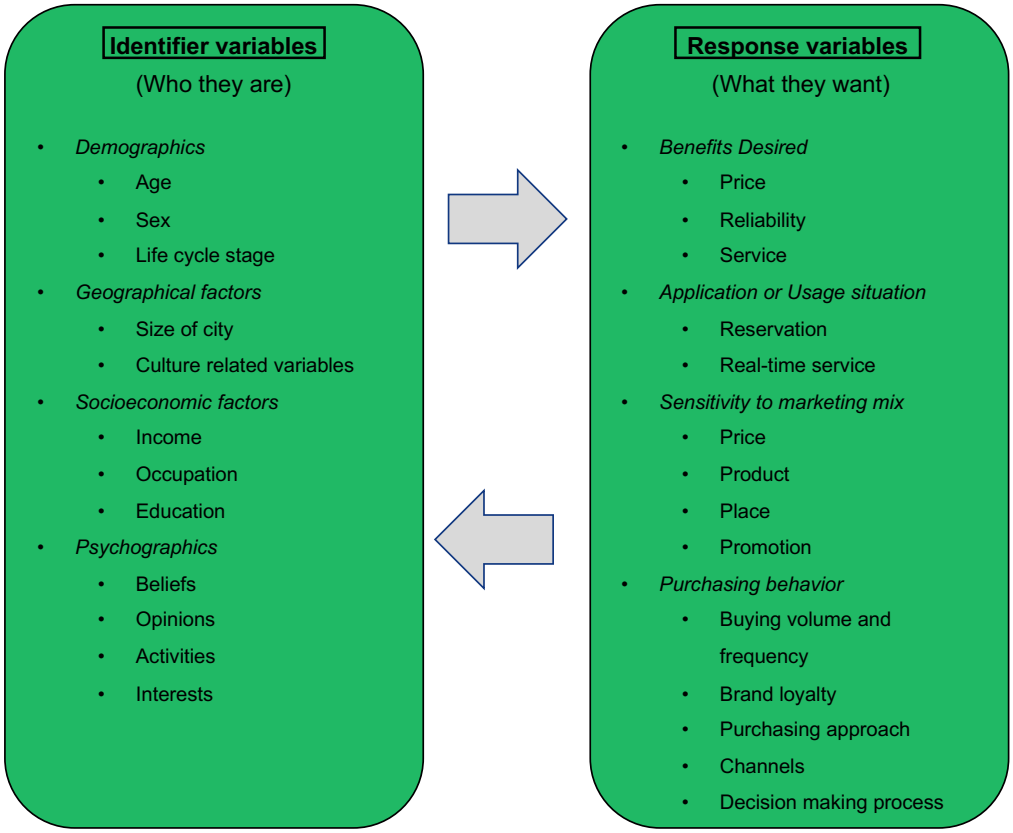


Figure 5. The identifier and response variables (Modified from Kumar (2004)).

A priori segmentation has remained the most common segmentation approach but yet it is considered to be the least effective. Pre-determined segments based on single or few variables are considered as a poor representation of the market in today's business environment. A posteriori segmentation methods, especially clustering, has been proved to be a powerful and effective way to segment a market. Modern segmentation research relies mostly on the a posterior segmentation, and the challenges are mainly related to the variety of different methods available and unclear justifications behind the choice of optimal method. In practice, a company should consider using both of these methods together to succeed in market segmentation (Kumar, 2004, p. 30; Wedel & Kamakura, 2000, pp.31-32, Wind, 1978, p. 319).

There exist namely two main challenges regarding the selection of segmentation variables; the sheer number of possible segmentation variables and the decision about optimal segment number (Dolnicar et al., 2018; Green, 1978). The abundance of possible segmentation bases complicates the segmentation project since it has to decide which variables are chosen to be used in segmentation. The selection of

segmentation variable requires substantial knowledge about the market and market dynamics, and a company should base their segmentation study on the most important variables related to their business aiming for the simplest possible solution (Dolnicar et al., 2018, p. 42-45). Dolnicar et al. (2018) argue that only a few most important variables should be included in the analysis since unnecessary variables can affect the calculation and distort the final segments. Wedel & Kamakura (2000) point out also that the selection of segmentation variables is crucial to the overall effectiveness of the segmentation study and the selection of segmentation bases should be chosen based on the overall goal of the segmentation study. The managerial implications of the selection segmentation variables have also been specified by Green (1978) – Green (1978) underlines that the selection of segmentation variables should be based on management's needs.

Certain segmentation bases have received critique about their usefulness, if not combined with other variables. Demographics have been criticized for being a too simple segmentation base – the customers of the same age may differ significantly in other factors, such as buying behaviour and motives. The purchasing behaviour and patterns seldomly align or rely on age, income or location as the customers have become less predictable in their buying habits. Psychographics has received critique about their usefulness. Although psychographics may reveal deeper motivations of customers, they have been found weak at predicting sales and thus cannot provide any deeper insight into strategical decision making about customer retention or acquisition of new customers. In other words, segmenting customers solely based on these factors may not provide any business-relevant information. In modern segmentation, a variety of different type of variables should be used to get the clearest picture about the market. (Dolnicar et al., 2018, pp.42-45; Yankelovich & Meer, 2006; Wedel & Kamakura, 2000, p.31)

While there exist many arguments for choosing certain segmentation variables, companies wrestle between the risk of oversimplifying and the risk of high complexity regarding the segmentation solution (Wedel & Kamakura, 2000, p. 337). At the same time, the companies should try to maximize the differences between segments and

minimize the differences within a segment while maintaining their manageability (Kumar, 2004, p. 29).

Another important decision related to the selection of segmentation variables is the number of segments. Usually, the number of resulting segments is determined in advance in a priori segmentation, whereas in a posteriori segmentation, the optimal of segments are generally calculated by applying different clustering algorithms and methods to test the robustness of the segmentation solution. In both of these options, there exists no clear method to find the optimal number of segments besides considering the statistical performance – the decision about the optimal number of segments have been mostly based on statistical fit or intuition (Liu, Liao, Huang & Liao, 2019; Wedel & Kamakura, 2000, p. 17,335)

2.4 Evaluation of segment criteria

The evaluation of segment criteria is another important task, that a company must conduct before and after a segmentation project. The evaluation of segment criteria is tied to the selection of the segmentation variables as well as to the implementation phase of the segmentation project since a company must decide what kind of segments they are looking to achieve and then evaluate if the calculated segments pass these criteria. (Dolnicar & Leisch, 2017)

Keller and Kotler (2016) have summarized and listed five criteria according to which finished segments should be evaluated. These criteria measures date back to the 1980s when Kotler first introduced them. To avoid ineffective segmentation, Keller and Kotler suggest rating the segments on five criteria (**Figure 6**).

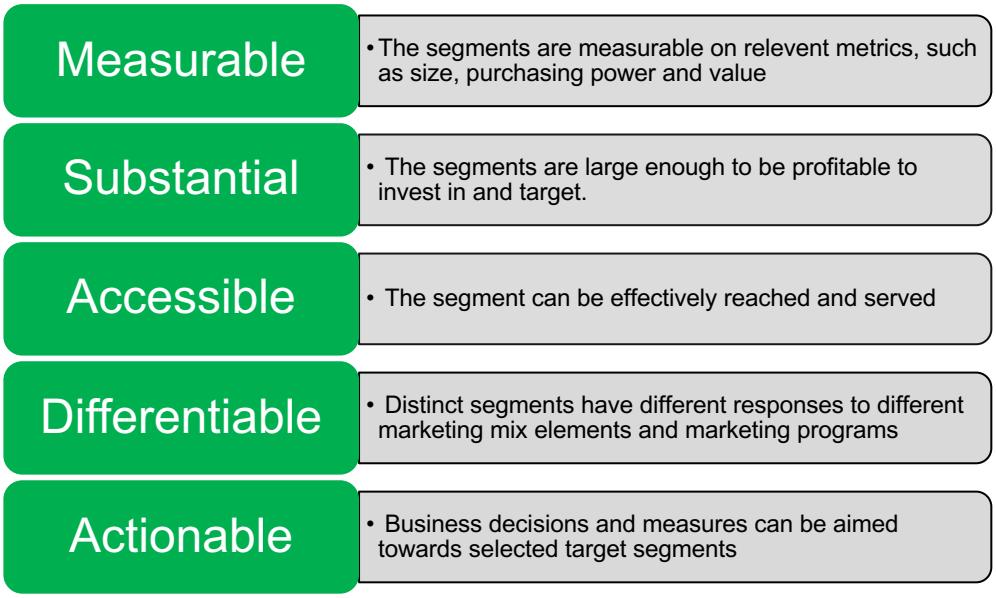


Figure 6. The segment criteria measures (Keller & Kotler, 2016, p. 285; Kotler & Armstrong, 2017, p. 221).

The criteria measures presented in **Figure 6** have been well adopted by the academics and they have been referred to in several academic publications and research in the field of market segmentation as global segment criteria. Firstly, the segments should be measurable, meaning that there exist internal measures to demonstrate the business potential of each segment and also that the segments can be identifiable from the market by the chosen segmentation bases. In this way, the segments are directly linked to the business and they can be linked to the internal strategic targets and goals in terms of, for example, profitability and growth. The next global segment criterion is substantiality, which refers to the sizes of segments. The segments should represent a large portion of the whole market to ensure the profitability of segment-wise strategies. Also, the chosen segments should be growing in size, which can be measured by appropriate monitoring. The third criterion is accessibility, which means that the segments should be reachable with the company's current marketing tools or that a company can develop products or services for the needs of targeted segments. Additionally, the final segments should be responsive and differentiable – the segments should respond to the activities aimed at them and they should respond differently to each other. If the segments' responses to different marketing mixes do not differ from each other, the segmentation is not effective since this would mean that the segments are not truly homogeneous. Lastly and most importantly, the segments should be actionable, meaning that a company should be able to cater for the needs

of segments with the internal goals and core capabilities of the company; a company should be able to plan and take on concrete actions. (Dolnicar et al., 2018, pp.33-34; McDonald & Dunbar, 2013, p. 39; Wedel & Kamakura, 2000, pp.4-5).

In addition, Wedel & Kamakura (2000) point out that segments' stability should be considered. If the segments are not stable in terms of their composition or behaviour, the identification and implementation of segmentation solution could suffer significantly. Although the segments may grow in size and the customers may emigrate and migrate segments over time, the segments should be stable long enough so that the segmentation solution can produce results. McDonald & Wilson (2011) underline that potential segments can be served by unique marketing strategies and value propositions and in order to the segmentation to be actionable, a company should be able to adopt an organizational structure, information and decision-making systems, which will enable it to serve these segments effectively (McDonald & Wilson, 2011, pp.106-115). Jenkinson (2009) study about strategic segmentation includes standard for successful segmentation. The standard includes factors, differing from those already mentioned. According to Jenkinson (2009), a segmentation should enable the identification of a single individual so that the employment of systems and organisational strategic, tactical and operational actions can be led to and tracked on individual customer level.

Dibb & Simkin (2010) segmentation case study included an extensive literature review about segmentation criteria. The main findings were that the application of segment quality criteria is one of the key challenge companies face despite of their widespread attention; there exists little to no evidence of their deployment and efficacy in practice. Dibb & Simkin (2010) have classified the segment criteria into two categories of "hard" and "soft" criteria. The main questions to ask regarding the "hard" criteria are; is the composition of each distinct segment statistically different? How many variables have a statistically significant effect to discriminate between segments? Can the segments be replicated later? The evaluation of "soft" quality criteria is in line with the aforementioned criteria (**Figure 6**). The key findings were that segment quality criteria should be a combination of "hard" and "soft" criteria measures considering the judging of the robustness and appropriateness of segmentation solution. This could be done

by testing and validating of statistical outputs of segments' calculation together with the evaluation of "soft" measures regarding the aforementioned Kotler & Keller (2016) criteria.

In addition to these criteria, the attractiveness of chosen segments can be determined by evaluating Porter's five forces concerning market segments (Keller & Kotler, 2016, pp. 285). Porter (1980) model of five forces was created to help corporate strategy formation and development. In addition to strategy development and market examination, Porter's five forces can be applied to the evaluation of the underlying, long term attractiveness of market segments and competition inside a segment (McDonald & Dunbar, 2013, pp. 32).

A market segment can be considered unattractive if there exists high competition inside the segment or the competition is related to products targeted to a specific segment. The number of substitutes also affects the switching costs of buyers and suppliers inside a segment. High competition inside a segment is related to the threat of rivalry and threat of substitutes. High competition may lead to price wars, thus making the segment unprofitable and expensive to compete in. Besides, the relation between entry and exit barriers of a market segment can be considered as an element of the attractiveness of a market segment. Favourably the entry barriers should be high in order to decrease the risk of new entrants but simultaneously the exit barriers should be low so ill-performing companies can easily exit the market segment. (Keller & Kotler, 2016, p. 285-286)

2.5 Implementation of market segmentation

The real impact of segmentation study comes from its successful implementation as a strategic marketing variable (Weinstein, 2004, p. 19). Already in the early days of the adoption of the market segmentation discipline, the importance of implementation was acknowledged. Green (1977) underlined that segmentation works best when a segmentation project is tied to strategy questions. A company should have a clear picture of how the segments will be implemented (Wyner, 1995).

As described in previous chapters, a market segmentation study includes many tasks, which are performed at different levels in the organisation. Dolnicar et al. (2018) stress the strategical management involvement and the importance of implementation measures in the market segmentation process (**Figure 7**).

Figure 7. The three layers of the market segmentation process (Dolnicar et al., 2018).

Figure 7 illustrates the additional tasks regarding the layers of market segmentation analysis. Albeit most of the tasks are technical at the top and second layer of market segmentation analysis, a layer of strategical implementation tasks is required in order to convert the market segmentation solution into actionable strategic decisions. The single act of extracting the market segments is located at the top of the market segmentation process, which underlines the observation that more focus should be aimed at the management part of the market segmentation study as the strategical work represents a large share of segmentation work. The act of extracting the market segments itself, which has been the centre of attention in academic research for the last decades, actually presents a minor part of the segmentation process (Dolnicar et al., 2018; Boejgaard & Ellegaard, 2010; Dibbs & Simkin, 2009; Kumar, 2004; Weinstein,2004; Wedel & Kamakura, 2000).

After a company has chosen segmentation variables, conducted segmentation analysis and evaluated the calculated segments with certain criteria, the next step is to implement the chosen target segments. The implementation often means the development of segment-specific marketing strategies or value propositions in a broader sense. Therefore, a segmentation strategy is a process whereby a company customizes a marketing mix variable (price, product, place and promotion) to satisfy the needs of target segments (Weinstein, 2004, p. 140).

Thus, the basis of a successful market segmentation study is formed by assessing and perform the planning and implementation tasks to bind together technical tasks and operation of market segmentation (Dolnicar et al., 2018, 12). However, it should be kept in mind that the strategical and technical tasks of the market segmentation process can be considered equally important. As highlighted by Dolnicar et al. (2018), the performance of statistical segment extraction is dependent on the quality of data. Similarly, the more detailed segments are, the easier it is to implement them into day-to-day business. Applying the evaluation of segment quality criteria into the segmentation process also plays an important part in successful implementation (Dibb & Simkin, 2010).

Successful segmentation consists of a systematic, integrative and synergistic process where evaluation and control complete the segmentation process (Weinstein, 2004, p. 154). The implementation of market segments includes also a focus on monitoring; a process for segment monitoring should be established. Customer behaviour, such as purchases and channel information, could be used to re-segment the market regularly (Weinstein, 2004, p. 169). Markets must be continuously segmented and re-segmented to arrive at a scheme that delivers actionable segments (Kumar 2004, pp. 30; Wyner, 1995). Both Simkin (2013) and Wyner (1995) underline the importance of evaluating the changing composition of segments – the movement and transition of segment members from one segment to another should be measured. Wyner (1995) noted that the possibility of the emergence of new segments or the disappearance of existing ones cannot be ignored. The monitoring applies also to the company's internal performance measures, such as profitability, market share or growth, which should be measured at the segment level as well (Wind, 1978, p. 318).

There exist multiple **implementation barriers** that have been acknowledged to complicate or even prevent the adoption of segmentation solution to strategic decision making (Dibbs & Simkin, 2009). Academic literature has identified the implementation of market segmentation as a core challenge for companies, but it has received limited empirical attention (Boejgaard & Ellegaard, 2010). One of the key challenges considering market segmentation is the lack of academic interest in its empirical application (Dibbs & Simkin, 2009; Palmer & Millier, 2004; Wedel & Kamakura, 2000). Already Claycamp & Massy (1968) were concerned about the exclusion of implementation-related problems from academic research.

Different implementation issues as well as proposed solutions found in the academic literature are presented and described in **Table 1.** The most common barriers to implementation are of organisational origin. The implementation barriers are related to organisational structure, culture, policies and senior management. Also, some implementation issues are related to the segmentation approach and the process itself. The problems related solely to the implementation phase of the segmentation solution represent only one part of the issues affecting the implementation. Dibbs & Simkin (2009) have identified three main areas that pose different challenges to implementation; infrastructure, process and implementation related barriers. A company should have an infrastructure that enables the undertaking of a segmentation project, processes that ensure its successful completion and operational capabilities to facilitate the segmentation implementation (Dibbs & Simkin, 2009; Dibbs & Simkin, 2001).

Table 1. The implementation barriers and solutions proposed in the literature

Implementation topic	Implementation issue	Proposed solution	Source
Lack of resources / expertise	Lack of training, lack of financial resources, lack of expertise, lack of authority, lack of personnel, lack of necessary tools and IT systems, lack of processes, poor understanding of market segmentation process, lack of data collection procedures and high quality data	Internal training, hiring new workforce, establishing new positions, establishing segmentation team, establishing data and data analysis team, using external workforce, acquisition of needed IT tools and systems, data and process development	Dolnicar et al. (2018), Dibbs & Simkin (2009), Dibbs & Simkin (2001)
Organisational culture	Lack of market orientated attitude, resistance and unwillingness to change, low level of innovation, bad communication and inadequate information sharing across organisational functions, short-term thinking, rigid and out-dated internal practises and politics	Clearly communicating the benefits, the changes required and the effects of market segmentation project to personnel of different functions, change management, establishing interfunctional communication, process development	Dolnicar et al. (2018), McDonald & Dunbar (2013), Dibbs & Simkin (2009), Dibbs & Simkin (2001)
Organisational integration	Low level of organisational integration, poor fit to tactical programmes	Establishing customer driven processes, strategies and unique value chains to integrate segmentation solution to organisation	McDonald & Dunbar (2013), Dibbs & Simkin (2009), Dibbs & Simkin (2009)
Segmentation approach and process	Too technical approach estranging senior management and risking overall usefulness to business, too high emphasis on building customer profiles and not focusing on business-related variables such as products, too low focus on customer buying behaviour, focusing on too deep or high level of analysis, final segments are robust or actionable	Well-designed segmentation planning, involving senior management, focusing on the quality of segments, taking the organisational structure into account	Dolnicar et al. (2018), Dibbs & Simkin (2009), Yankelovich & Meer (2006), Weinstein (2004), Dibbs & Simkin (2001)
Senior management	Lack of leadership and involvement, inability to make strategic changes, unflexible organisational structures, focusing too much on the cost side	Pro-active commitment and involvement in the market segmentation process and decision making. Adequate planning of the implementation of segmentation results. Providing needed resources for segmentation study itself and for its implementation. Facilitating necessary changes to organisation's structure and culture. Clearly communicating the concept of segmentation, segmentation process, the consequences and costs of its implementation and the plans for implementation to engage management	Dolnicar et al. (2018), McDonald & Dunbar (2013), Dibbs & Simkin (2009), Weinstein (2004), Dibbs & Simkin (2001)

To fully benefit from market segmentation, market segmentation should be conducted within the context of management, whereby the whole value chain of production, marketing, logistics and finance should be taken into account (Wedel & Kamakura, 2000, pp.336-337). In the modern business world, even more, functions are affected by the adoption of segment solution, such as customer service, technical support, procurement and HR, to deliver value effectively to customers (Simkin, 2013). Entire value chains or parts of value chains can be developed and aligned to the extracted market segments (Kumar, 2004). These market segments based on value chain differentiation are called strategic segments, as introduced to the academics by Kumar (2004).

Strategic segmentation may be the solution considering the integration of market segmentation to strategic decision making. Strategic segmentation aims to integrate market segmentation into the different functions of a company. The main difference is that while market segments are being served and catered via shared business operations, such as marketing and sales, a strategic segment has its own value chain or part of it depending on the level of segregation. A strategic segment may have its own marketing and sales function allocated, or even its own specific organization inside a company (**Figure 8)**. (Kumar, 2004, pp. 34-44)

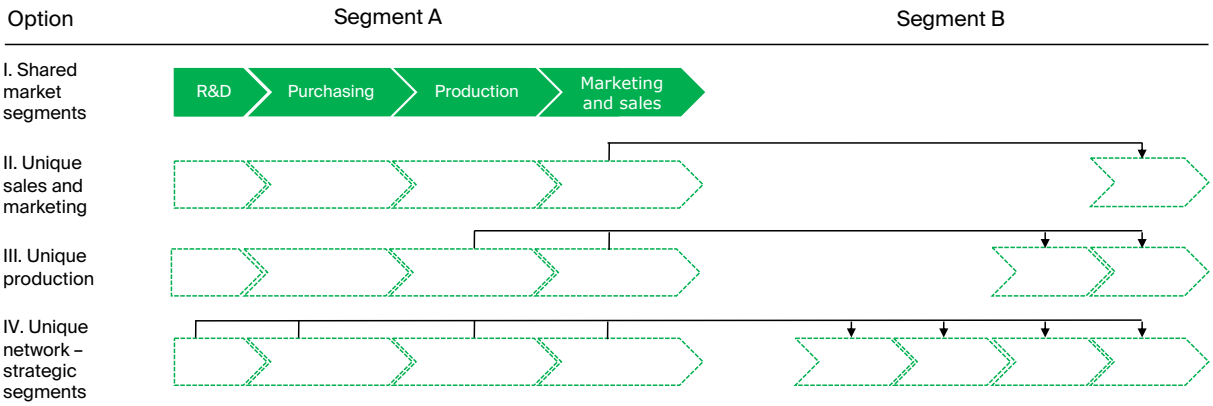


Figure 8. The value chain taxonomy of strategic segmentation (Kumar, 2004).

Figure 8 illustrates the assessment of value chain configurations. In contrast to market segments, strategic segments are not based on the differentiation and alignment of marketing mix elements of four Ps. To form a strategic segment, a company must align its value chain and functions according to the valued customer, value proposition and value network. Strategic segments cannot be served by simply altering the marketing mix, but they require much deeper differentiation. A company can create and gain a competitive advantage by, for an instance, focusing sales and marketing function to only serve a specific segment, if the value proposition lies in the marketing and sales-related tasks, such as higher-quality customer service.

3 LITERATURE REVIEW OF SEGMENTATION IN TRAIN TRAVEL

This chapter provides an overview of the relevant segmentation research in the field of train travel. In all of these studies, passengers have been the focus of segmentation studies. The literature review chapter focuses on the topics introduced in the theoretical framework and examines the segmentation variables, criteria and implementation that are specific to train passengers. Also, the literature review aims to evaluate the strategic perspective of segmentation and how well different studies have dealt with the strategical implications of market segmentation. This chapter builds on the theoretical framework focusing solely on the segmentation variables, criteria and implementation.

3.1 The methodology of literature review

A review of prior relevant academic literature is an important element of any academic study (Snyder, 2019; Webster & Watson, 2002). According to Webster & Watson (2002), the aim of literature review is to advance knowledge and theory development. This can be done by indicating areas where research already exists and on the other hand, by uncovering areas where more research is needed (Webster & Watson, 2002). Literature review helps to assess the research area and justify the research questions and hypotheses (Snyder, 2019). This literature review aims to represent the findings from existing research regarding segmentation variables and segment criteria, and especially uncover research gaps regarding the practice of implementing segment solution in strategic decision making.

The data for the literature review of this study was gathered from previous relevant studies searched from Primo database of LUT University. In addition, several external searches were done from the databases of Elsevier, ScienceDirect and Journal of Public Transport and other applicable journals focusing on train travel and public transport. The selected studies represent the modern state of passenger segmentation and only relevant, peer-reviewed scientific studies conducted after the year 1990 were

included in the analysis. The external journals, such as Elsevier and Journal of Public Transport, are international peer-reviewed open access journals containing research articles and original studies associated. The same search terms were used in these external journals.

The first step of the literature selection process was to search relevant studies with suitable keywords. The database search was conducted mainly using LUT University's Primo article database. Additional searches were made from external journals' databases using the same search terms. Multiple initial searches were conducted using different search terms from all aforementioned systems. The search terms and their results are represented in **Table 2.**

Table 2. The database search results of initial article search

Search term	From	To	Number of articles
train travel segmentation	1990	2020	5 116
public transport segmentation	1990	2020	14 560
passenger segmentation	1990	2020	5 587
train traveller segmentation	1990	2020	1 086
public transport traveller segmentation	1990	2020	1 335
train passenger segmentation	1990	2020	1 470
public transport passenger segmentation	1990	2020	1 691

As seen in **Table 2**, the results of the initial search vary by search term. The higher number of search terms tended to result in a lower number of results, and the search term "public transport segmentation" produced most search results. Many of these articles were although irrelevant and - due to the high number of articles, the searches had to be narrowed.

An advanced search was used to add search filters to limit the search more. The filters related to the titles of articles, which was set so that the titles of articles should contain the word "segmentation" and the publication date should not be before the year 1990. An additional search was conducted to retrieve the latest relevant studies by setting the search to only include articles published after the year 2010. Another advanced search method was to search for articles from specific journals and/or subjects. The journal filter of "Transportation" was used to find relevant segmentation studies from

the journals regarding transportation research. The subject filter refers to the subject area of the article, e.g. “Segmentation”, “Market segmentation”, “Marketing” or “Business & Economics”. This filter was used to exclude any studies focusing on the development of segmentation algorithms or other technical articles since the main focus of this study is to examine the managerial and strategical implications of market segmentation. The results of the advanced search with filters are illustrated in **Table 3.**

Table 3. The database search results of advanced article search

a word "segmentation" must appear in title			
Search term	**From**	**To**	**Number of articles**
train travel segmentation	1990	2020	102
train travel segmentation	2010	2020	81
public transport segmentation	1990	2020	222
public transport segmentation	2010	2020	166
passenger segmentation	1990	2020	113
passenger segmentation	2010	2020	87
train traveller segmentation	1990	2020	36
train traveller segmentation	2010	2020	23
public transport traveller segmentation	1990	2020	49
public transport traveller segmentation	2010	2020	34
train passenger segmentation	1990	2020	25
train passenger segmentation	2010	2020	20
public transport passenger segmentation	1990	2020	26
public transport passenger segmentation	2010	2020	20

After the advanced search, the selection of relevant studies was easier compared to the initial search as the number of articles was much lower. The next step was to inspect potential studies based on their titles and abstract texts. It was possible to exclude irrelevant studies in the early stage of inspection since the articles did not include a segmentation study about passengers or did not concern train travel.

The articles included in this study are extensive segmentation studies including information about the segmentation variables, segment criteria and implementation of passenger segments in train travel. Also, the relevant articles found in external journals were inspected using the same procedure. Articles on public transport segmentation were included in the study when applicable, i.e. when the article contained also

separate information about train travel segmentation and findings specific for train travel. Overall, **20 relevant articles** were selected for literature review after the selection process.

3.2 Selecting segmentation variables

The selection of segment variables is an important managerial decision (Dolničar, 2017). The selection of segmentation variables should be driven by the management's needs and the strategy of a company (Elmore-Yalch, 1998, p. 97). Market segmentation helps a transport company to identify and understand groups of travellers with similar preferences, needs and/or behaviour.

Market segmentation should be part of the transport organization's strategical planning, and effective segmentation requires selecting the right segmentation variables, including geographics, demographics, usage, other behavioural measures and psychographics. By assessing the differences between groups and identifying homogenous traveller groups, a transport company may develop targeted strategies to influence travellers' behaviour and to satisfy their needs better. In addition to service design and marketing, passenger segmentation can be utilized in demand forecasting, public policy planning and strategic planning. (Pas & Huber, 1992, p.178; Elmore-Yalch, 1998; Barr & Prillwitz, 2012)

3.2.1 A priori and a posterior segmentation

Previous rail travel segmentation research shows that both a priori and a posteriori segmentation approaches are used in travel segmentation (Dolničar, 2004, p. 244). Although a priori segmentation remains to be the dominant approach, amounting to more than half of all segmentation studies reviewed by Dolničar (2004) in her research about segmentation systematics in tourism, a posteriori and combination approaches of a priori and a posteriori segmentation are becoming increasingly popular.

A priori segmentation focuses to identify differences between the needs, preferences or travel behaviour of various groups based on variables selected in advance (Pas &

Huber, 1992, p. 188; Anable, 2005). Usually, the number of segments is known already before the actual segmentation (Pas & Huber, 1992, p. 188; Anable, 2005; Haustein & Hunecke, 2013) For instance, common segmentation variables used in train travel segmentation are age, income, gender and especially the level of usage, which can be used to form light, medium, and heavy usage segments (Anable, 2005; Dolnicar & Leisch, 2017, p. 430).

The previous research literature implicates that modern travel segmentation combines both a priori and a posteriori approaches and two-step segmentation concepts may open better possibilities for companies compared to using only a single approach (Dolničar, 2004; Kumar, 2004). Segmentation could be conducted using multiple methods, for example, a priori segmentation could be used to find out main segments or meaningful variables and then a posteriori segmentation could be applied to form segments from the selected variables or sub-segments from the main segment (Dolničar, 2004). This would help in learning more about the travel behaviour of specified sub-population instead of creating a general overview of the market in terms of multiple, global segments.

In addition to using multiple segmentation approaches, the previous studies of passenger segmentation implicate that a single variable is rarely enough to explain the many reasons and motivations behind travellers' motivations and behaviour (Van Exel et al., 2011). This finding is in line with other studies of segmentation theory (see Kumar (2004) and it can be seen also in all literature review articles, where multiple segmentation variables of different types are used. The selection of segmentation variables is a critical management-related issue, and it should be one of the first things to consider before proceeding into actual segmentation analysis.

Pas & Huber (1992) conducted a priori segmentation between business and non-business travellers and found out that the traditional division of passengers to business and non-business travellers is not a valid conclusion, being an oversimplified representation of existing traveller groups. This finding indicates that the segmentation of passengers is a more complex issue than previously thought and it is supported by the fact that Pas & Huber (1992) did find multiple segments in their cluster analysis

based on multiple variables. Historically, a priori segmentation has been the dominant approach to segment passengers' travel behaviour (Anable, 2005, p. 67). However, Anable (2005) argued that segments formed by a priori methods are not necessarily homogenous despite being perceived as such, which may lead to false interpretations when the homogeneity of certain travel behaviour tendencies is assumed. This suggests that a priori segmentation oversimplifies the complex patterns behind travel behaviour, supporting the findings of Pas & Huber (1992).

A posteriori segmentation approaches segmentation from a different point-of-view. Also referred to as data-driven segmentation, in a posteriori segmentation, the subgroups are determined by multivariate basis (Dolničar, 2004, p. 245). Clustering solutions are usually based on four different groups of variables: geographical, e.g. trip destination, place of residence; socio-demographical, e.g. age, education level and income; attitudinal, e.g. satisfaction attributes, preferences and desire to use an alternative travel mode (Dallen, 2007; Haustein & Hunecke, 2013; Dawkins, Williamson, Barr & Lampkin, 2018) In addition, travel behaviour-specific variables and operational variables are often used, such as cost of the ticket, trip frequency and trip purpose (Tuominen, Järvi, Sirkiä & Himanen, 2007; Sperry, Ball & Morgan, 2011; Cheng & Huang, 2014)

Clustering of passengers is conducted without the pre-determination of segment variables that specify the different segments. The similar travel behaviour of different passengers is re-engineered back to the needs and characteristics of passengers by forming clusters of individuals according to their similarity in a set of different variables. Groups of passengers with similar travel patterns or other attributes, such as demographics, can be identified by cluster analysis and specified based on the empirical results of the cluster analysis. Cluster analysis can be based on chosen attributes, or it can be utilized so that the clustering algorithm itself finds the most important variables from the data in terms to maximize the homogeneity and interpretability of each cluster. Same applies to the number of clusters – the number of clusters can be based on user-specified input or evaluation of the algorithm. (Pas & Huber, 1992, pp.189-191; Sperry et al., 2011, p. 31)

The advantage of post-hoc segmentation approach in travel segmentation is that when the main object of interest is the travel behaviour, attitudes and motives, cluster analysis can provide rich and comprehensive travel profiles to describe and explain the differences between passengers (Haustein & Hunecke, 2013). Clustering can be an effective way to reveal information about the motives behind travelling the public (Sperry et al., 2011, p. 32). By identifying the different travelling profiles, the quality of train experience of each segment can be maximized with service improvements aimed directly to corresponding segments (Dallen, 2007, p. 196). Recognizing different travel profiles could be then also helpful in strategy development when a certain segment is chosen as a target.

3.2.2 Choice sets

Another common choice for segmentation variables in passenger segmentation is choice sets. In general, two distinct groups of public transport users can be recognized and identified from the pool of travellers: choice and captive riders. Choice riders are usually defined as riders, who choose to use e.g., a train, even though an alternative mode e.g., a car, is available to them. Captive riders are those who do not have an alternative available to them due to their income, location or other reasons. (Elmore-Yalch, 1998, p. 93; Krizek & El-Geneidy, 2007; Cynthia, Manaugh & El-Geneidy, 2013; van Lierop & El-Geneidy, 2017).

According to van Lierop & El-Geneidy (2017) survey analysis based on data of over 60 000 interviews conducted in 2009-2013 by two large public transit agencies in Montreal and Vancouver, approximately 70 % of transit users belong to choice riders. Therefore, choice riders represent the most potential group as their frequency of ridership could be increased by encouraging them to choose the rain for different types of trips or by encouraging them to choose the train more often (Elmore-Yalch, 1998, p. 93). Captive users are somewhat forced to use public transport. The survey data analysis of Krizek & El-Geneidy's (2007) based on over 4 000 interviews, showed that they do not have access to other vehicles, or they are limited by their income or disability; captive users may have chosen to only use public transport or their travel needs are not met through car use. Captive users may turn into choice users later in

their lives when their lifestyle changes (van Lierop & El-Geneidy, 2017). Therefore, the retention of captive users can thus be considered important, and it could be supported with e.g., loyalty programs (Elmore-Yalch, 1998, p. 93).

3.2.3 Modern segmentation variables

Previous segmentation studies have also used the likelihood of increased rail patronage or another business-related measure (number of trips, the amount of money spent in transit) in response to service changes (faster trip time, higher frequency of departures, lower ticket fares) as a segmentation variable (Sperry et al., 2011). This is possible by constructing the segmentation study around specific interview or survey questions, which are then transformed and scaled to variables. This particular approach is common for transport market segmentation, which relies much on behaviour research since the main concern of transport organizations is to learn more about the travel behaviour of their customers and non-customers and how to influence it (Elmore-Yalch, 1998, pp. 92-102).

In addition to the aforementioned approaches, passenger segmentation research has been developing, introducing new ways to analyze deeper the behavioural cause-effect relationships of passengers. Dawkins et al. (2018) conducted a segmentation study on 2648 commuter survey respondents in Exeter (UK), arguing that multidimensional cluster segmentation creates complex group narratives, assuming the homogeneity of each group. As a solution, Dawkings et al. (2018) conducted a segmentation study resulting in individual probabilities of segment membership enabling dynamic segment structure. Segment membership probabilities were calculated by using separate behaviour and group identifier variables.

Segment membership degrees were also used in Pan & Truong (2019) study in segmenting high-speed rail transport passenger segments in China. Pan & Truong (2019) conducted a segmentation study in which demographic variables age, education and income were used to form high-speed rail traveller segments from the passenger population These segments were then profiled with additional variables such as gender, occupation, trip purpose and ticket purchase channel. All together four

segments were formed – High-Educated Youths, Mature Travellers, New Starters and Elite Travellers. To form a basis for predicting travel behaviour at a segment level, additional clustering was made based on the satisfaction levels of different service attributes. The calculated segments differed in terms of ticket buying channel preferences, service level preferences and price preferences. This led to the further conclusion that when a passenger's satisfaction levels and segment membership degree are known, passenger's travel behaviour can be – to a certain extent – be predicted. When travel behaviour has been calculated, resources can be allocated to segment-wise strategies by altering the corresponding marketing mixes.

The behavioristic interest and focus may sometimes lead to wrong conclusions, if not correctly studied. Barr & Prillwitz (2012) noted in their segmentation study of 1155 survey respondents from South West of England, that while those passengers who were classified as environmentally friendly, based on their attitudinal characteristics, were not displaying the most environmentally friendly travel behaviour. This may be interpreted as a major finding as the environmentally friendly segment was the largest segment (n = 524) of the total four segments. This leads to a conclusion that both attitudinal and behavioural variables should be included in the segmentation study in order to get the most truthful picture of underlying groups in the passenger population.

3.3 Deciding segment criteria

The goal of segmentation in the field of train travel is to find one or a few target segments to which a transport company can target its services and develop segment strategies. Besides, these target segments should be able to be targeted and easy to interpret in the first place. The theme of segment criteria is associated with certain controversiality; a company should only choose attractive (i.e. profitable) segments but at the same time global segmentation criteria, such as segment's size and homogeneity between the members of a segment, does not always guarantee the attractiveness of a segment (Dolničar & Leisch, 2017).

Besides the aforementioned managerial decisions about segmentation variables, a standardized approach for segment criteria evaluation is essential in order to conduct

successful segmentation analysis (Dolničar & Leisch, 2017). A segmentation solution may vary depending on the selected variables and therefore it is crucial to evaluate all the different solutions with same criteria. The two main application areas of segmentation criteria evaluation also apply to passenger segmentation; the segmentation criteria are used to determine the number of segments as well as to evaluate the contents and quality of the segments in the train travel and passenger segmentation.

Dolnicar & Leisch (2017) reviewed overall 29 a posteriori segmentation studies conducted after the year 2006. In their review study, Dolnicar & Leisch (2017) found out that in all of these studies, the selection of general segmentation solution was based on overall measures in terms of segment criteria, such as interpretability, distinctness, size or statistical criteria and visualizations. Often this kind of approach leads to exclusion of the most attractive segments as they might be excluded in terms of general criteria. As mentioned before, smaller segments may offer great business opportunities. The main goal of segmentation analysis should be to balance the segment-level stability and reproducibility when seeking to find the most attractive segments.

In addition to distinctness or interpretability as a segment criteria measures, other measures based on subjective experiences of segments' "goodness" are used in previous studies on passenger segmentation. For example, Krizek & El-Geneidy (2007) and later Van Lierop & El-Geneidy (2017) used statistical cluster characteristics, the transferability of the segmentation output, lessons from past research and researcher's intuition and common sense as segment criteria. Pas & Huber (1992) mentioned only that the interpretability of the different segmentation solutions determines if a segment is chosen for targeting. Chakour & Elaru (2014) justified the choice of variables on statistical significance, intuition and findings from previous literature. This is more related to the determination of segmentation variables but brings up the important question of existing criteria to the selection segmentation variables – the selection of segmentation variable is a case-sensitive task.

The same kind of logic of using subjective measures is related to the reasoning of the correct number of segments. Pan & Truong (2019) argued that the selection of the optimal cluster number depends on the researcher's subjective judgement. The stability of the segmentation solution can be considered also as the justification behind the choice for the number of segments (Sperry et al., 2011). However, Sperry et al. (2011) also emphasize that there does not exist an exact procedure or algorithm for choosing the correct number of segments. Barr & Prillwitz (2012) also describe the task of choosing the number of segments as a subjective decision.

While computing different statistical measures about segmentation model's robustness may generate good insights about the appropriate number of segments, segments' structure and statistical significance of their attributes, the statistical output of segmentation algorithm and different statistical tests are more or less a global solution to determine the "goodness" of a segment. Only a closer inspection of the segment's structure or deeper analysis can reveal whether the segments are meaningful, interpretable and actionable. (Dolničar & Leisch, 2017)

Despite the criticism of Dolničar & Leisch (2017), the global criteria measures have been the most used ones in train travel segmentation. These global measures include the size of a segment as one criteria factor (Pas & Huber, 1992; Elmore-Yalch, 1998). The size in this particular context means that a segment should represent a meaningful sub-group of the total passenger population and that a segment should be large enough so that it is profitable to target (Elmore-Yalch, 1998, pp. 96, 122; Dolničar & Leisch, 2017). In addition, Elmore-Yalch (1998) noted that potential target segments are the segments that are growing in size. The observation was based on the assumption that the segment strategies could be planned for several years into the future, and, although the evolvement of segments structures may be inevitable, the development of segment's size should be positive, or at least stable in order to affect positively on market share and turnover. However, the decision about suitable target segments should not be based entirely on segment's size alone - as pointed out by Dolničar & Leisch (2017), smaller segments may offer better business potential than large general segments. Therefore, smaller segments could be targeted if they are profitable and represent significant growth potential.

Other global criteria measures used in passenger segmentation are homogeneity within the segment and heterogeneity between segments (Elmore-Yalch, 1998; Barr & Prillwitz, 2012; Pan & Truong, 2019). These criteria are used to make sure that the final segments are different enough in order to aim targeted strategies to them – two very similar segments could merge if the number of segments is decreased. Different segments respond differently to different marketing mixes and also to changes made to these marketing activities, such as product, price and promotional changes (Elmore-Yalch, 1998, p.96). Also, the passengers belonging to a segment should share similar characteristics to a sufficient extent so they can be treated as a segment (Elmore-Yalch, 1998; Pan & Truong, 2019). The statistical outputs of different clustering algorithms also take into account these factors. The more manual approach could be applied, when a particular travel behaviour or attribute is of special interest – a closer look to a segment's structure will reveal how the passengers differ in terms of chosen attribute (Dolničar & Leisch, 2017).

3.4 Implementing segmentation solution

Segmentation study can be utilized to support strategic decision making also in transport companies. The strategic goals of segmentation study may include increasing ridership, attracting new riders, increasing turnover of existing customers or marketing purposes. If there does not exists specific strategic goal for segmentation study, a transport company should not conduct segmentation study; segmentation solution depends on the strategic goals and needs a strategic context in order to be implemented successfully. (Elmore-Yalch, 1998, pp.140-144)

The train passenger segmentation studies reviewed in this study mainly focus on marketing and promotional aspects of implementation such as marketing and pricing campaigns (see Pas & Huber (1992) and Sperry at al. (2011)). Hanna & Drea (1998) concluded the differences between different travel profiles based on survey responses of 1 759 Illinois travellers, but did not include specific plan of how to strategically implement these findings into the strategic decision making of the transport company in their study. The conclusions of the study of Hanna & Drea (1998) focused mainly on describing the characteristics of calculated segments. Sperry et al. (2011) identified

five different groups of travellers in their study in the field of high-speed rail travel based on a data of 3 191 passenger surveys including 24 questions about passengers' trip, evaluations of in-transit service, preferences for different services and demographics. Comprehensive travel profiles were constructed based on travel behaviour, preferences, satisfaction levels and demographics but no actual plans were proposed related to how different groups should be taken in account in company's strategic decision making. Instead, Sperry et al. (2011) described the calculated segments and only mentioned that these different groups should be taken into account in marketing activities. Cheng & Huang (2014) proposed developments to the ticket channel offering of railway company based on the results of their segmentation study. Other managerial implications of Cheng & Huang (2014) were related to service offerings and service adjustments for segments. These recommendations were based on demographics, travel behaviour, personal motivations to choose train and the effects of service changes to ridership. The segmentation study of Cheng & Huang (2014) is comprehensive but lacks strategical context – only potential marketing efforts were described.

The inadequate recognition and handling of strategic implications of segmentation do not limit to these studies. None of the previous studies addressed in this study did examine the strategic implementation of segmentation albeit the topic was sidelined in these studies from the point of view of marketing efforts. This was addressed also by Molander, Fellesson, Friman & Skålen (2012), who underlined that very few studies have dealt with the problem of how to implement and use market information in public transport organizations and that more studies should be addressed to this particular topic.

Elmore-Yalch (1998) reviewed multiple segmentation studies done in the field of transportation by different transit agencies in the USA. strategical segmentation and the barriers of its implementation in her publication about integrating market research into transit management. In her study, Elmore-Yalch (1998) concluded that strategic market research and strategic segmentation are tightly related to the act of sharing knowledge between departments. A similar finding related to the importance of intra-organizational coordination in implementation was made later by Molander et al. (2012)

based on their review of 60 studies regarding the role of market orientation in public transport. According to Molander et al. (2012), a minority of reviewed studies have dealt with how market information is implemented and used in organizations. In addition to the lack of research and establishment of best practices, other limiting factors may be the lack of communicating strategic or marketing plans to personnel properly, lack of front line or top management input, low frequency of training or lack of concrete incentives or reward system (Elmore-Yalch, 1998).

3.5 Summary of literature review findings

Table 4 below summarizes the different segmentation variables used in train travel segmentation studies. Altogether 12 different segmentation studies were analyzed in order to compile the most common variables used in segmentation. These segmentation studies spread over 27 years, starting from one of the earliest passenger clustering studies of Pas & Huber (1992), representing a considerable large sample of passenger segmentation studies in the field of train travel.

Table 4. The segmentation variables of train passengers proposed in literature in chronological order

Source	Segmentation variables
Pas & Huber (1992)	Cost of ticket, food service, number of daily departures, seating type, travel time
Hanna & Drea (1998)	Importance of comfort, cost, timing, destination and ability to be productive in-transit, overall convenience
Tuominen et al. (2007)	Activity, age group, daily mobility activity, distance travelled, gender, household's car ownership, location, number of trips, time used in travelling, type of residential area
Dallen (2007)	Travel attitude attributes related to car availability, cost, degree of independence preferred whilst travelling, environmental concern, feelings towards car use, enjoyment of train use
Department for Transport, Transport Scotland & Passenger Demand Forecasting Council (2010)	Average fare, distance between starting point and destination, flow type (urban/to and from metropolitan area/airport), trip destination, trip origin
Sperry et al. (2011)	Age, day type, education, gender, income, number of household's vehichles, round trip, service change response, trip purpose, trip frequency, alternative travel mode, traveling entourage
Fröidh & Byström (2013)	Age, accessibility to car, cost, distribution between business and leisure trips, level of catering service, train operator, travel time, train type, willingness to pay
Chakour & Eloru (2014)	Age, average distance to the closest station, average distance to chosen station, car ownership, gender, occupation, time left home, travel mode to/from the train station

Cheng & Huang (2014)	Age, credit card usage, education, gender, income, occupation, ticket purchasing channel, time frame of ticket purchase, ticket type, trip frequency, trip purpose
Grisé & Al-Geneidy (2018)	Accessibility of jobs, accessibility of parking space, average commuting distance, employment status, household income, transport mode loyalty, satisfaction with parking spaces, satisfaction with service and train stations, time of travel
Pan & Truong (2019)	Age, education, household income

Table 4 illustrates that the number of segmentation variables varies depending on the study. This is not extraordinary since there does not exist global variables, that should be used in segmentation, but rather the segmentation variables are defined according to the purpose of the study, the research methods and segmentation approaches used in the analysis. As seen in **Table 4**, segmentation can be based on socio-demographic characteristics of passengers, trip characteristics, passenger's behaviour (e.g. chosen ticket buying channel), passenger's attitudes or passenger's preferences related to certain attributes (e.g. productivity, satisfaction level or importance factors). For an instance, Fröidh & Byström (2013) studied the willingness to pay related to the purchasing party and chosen service as a segmenting factor. They found differences between the travellers who pay themselves and those whose trip is paid, for example, by an employer regarding travel behaviour and preferences for travel time and service level.

Previous research implicates (see Sperry et al., 2011; Cheng & Huang, 2014; Pan & Truong, 2019) that the applicable principles of global recommendations for segment criteria vary, the evaluation of segment solution and the evaluation of appropriate number of segments are based on multiple factors. The most common criterion for determining the number of segments is the statistical output of different clustering algorithms regarding a posteriori segmentation studies (Sperry et al., 2011; Chakour & Elaru, 2014; Van Lierop & El-Geneidy, 2017; Pan & Truong, 2019). In most of the articles examined in this literature review, the criteria for segments or the criteria for segmentation solution were not precisely defined; for example, the statistical significance of certain variables on which the segment selection or the selection of the number selection was based, was not generally justified and even the importance of

intuition and the subjective experience was emphasized as a justification for the selection of segmentation variable or segment solution.

The managerial implications of segmentation study and the implementation of segmentation solutions are largely ignored and neglected or at least, their importance is underestimated in the articles reviewed for this study. Still, some observations can be made from the relevant studies.

The major barrier for implementation seems to be having no comprehensive plans to design, develop, carry out and monitor passenger segmentation. Having no plans is related directly to the lack of knowledge of how to conduct and lead strategic segmentation in the organization. Therefore, communication channels between different departments must be established. Strategic implementation requires top-management involvement; segmentation study is no different as it is critical to involve and commit management to segmentation study in an early phase and during the study (Elmore-Yalch, 1998, Dolničar, 2004). Top-management involvement should concern also the selection of segmentation variables and criteria (Elmore-Yalch, 1998, Dolničar, 2004, Dolničar & Leisch, 2017). Also, to successfully implement segmentation to strategic decision making, a transport company should be able to vary its pricing, existing route structures and service plans and communicate the changes effectively (Elmore-Yalch,1998, p. 80).

The framework of Elmore-Yalch's (1998) segmentation strategy implementation relies on the overall theory of the STP process – identifying target segments, positioning marketing strategies to target segments and specifying the marketing mix for each target segment. This supports the observation made in the theoretical framework that segmentation is a vital part of companies' marketing planning processes and should be considered as a part of overall strategy formation (Keller & Kotler, 2016; McDonald & Dunbar, 2013; Kumar, 2004)

4 RESEARCH METHODOLOGY AND DATA

This chapter describes the research methodology of the study and presents the research design. The chapter aims to link the literature review to the empirical research and also justify the choice of research method. In addition, data collection and analysis methods are presented. The empirical analysis and results are presented after this chapter.

4.1 Research design and methodology

This thesis is a qualitative case study. The choice of qualitative research method is justified by the fact that the research problem and overall objective of this thesis are to make sense about the studied phenomenon, market segmentation and problems related to its application in a particular research context to gather in-depth understanding (Saunders, Lewis & Thornhill, 2016, p. 168). The decision is supported also by the fact that the research questions cannot be answered using quantitative research methods due to the nature of the research problem. Besides, qualitative research is a typical choice for case studies (Eriksson & Koistinen, 2004, p.4).

Eriksson & Koistinen (2004) justify the choice of case study as a research method if one or more of the following conditions are being met: (1) “What” and “How” type of questions are the key questions, (2) the researcher has little or no control over the studied events, (3) there has been little empirical research on the topic, or (4) the studied case is related to a real-life phenomenon. These conditions are also mentioned by Yin (2018), and these conditions apply to this thesis.

The definition of a case study has been more or less vague in the scientific research community, but at least one connecting factor is that “a case study aims to study one or more ‘cases’ whose definition, analysis and resolution is the main objective of the case study” (Eriksson & Koistinen, 2004, p. 4). Yin (2018) defines a case study as “… an empirical method, which aims to investigate a contemporary phenomenon in depth and within its real-world context”. It is common to compare the findings of the case study with previous research and research literature (Yin, 2018, p. 67). Usually, case

studies draw information from the researcher's own experiences and the findings are applied in practice (Metsämuuronen, 2006, p. 91). The practical application of findings is related to the generalizability of the case; a researcher tries to find the similarities and differences compared to the theory and a case study may act as a step towards creating new generalizations and theory (Metsämuuronen, 2006, p. 92).

The case should be a well-defined system or phenomenon between individuals, teams or inside an organization. A case study should include a concrete manifestation, such as project, process, relationship or decision making. Case studies in business and management typically include projects or development projects conducted in companies. Cases that are usually harder to define include different change management projects, chains of events, diverse relationships between actors and different phenomena such as management. (Eriksson & Koistinen, 2004, p. 5; Yin, 2018, p. 66)

This thesis has an exploratory nature. An exploratory study seeks to gain insight about a specific topic and the research questions are likely to start with "What" or "How". The exploratory approach is suitable especially when the goal is to get a deep understanding of a specific problem or phenomenon. It is common also that the focus of research narrows as the research progresses, which is also true in the case of this thesis. (Saunders et al., 2016, pp. 174-175)

Although this study seeks to find answers and develop solutions to a real organizational problem in a participative and collaborative way, no action was taken or evaluated in this study as a part of empirical research. This distinguishes a case study from an action research study. The process of action research study is iterative and emergent, which includes the steps of taking action and evaluation action in multiple iterative rounds, in addition to the act of planning action. (Saunders et al., 2016, pp. 189-192)

4.2 Data collection and analysis methods

The selection of data collection methods is vital and plays a key role in empirical research (Hirsjärvi, Remes & Sajavaara, 2009, p.184). Multiple data collection and

analysis methods can be combined in a case study (Eriksson & Koistinen, 2004, p.27). Using multiple different data sources and combining them is referred to as data triangulation, which is typical for case studies (Yin, 2018, p.171; Eriksson & Koistinen, 2004, p. 31).

The data used in research can be divided into two categories, primary and secondary data. Primary data sources include data gathered by the means of observation, interviews or a survey. Secondary data can be documents, emails, presentations, notes, interview transcripts, recordings, compiled data et cetera. Despite their names, secondary data is not secondary in value; secondary data can be even favoured. The research data collection should strive for efficiency and appropriateness, and if there exists good secondary data, it should be exploited. (Saunders et al., 2016, p. 319-340; Hirsjärvi et al., 2009, pp. 186-190)

The goal of this thesis is to study and exploit relevant scientific literature and compare the data gathered from the case company to the relevant literature. In this study, the qualitative data has been gathered using secondary data sources, such as documents, presentation material and notes from meetings and informal discussions between the analytics director, business intelligence developers and customer research analyst of the case company. The presentation material involved plans of segmentation project, such as used segmentation variables and implementation plans made by the external consulting firm. The presentation material was reviewed together with the case company and suitable material was selected for analysis. Additional information was gathered by informal meetings during my employment period, phone calls and emails after the employment period. The phone calls or email discussion were unstructured and thus, the transcripts are not included in this thesis.

Many internal meetings were held, and notes were taken to understand the segmentation project and process. All relevant information was then gathered in a separate file. This was the material I could refer to and use as my empirical data in this thesis in addition to meeting notes, discussions and observational data. The data provided was comprehensive enough that together with my notes and experiences, no external information was needed to conduct the research. The question of research

data adequacy was also discussed with the supervisor to ensure its sufficiency and quality.

As there are risks involved in using secondary data, the question of research data adequacy was also discussed with the supervisor to ensure its sufficiency and quality. Secondary data may not fulfil the needs of research, which often means that the data needs to be edited for a specified purpose (Hirsjärvi et al., 2009, p. 186). Ready-made materials, such as documents, presentations and memos are written and compiled from a certain personal point of view and sometimes it might be assumed that the reader is aware of the context (Saunders et al., 2016, p. 339). These risks are analyzed and taken into account in this thesis. It was ensured during the data extraction process, that no relevant information was missing and during the meeting, I was able to ask specific questions regarding different themes so that the whole context was clear.

The data was analyzed from three perspectives, segmentation variables, segment criteria and implementation. The data provided by the case company is studied and classified into these sub-groups. Then the different themes are compared to the findings from the literature review and also to the theoretical framework.

The theoretical framework and literature review parts of this thesis also help to answer some of the research questions, which are concerning the understanding of implementation practices and application of segmentation criteria. The theoretical framework and literature review offer a benchmark to which the current state of the case company is compared, to answer the research questions. The results are then formed from these comparative findings.

5 RESULTS AND ANALYSIS

This chapter includes the analysis of research data and the results of empirical research. An introduction of the case company is provided at the beginning of this chapter. Next, the current state of segmentation and challenges of segmentation are presented and analyzed based on the data. Lastly, the findings and assessment of proposed improvements are summarized.

5.1 Case description and research context

The case company offers public transport services in long-distance and commuter traffic with trains and buses nationwide. The passenger traffic division is the largest business division accounting for approximately 60 % of the total sales in the year 2019. The passenger traffic division covers also a major part of operating profit – over 80 % of the total operating profit is generated by passenger traffic business. The case company aims to be the leading transport service provider in the next years. The case company has invested heavily in the growth of passenger traffic, especially in train traffic in the past few years. The passenger traffic business had a 5% growth in revenue and over 55% growth in terms of profit in the year 2019. A growth strategy adopted in 2019 relies remarkably on the growth of the train traffic business area, which is supported by the megatrends of urbanization and climate awareness. (Case company's annual report, 2019)

Significant efforts have already been made to take advantage of these megatrends, such as competitive pricing strategies, shortening of travelling times and increasing the frequency as well as the number of train journeys, to increase the case company's market share. These efforts have been proved effective since the year 2019 was record-breaking for train traffic business area in terms of turnover, number of journeys and profitability. (Case company's annual report, 2019)

The non-commercial train traffic and sensitive travel industry to which changes in society and markets are strongly reflected, especially amid the COVID-19 pandemic, have set interest to find new ways to find growth and serve customers better. Besides,

the growing demand for digital services has been a key driver for the development of digital services. Therefore, the case company has chosen to develop customer segments to increase their market share both in commuter and long-distance travelling, aiming for higher customer satisfaction and service quality by pursuing segment strategies for different kind of travellers.

The case company has invested heavily in digitalization in recent years. This development has led to the establishment of new data & analytics team to match the increasing need for data utilization. Both the webshop and mobile app shop produce tons of customer data, which could be utilized for business development. The overall goal is to lever up the analytical capabilities and to serve all other functions' needs regarding analytics and reporting solutions. Another aim is to identify the customer in all different user interfaces, to provide data for service and product development, sales, marketing, pricing and internal process development. The strategic goal is to offer multichannel customer services, using multichannel data to further improve these services.

Conducting a market segmentation study is justified strategically, and a natural next step towards a more customer-oriented business model. The real business problem is that the case company does not know their customer segments or the value that the different groups of customers represent. The case company has developed a segmentation model based on the customers' transactional data, which focuses on the recency, frequency and monetary value of the customers' purchases. This model has not however implemented in strategic decision making, since it did not offer any added value in terms of customizing services for passengers. The problem of missing customer segments remains unsolved.

This empirical part of the thesis is focusing on studying the segmentation plans of the case company and providing improvements based on the theoretical research data. First, the current situation of the case company is described before proceeding into actual research about identifying the challenges of segmentation. Then, improvements regarding the selection segmentation variables, evaluation of segment criteria and implementation are proposed based on the analysis.

5.2 Assessment of the current situation

The case company decided to take on a new segmentation study in spring 2020. The segmentation study was planned to include market research data, especially passenger interview and survey data. The segmentation solution would consist of need-based segments, in which each segment would represent a unique mix of travel needs and behaviour. The result would be passenger segments from which a separate classifier is built, which is used to classify the case company's internal customer data. Descriptive variables, such as demographics, would be used to describe these segments in detail and business-related variables are used to link the separate customer survey data and internal data. Three different clustering classifiers are planned to be used in this process.

The segmentation study aims to increase the total revenue and the total number of trips to achieve growth targets. Also, the segmentation study is expected to provide much-needed information on market share compared to other competing modes of travel, such as air travel, car travel, bus travel or even cycling or walking. In addition to this, customer segments are an important tool in the planning of first and last-mile connections; passengers with similar travel behaviour could be targeted with travel solutions for the entire trip instead of for just a part of the trip. The planned segmentation process is illustrated in **Figure 9.**

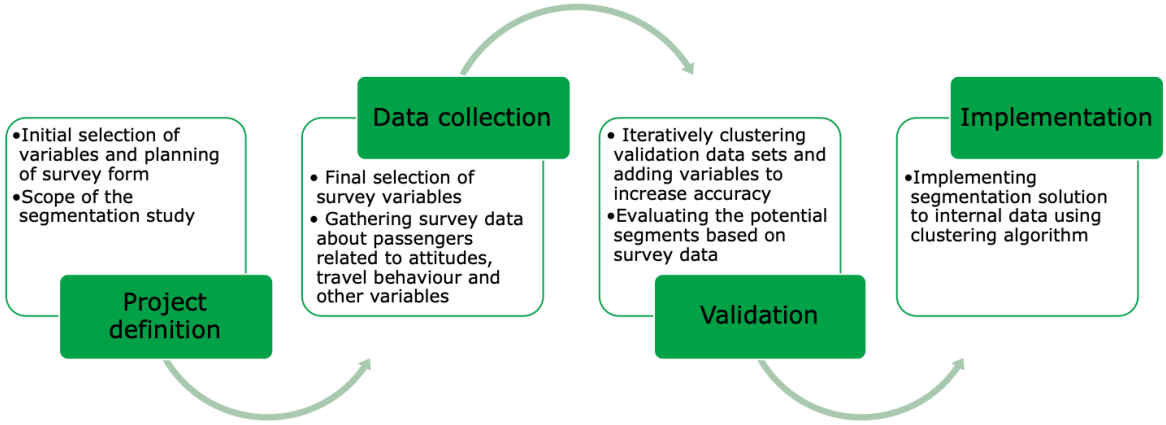


Figure 9. The segmentation process of the case company

The plan is to conduct and find a segmentation solution that the case company can utilize to guide strategic decision making. The final desired state would be a state in which the different customer segments have been implemented in the internal, joint cloud database; meaning that each new row of purchase data would include the information about the segment in which that particular passenger belongs. In addition to the segment information about different passenger profiles, this would enable 1) monitoring and updating the segments regularly 2) segment information is visibly available for each function 3) measuring strategic KPIs on segment level 4) estimating segments' future development.

The ultimate plan is to get a picture of the whole market in terms of behavioural segments. The segmentation solution is based on survey data gathered from external passenger panel so that a "baseline" solution can be formed. All business-related variables are asked from the panellists so that the segments formed from the survey data can be imported to the internal database. The main idea is that the segmentation solution provides segments, which also exist in the internal data when implemented via a separate clustering classifier. The implementation of the segmentation solution relies on the business-related variables, so-called "glue variables".

5.2.1 Segmentation variables

The case company aims to form market segments based on passengers' travel behaviour, needs, attitudes, buying profile and demographics by combining information from multiple sources. The case company utilizes surveys, interviews and internal purchasing data to gather information from their customers and potential customers. Although the selection of the most suitable clustering algorithm and data collection methods are other problems faced by the case company, this thesis does not focus on these. Different data collection or clustering methods and their combination are not further analyzed in this result chapter. Instead, the analysis focuses on analyzing the selection of segmentation variables and their challenges.

The case company has identified multiple potential segmentation variables and the real problem is caused by the abundance of data. Which variables offer the best

solution? Which variables offer added value to the segmentation analysis? Which variables are used in describing the final segments? How to combine “soft” and “hard” variables, such as attitudes, needs and purchasing data?

Table 5 below summarizes the different segmentation variables identified by the case company. Overall, the segmentation variables used to segment the customers or used to describe the final segments align with the variables found in the literature review.

Table 5. Segmentation variables identified by the case company

Variable category	Segmentation variables
Attitudinal	lifestyle (active/passive), overall attitude to life, personal values, reasons to choose train
Demographics	age group, gender, distance to the closest train station, place of residence
Sensitivity to the marketing mix	price sensitivity depending on the usage situation
Socioeconomics	car ownership, driver’s license, household size, income group, occupation
Travel behaviour	estimate of all trips made in a year in certain distance groups, the estimate of the amount of money spent to train trips and services, does the customer intend to increase the use of the train, has the customer travelled via train in the last year, the share of wallet (train, bus, car), ticket-buying channel
Usage	the share of business trips from all train trips, the reason to travel

As seen in **Table 5**, the case company has identified multiple different variables to use in market segmentation. Starting from attitudinal variables, the case company aims to understand the underlying needs and attitudes behind choosing a train as a travel mode. The reasons for choosing a train may refer to the price of the trip, safety or environmental friendliness, and the goal is to identify customers’ travelling needs and factors influencing customers’ travel decisions. Also, lifestyle information is gathered to know if the segment’s population is more active or passive. Including these variables sounds reasonable since the goal of the case company is to form need-based segments.

In addition to “soft” attitudinal and need-based information, the case company has gathered diverse data from the travel behaviour and usage patterns of the customers. This data can be considered as “hard” – the variables act like key figures, creating

different groups and minimum and maximum levels. The most important variables are, according to the case company, the estimate of the amount of money spent on train travel during a year and the estimate of the number of train trips made last year. These figures tie the attitudinal and need-based information to the real world, indicating, for example, whether the people who identify themselves as environmentally woke, prefer train over other transportation modes. By cross-examining and comparing these different information sources, the case company could conceptualize the potential of a segment. Another important variable is the share of wallet variable, which indicates the share of train travel from all other travel modes (train, bus, car).

Estimate of all trips made in a year in certain distance groups -variable helps to form distance-based potential groups between and within segments. This very specific variable enables the case company to examine whether the different segments differ also in terms of the distance travelled. Based on this information, the potential can be widely analyzed, and combined with attitudinal data, which creates a solid picture of the travel behaviour and potential. The case company has focused on multiple variables to measure the potential of segments. For instance, does the customer intend to increase the use of the train or has the customer travelled by train last year? The variables could also work as baseline filters – only looking at these two variables the case company can see if it makes sense to target these segments and get an idea about their potential. In addition, an estimate for the growth of a segment can be determined.

Additional usage variables allow analysis at the trip and passenger type levels; the case company identifies three different trip types (leisure, business, commuting) and five different passenger types (pensioner, student, employed, unemployed or other). Including marketing mix related variables in the segmentation analysis has been mentioned in the literature by Kumar (2004). The case company examines the price sensitivity of different trip types to learn more about whether business travellers and commuters differ from leisure travellers in terms of price. Although the simple division between business and leisure travellers may not offer great insights, examining marketing mix responses may generate useful information for decision making. The

case company could consider utilizing also other marketing mix related variables in segmentation besides the ticket channel and price information.

The case company utilizes demographic and socioeconomic information to segment the passengers, or to describe the final segments in detail. The demographic variables include age group, gender, distance to closest train station and place of residence (capital area or other). The socioeconomic variables gather information from car ownership, driver's license, household size, income group and passenger type. These are all very common variables, but the categorical variables of age and income groups may distort the analysis; there exists six different age groups and five different income groups. Also, the car ownership variable examines whether the passenger has no car at all, 1 car, 2 car or 3 cars or more. The data can include also binary variables, for example, has the passenger travelled in the previous year or not. An illustration of the segmentation variable hierarchy is depicted in **Figure 10**.

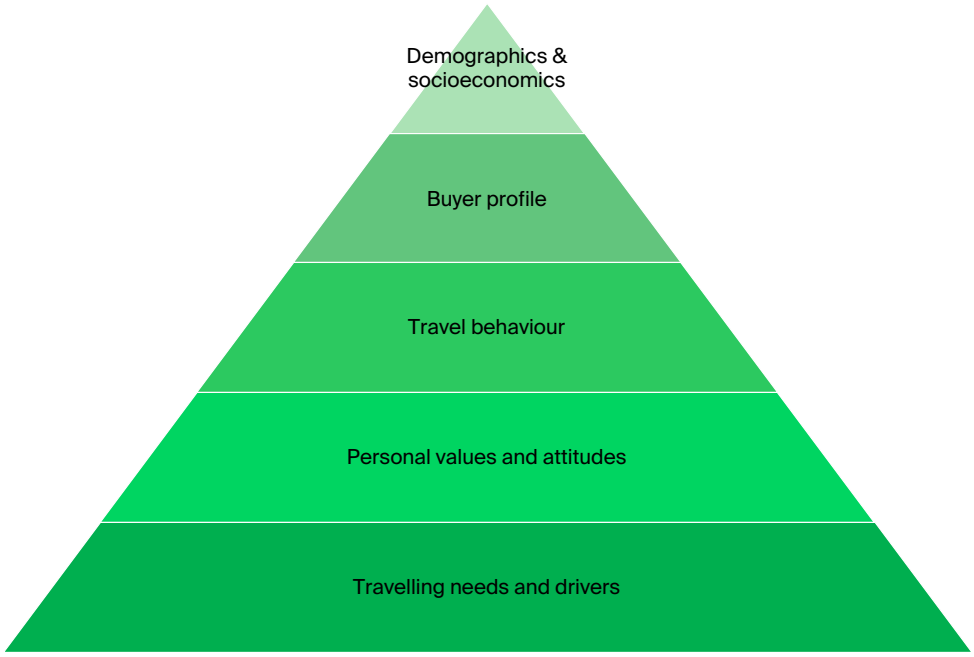


Figure 10. The segmentation variable hierarchy of the case company

Figure 10 represents the segmentation variable hierarchy of the case company. The segmentation variables mentioned in Table 4 form a hierarchy, in which the demographic and socioeconomic variables act as descriptors and travel needs as well as attitudes form the basis of segmentation solution. The hierarchy is very detailed and

several different variables, data sources and clustering algorithms are used to form the segments. The buyer profile variables are directly linked to the transactional data of the case company, which increases the relevance of the segmentation as the segments are directly related to the real-world data. However, the accuracy of the segmentation solution may suffer when the detail level increases and it is harder to interpret the segments, based on the fact that using multiple clustering algorithms may affect the calculation.

The case company has utilized some kind of choice sets in determining the initial scope of segmentation. As mentioned in the literature review, the choice sets are typical for train travel segmentation and also common in the public transport domain. The choice sets are; existing customers (travel by train regularly or occasionally), not customers yet (could use the train in the future, but do not travel by train now or travel by train little), hard to reach customers (do not travel by train and won't shift easily to use). The other dimension of the scope is the different passenger types mentioned earlier; leisure travellers, business travellers, commuters and students. Together these different target groups form the scope. Although the scope is preliminary and appears only in segmentation plans, it can be assumed that these groups are of genuine interest in the case company.

To summarize, the population can be divided into two separate groups – users and non-users. Users are then further divided into choice and captive user categories, and non-users into the potential users and car captives categories. The case company does not directly target choice riders but instead, existing customers. It should be noted that existing customers can be either choice or captive riders. Although they both may travel by train regularly, they have different needs and characteristics, for example in terms of income. The second group mentioned by the case company are potential users as they are defined as users who could use the train in the future. The "hard to reach customers" are either potential users who are less likely to switch to train or car captives who exclusively use only the car or cannot use the train due to its poor availability or practicality. The case company should take into account that life-cycle changes (e.g. shifting from student life to working life, migration, changes in housing

type, changes in income) may affect captive riders and choice riders, which could lead to a transition from one group to another.

Van Lierop & El-Geneidy (2017) identified also captive-by-choice passengers in addition to traditional captive and choice users. Captive-by-choice passengers are a new group, which have been just recently identified and they view train as a viable alternative on its own. They do not view the train as a last alternative nor as a preferred mode over other transit modes. They have financial access to use also other transportation modes, and the competitors in this field could be the new car-share platforms such as Uber.

The case company did not utilize satisfaction level measurements as variables or responses to price or service changes in segmentation. Since it has been found that the case company is capable of gathering rich information from their customers, they could utilize these variables in segmentation to help in service design and development. Although the satisfaction levels are somewhat included in the “reason to choose train” variable, they could be exploited more. The case company has studied how the price affects the selection of train in terms of leisure, business or commuting trips but not how different segments would react to price or service changes. This could be interesting data because then the price elasticities of different segments could be determined. However, the price elasticity information should not be tied to certain products or passenger scope only.

According to the prior analysis, the case company has set some “fixed” a priori classes, such as passenger and trip types. These include leisure, business and commuting travel, and the division to the existing customers, potential customers and “hard to reach” customers. However, the passengers are not segmented according to these, since the goal is to form needs and attitude-based segments related to the actual travel behaviour. The case company determines the number of segments by clustering passengers a posteriori and based on attitude and need combinations that emerged from the data.

Since the selection of segmentation variables affect the segmentation solution, it could be interesting to test if a better solution can be obtained by using a multi-method approach, combining a priori and a posteriori segmentation methods. For example, the number of trips, age, occupation, average ticket price or location could be used to develop a priori segments and then see if certain behaviours and values differ between these segments. Another way of modern segmentation is to use individual probabilities for segment membership, which enables dynamic segment structure (see Dawkings et al. (2018)). For example, if a passenger belongs 85 % to segment A and 15 % to segment B, it could be easily measured if the person swifts more towards segment B over time. Besides the segment membership degrees, these similar kinds of probabilistic measures could be set to measure certain behaviour and attitudinal types, for instance, a passenger travels 80% for leisure preferring safety and 20% for work preferring punctuality.

5.2.2 Segment criteria

The case company's aim for market segmentation is to form the most accurate picture possible of the whole market. This must be ascertained before the case company can conclude the segments according to the data provided by the case company. One of the key problems is how to evaluate the segments and their "goodness", meaning the accurateness of the segments calculation-wise and business-wise. What should the measurement of accurateness be based on? How to interpret final segments when the calculation had based partly on external data?

The case company has set some general rules for the segments. Some of the criteria focus on the number of segments, but the case company has also business-related criteria in place. The majority of these rules describe and evaluate the desired outcome, rather than the specific method or manner. For example, it was defined that the potential segmentation solution would need to have a "reasonable" number of segments instead of focusing on the concrete actions which could be used to evaluate the suitability of the number of segments.

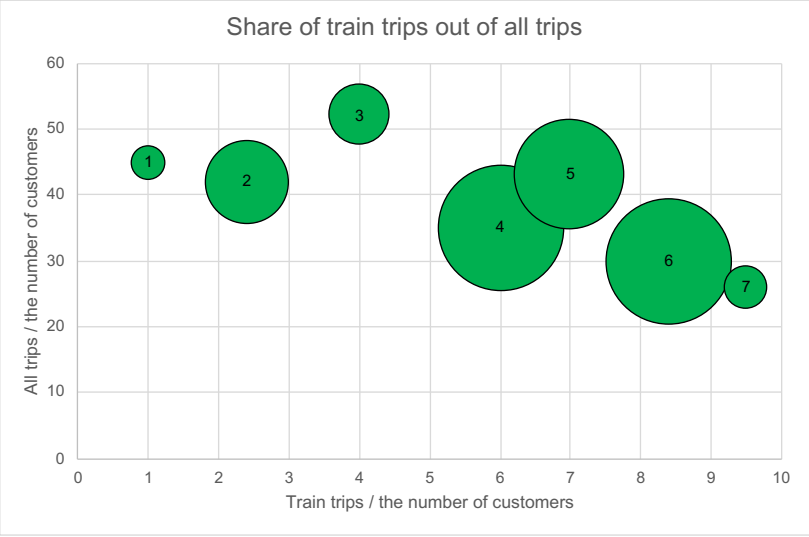
The case company have underlined that the final number of segments should be “reasonable” in a business sense. The discussions with data scientists of the case company revealed that different statistical measures are used to validate the choice of the optimal number of segments during the segmentation analysis. The used measures are actually in line with the measures mentioned in the scientific literature; sample distributions within the segments and between the segments were analyzed. Besides, the skewness of data was addressed regarding the behavioural and demographic characteristics of different segments. This is an important observation that when using multiple data sources, the skewness of different data sources affects the stability of the overall segmentation solution and thus needs to be addressed. However, this thesis does not focus on the data analysis tasks of the market segmentation study, so these statistical measures are not analyzed further.

The case company does not have more specific criteria in place related to the optimal number of segments. This is not unusual - as demonstrated in the literature review, most of the studies reviewed in this thesis relied on intuition, past experiences and the researcher’s subjective opinion when deciding the number of segments. However, other criteria specified by the case company affect directly or indirectly the decision about the number of the segments. These other criteria include size, measurability, differentiability and actionability – similar to the criteria mentioned by e.g. Kotler & Keller (2016).

According to the data, the case company thinks that the final segments should be sized equally; they should not be too small or too large. Also, passengers should be statistically evenly distributed across different groups, meaning that the segments are equal in size. It should be noted that while one segment shouldn't contain significantly more customers than others, natural differences in segment size are generally very possible. Therefore, it should be clear that the segments are very likely to differ in size, but this observation should be supported by examining the distributions inside the sample before making assumptions. For example, some of the size differences can be explained directly by looking at the population distribution in a country, if certain behaviour is specific for a certain age group alone.

Measurability and differentiability criteria mean that the segments should differ enough from each other in terms of main KPIs, such as the number of trips, revenue or the share of wallet. The “Share of wallet” measures the percentage of a passenger’s total travel costs that goes to the case company, which is monitored with surveys. The main KPIs are decided by the case company and are related tightly to the overall strategy of the company. As mentioned in the literature, by tying the segments to measurable metrics, their effectiveness can be ensured; the segments should be measurable in terms of their size, purchase power and value.

The case company has understood the importance of heterogeneous segments, and one part of the segmentation process is to ensure that the segments differ in terms of their actual value, so that different strategies can be developed for each segment. The segments are not only distinguished by their attitudes towards the train as a means of travel, but also by the share of passenger’s journeys made by train out of all passenger’s journeys made during the year. This indicator can be collected from customers in the form of a survey study. Also, another indicator is used to measure the segment’s potential; the share of the segment's customer-specific sales out of the number of customer-specific train journeys. The data for this indicator can be found directly from the purchase data. **Figure 11** below illustrates both figures – the numbers are illustrative.



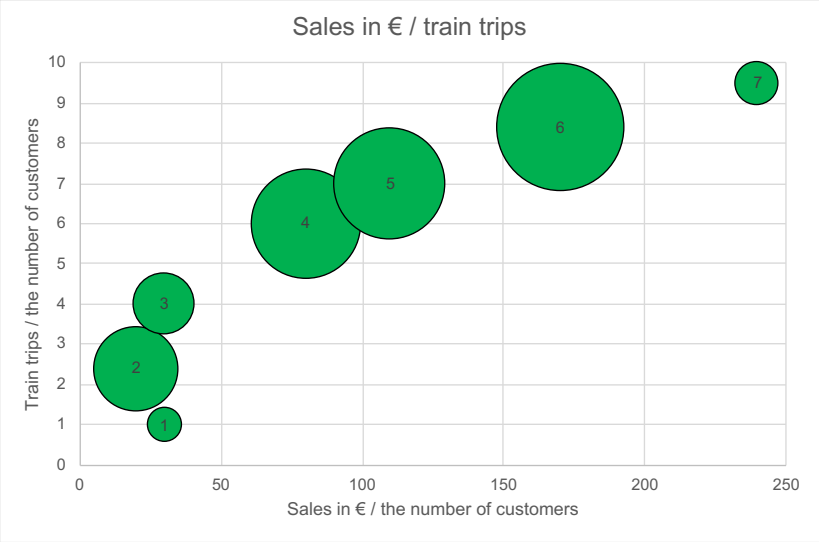


Figure 11. The representation of evaluating segments' business potential

As seen in **Figure 11**, interpreting segments can prove to be a difficult task when their potential business value appears to be inconsistent. The data point sizes represent the illustrative sizes of the segments. For example, it seems that the passengers belonging to segment 7 have the highest number of train trips but their total trip number is low. At the same time, segment 7 has the highest sales. Should the small size be a barrier to implementation?

Since the segments are end-products of a clustering algorithm, or outcomes after using multiple iterations and clustering algorithms, the size of a segment can also indicate that the particular segments are under or overrepresented in the actual data. Representability and segment distributions are related to the skewness of data, but also it could indicate the actual underrepresentation of the customer group – created by a clustering algorithm – in the data. In short, the "absence" of certain customers does not necessarily mean that the segmentation solution is weak. Realistically, for instance, the number of wealthy, car-owning, older people living in the archipelago, can be low in the data.

Another point is that if the attitudinal and/or behavioural profiles of segments 4 and 5 in Figure 10 are different, which segment should be targeted? The choice could be based on the company's organizational capabilities together with an estimate about

the segment's future change, given that segments of the same size now may be very different in five years.

Besides differences related to main KPIs, the segments should differ in terms of their needs and behaviour. The case company has addressed this by underlining that segments are required to be different for customer profiles to be functional and actionable. The actionability means that the company can come up with ideas about products, services, prices and promotions as well as distribution solutions for the segment. However, heterogeneous and actionable segments are not enough. The segments need to be accessible, meaning that they can be reached and served through the channels and means available to the case company. Different responses to marketing mix variables (4 Ps) ensure that it is possible to develop new marketing mix strategies for segments, but the real potential is reached only then when these strategies are executed using appropriate channels. The case company should not focus on developing thorough marketing mix strategies for segments that they cannot completely serve and reach, for example, due to the passenger's limited income or poor access to a particular distribution or promotional channel.

The relationship between needs, attitudes and behaviour should be examined more deeply. As noted by Barr & Prillwitz (2012), the relationship is not always as straightforward as one might expect. Passengers with similar needs may differ in terms of travel behaviour, and vice versa. Also, the values or attitudes of the passenger may not be reflected in the behaviour – a preference for not owning a car does not always mean increased train patronage. The case company should be careful when examining the needs and attitudes of passengers, and if possible, the behavioural link should be verified.

The data shows that the case company understands the importance of proper criteria evaluation and has implemented criteria, which are in line with the literature. However, the case company has not addressed the stability or replicability of segment solution. According to the literature, especially when using multiple data sources and clustering methods, a company should focus on the dynamic and replicable solution, instead of conducting market segmentation as a one-time project. Assessing the monitoring

capabilities of the company and establishing monitoring processes and measures for segments are means how these factors can be taken into account. The case company should plan, which additional or revising segmentation activities should be conducted after the initial study, so that the segmentation solution remains stable and dynamic.

According to the relevant scientific literature, the monitoring of segments is critical for the long-term success of market segmentation, and a monitoring process should be implemented to see how the segments change considering their size and contents. Do certain types of passengers migrate to other segments, and, especially, does the typical travel behaviour and attitudes of a segment change over time. The latter is certainly the most difficult to measure since the behaviour data is gathered via surveys and interviews. One solution could be determining certain business-related measures or KPIs to measure certain behaviour. Then, a changed behaviour is reflected in the specific KPI, special to this particular segment. Also, a validation survey could be sent to certain sub-population, to measure the potential change in attitudes on a segment level regularly. If the company wishes to examine its positioning in the whole market, a separate survey or study could be conducted in which the case company maps the number of users and non-users. A completely new segmentation study should be conducted regularly to ensure that if new segments have appeared or if the fundamentals of existing segments have changed drastically.

The change in size affects also the important quality criteria, size, itself. As pointed out in the theoretical framework, a potential segment may be a small segment, which grows fast or is expected to grow fast. A large segment may offer great potential due to its size, but if a large segment is decreasing in size, it should be viewed as unattractive. The segments should not be evaluated based on size alone; the size of a segment should be one criterion among others. All different segmentation studies and the segments produced from these studies must be evaluated with the same criteria to ensure reliability and validity.

If the segments appear to be equal and the most potential target segments cannot be separated from the overall segmentation solution, the case company could consider utilizing Porter’s 5 force model in the evaluation. In this case, the case company could

look at in which segment the competition is low in the desired market and product area, the switching costs are high and in favour for the case company, and the threat of substitutes is low. Also, the entry and exit barriers could be analyzed; low entry barriers attract new entrants, but low exit barriers reduce the risk for all the operating companies. The case company could utilize the idea of choice sets in this context: who are the choice and captive users of the segment and what kind of business potential they represent.

5.2.3 Implementation

The company aims for strategic segmentation, based on which segments could be targeted more broadly than simply marketing efforts. The case company is particularly interested in implementing segments as part of strategic decision-making. To achieve this, the current situation must be understood and assessed first.

At the moment, the Data Analytics team is responsible for the segmentation study. The Data Analytics team is located at the independent Business Development function and thus is not directly related to the operational business, acting as a support function. According to the data, marketing is the most strongly involved function on the business side to the segmentation. Other functions that could utilize segment information are product and service development, communications, schedule and transport planning, pricing and customer service. It can therefore be concluded that the case company has understood the principle of strategic utilization of market segmentation. This is also supported by the observation that the strategic goals of segmentation are already listed at the beginning of the project. These strategic goals are:

1) Mutual understanding of segments on a corporate level
2) Tool for management and strategy targeting
3) Improving marketing
4) Product and service development, identification of new opportunities

The first goal refers to the aim of segmentation. The goal is to find clear and easy-to-adopt segments that can be viewed in a versatile and flexible way from the perspective

of different processes. This is a prerequisite for the segments to be harnessed as a tool for strategic decision making. To capture the business potential for additional sales represented by the segments, the whole organization and its functions and processes should be segment-oriented. The last two strategic goals refer to the means of how segments can be targeted by the means of marketing and product development to increase growth and profitability.

When written open, the strategic goals make business and academic sense. Still, there exists no implementation plan on how to reach these goals. Although strategic goals are acknowledged and include important themes, the overall goal setting is very fragmented. The strategic goals are individual issues that do not intertwine as a whole and there is no strategic implementation plan. The case company has made a very detailed tactical segmentation plan, which also includes strategic issues such as selection of the segmentation variables and criteria. The case company does not have a segmentation monitoring plan either. As pointed out by Dolnicar et al. (2018), strategic segmentation tasks form the basis for segmentation analysis, in which extracting the segments (clustering) and data analysis are in an important but secondary role regarding strategic implementation.

The case company wishes that the future segments could be examined from several different perspectives in terms of price, channel, the purpose of the trip, product category, product type, season and booking intervals. These perspectives are related to the marketing mix variables. The case company has also mentioned a few development focus areas regarding the implementation of the segmentation solution. These areas are channel development, personalized content marketing and content planning to different channels.

What comes to the implementation barriers, the case company has encountered similar barriers mentioned in the literature. These implementation barriers are more focused on the management and processes rather than technical capabilities. To summarize, the case company has not established an STP process, where the segmentation would act as an origin for value delivery. The processes of segmentation, implementation and monitoring are missing partly due to this reason. The relationship

between segmentation and marketing mix has not been fully understood. The concept of strategic segmentation including its value chain integrations is not related to the concept of strategic segmentation as the case company understands it. The identified implementation issues are summarized in Appendix 1.

The case company has established a solid IT infrastructure, the data analytics team is responsible for analytical capabilities and development including relevant tools and workforce. The data analytics team and IT function are utilizing the best practices of agile software development. The data quality remains as an only identifiable technical challenge which is partly due to utilizing several internal and external data sources. The segments are based on the data in the end, so a great emphasis should be placed on data quality as well.

5.3 Summary and proposed actions

This chapter focused on analyzing the current state of market segmentation in the case company regarding the segmentation variables, segment criteria and implementation practices. The case company has identified several variables suitable for market segmentation. The variables are related to the travelling behaviour and factors influencing it, such as attitudes, values, reasons to travel and lifestyle information. Besides, demographics and business-related information are gathered, such as share-of-wallet information. The case company could utilize more web analytics information to gain an understanding of customers' buying behaviour.

The challenges faced by the case company regarding the segmentation variables are using too many variables and aiming for a general solution. While including too few variables may be a bad starting point for a market segmentation study, selecting too many variables can be harmful as well, as a too wide scope of segmentation study tends to decrease the business relevance of the study and the level of approximation is likely to increase to an unsustainable level when data is aggregated and analyzed through multiple algorithms. As a solution, certain variables could be excluded from the analysis in an early phase of the segmentation study and statistical measures could

be used to evaluate the statistical significance of a specific variable to the overall solution.

Based on the literature, combining multiple variables offers the best segmentation solution. The case company should identify by which variables are related to the passengers' travel behaviour directly or indirectly, and what are their organizational capabilities to act based on segment information related to selected variables. A multi-level customer profile may offer detailed information about the customer, but it is complex to build and consists of several steps at the same time. The case company should assess whether the added value of the profile exceeds the risks and costs related to building it. Besides, the accuracy of the segmentation solution may suffer when the detail level increases and it is harder to interpret the segments, based on the fact that using multiple clustering algorithms may affect the calculation.

The case company could benefit from combining *a priori* and *a posteriori* segmentation approaches to examine what kind of behavioural segments lie beneath different products or passenger groups. If the division of passengers to pre-defined groups does not make sense, the case company could utilize segment-level membership calculations based on individual probabilities to estimate customer's segment membership more dynamically.

The scope of segmentation determines far the selection of segmentation variables; different variables act and respond differently to changes when several different variables are combined increasing the risk for misinterpretations. Based on previous studies in the industry, aiming for a general segmentation solution is usually doomed to fail. Instead of devoting to understand the non-users, the case company should aim to understand the behaviour of their current customers and potential customers, focusing on increasing the revenue from existing customers and attracting potential users regarding choice, captive-by-choice users and potential users.

The analysis tells that the case company has managed to set general criteria for the segments and segmentation solution, measuring both the quality of individual segments and the overall solution. Yet, the case company lacks concrete action steps

to evaluate the selection of the number of segments. Although the right number of segments is heavily context-dependent, the case company should base the decision on the organizational structure and structure of segment solution in addition to statistical measures.

The data shows that the case company understands the importance of proper criteria evaluation and has implemented criteria, which are in line with the literature. However, the case company has not addressed the stability or replicability of segment solution. According to the literature, especially when using multiple data sources and clustering methods, a company should focus on the dynamic and replicable solution, instead of conducting market segmentation as a one-time project. Assessing the monitoring capabilities of the company and establishing monitoring processes and measures for segments are means how these factors can be taken into account. The case company should plan, which additional or revising segmentation activities should be conducted after the initial study, so that the segmentation solution remains stable and dynamic. The monitoring could be implemented by setting up new KPIs related to certain behaviour so that the case company could monitor the change in both the behaviour and its effect on the business.

Combining hard, numerical measures of statistics and soft quality criteria the company can evaluate their segmentation solution. The case company has identified both hard and soft criteria. Both statistical measures and management consideration are used in the selection of the number of segments. The segmentation criteria and evaluation KPIs are directly related to business, which increases the probability of a successful segmentation study. The case company should use the same criteria to evaluate different segmentation solution and aim more focus on the monitoring, reproducibility and stability aspects of segmentation. Trusting only on general criteria measures may lead to excluding attractive segments due to e.g. their small size if the growth potential is not identified.

The case company does not have concrete implementation plans outside tactical segmentation plans. The case company has identified multiple business use cases but

lacks a plan of how to implement the segments to strategic decision making. The strategic goals of segmentation are not specific and are not integrated into the strategy of the whole company. Several implementation barriers were identified regarding the managerial side of segmentation. According to the data, the case company has not established or at least documented an *STP* or value delivery process to which the segmentation aims to contribute as a value creation component. To ensure continuous implementation and monitoring of a segmentation solution, the organization should be segment-oriented. Therefore, a successful implementation comes with organizational realignment, change and value chain integrations.

6 CONCLUSIONS AND DISCUSSION

This thesis focuses on studying the utilization of market segmentation in strategic decision making by focusing on three key areas: choice of segmentation variables, evaluation of segment criteria and implementation of a segmentation study. The overall application of market segmentation is studied through these three key areas of interest. The selection of the focus areas is based on the research needs of the case company.

The segmentation process of a case company was studied, and it was found out that the case company has identified several segmentation variables to use in segmentation and criteria to evaluate segments, which are in line with the relevant literature and previous studies in train travel. These variables were related to the attitudes, values, travel behaviour and demographics of passengers. The case company has set criteria for segmentation solution utilizing statistical measures as well as qualitative values. The implementation practices were found to be generally inadequate as a result of both a literature review and the case study. As a result, certain discrepancies between theory and practical application were found. The findings support the observation that segmentation theory and practical application differ and that there exists a research gap related to the managerial implications of a market segmentation study.

6.1 Answering research questions

Three research questions were formed to support the objective of this study to help solve the research problem. A secondary objective of the thesis is to increase understanding of the strategic implications of market segmentation. The strategic link is examined from three different perspectives by answering these three research questions.

Q1: What different market segmentation bases exist for train passengers and how these market segmentation bases can be combined to support strategic decision-making?

The segmentation bases used in the case company to segment train passenger are similar compared to other industries and align with the overall segmentation literature based on the empirical case study. The train passenger segmentation is emphasized on building travel profiles utilizing both independent and dependent variables.

Multiple studies focus on analyzing and understanding the travel behaviour of different passengers and studying their demographics. Unfolding behavioural patterns of the passengers have been of particular interest to transportation companies, as it is influencing travel behaviour, as in other businesses, that brings longer-term benefits compared to conducting a single advertising campaign. The segmentation in train travel then focuses heavily on psychographics. This attitudinal information is supported by demographics and socioeconomics. Many of the examined variables are directly related to the business, such as sensitivity to marketing mix changes and other trip-related measures, such as the average number of trips travelled.

Industry-specific variables special to the travel industry are choice sets, which the case company have also taken into account but not included in the segmentation. Choice riders, captive riders and potential non-users all have different motives for their actions, which affect their travel behaviour. Therefore, considering adding choice set information to the segmentation analysis would offer added value. Other common industry-specific variables are variables about competing travel modes, such as car ownership and the share-of-wallet measures, which were also used by the case company.

The case company has identified multiple segmentation variables that are supported by the literature and research studies. The case company has utilized psychographic, demographic and socioeconomic variables in addition to travel behaviour variables. The case company has utilized the information about the price sensitivity of the passengers. However, the abundance of segmentation variables and approaches have made the segmentation too complex. The selection of segmentation variables should be based on identifying different travel behaviour. Psychographics and comprehensive customer profiles serve only when the attitudes, motives and other characteristics can be identified as factors influencing observed travel behaviour. In addition to price and

product information, there exist channel and promotion information; utilizing web data should play an important part in building customer profiles and customer paths by knowing which web channels the passengers are utilizing and which campaigns appeal to which customers.

The choice of segmentation variables is one of the most important strategic decisions when conducting a market segmentation study. The choice of segmentation variables is directly related to the aim of the segmentation study and used approaches. A priori segmentation is the most common segmentation approach used in the travel industry despite its simplicity and partly because of it. This tendency is also supported by the organizational structures of travel companies – many companies organize themselves based on specific geographical areas, products or passenger types. Although a priori segmentation is still useful, it should be combined with a posteriori segmentation approach to reach better results.

The segmentation variables are defined according to the purpose of the study, the data collection methods and segmentation approaches used in the analysis. A relevant business context must be constructed around the project; a company might not reach a state where they would have general customer segments available for all functions from marketing to product development to exploit. It might be impossible to create precise general segments from the whole market, where the computational error and the estimation error alone become too large when using several data sources and clustering algorithms. This is supported also by the observation that the segmentation outcome usually depends on the chosen clustering algorithms.

The best outcome is usually generated by utilizing multi-approach based on few relevant variables. The latest segmentation research in the field of train travel or tourism uses both a priori and a posteriori approaches to first segment the market based on pre-known categories and then analyze the sub-population using clustering methods to see if certain behaviours differ between these segments. Another state of the art -approach uses segment membership probabilities to segment passengers, which leads to dynamic segments giving each passenger a probabilistic estimate of

their segment membership instead of providing a binary solution. The manageability of the segmentation solution also is eased with establishing a segment criteria policy.

Q2: What are the criteria for a good segment and how evaluate the quality of segments in the travel industry?

A successful segmentation project is often determined by the criteria used to select and evaluate target segments among all the final segments. The criteria can be also used to measure and review the overall quality of a segmentation project as well as the number of segments.

The criteria used to measure segments' quality is still mostly based on the criteria formed by Kotler. The segments should be measurable in terms of size, purchasing power or value metric relevant to a company. The segments should be substantial enough to present a significant business potential and to ensure that targeting these segments is profitable. A company should only target segments that it can be reached and serve with current organizational capabilities and channels. The segments should be heterogeneous having different responses to marketing mix variables so that a company can develop differentiated strategies for them. In addition, a company should be able to act based on the segment information – actionable segment information can be implemented to the strategic decision making.

In addition to substantiality and size, in the best scenario, the segments should represent high growth potential – a large segment decreasing in size can be considered less attractive compared to a smaller segment with high growth potential. Examining the change in segment size requires monitoring process and tools. This brings us to the stability criterion, which importance has been highlighted during the development of segmentation methods and algorithms. Besides all aforementioned criteria, the segment solution should be stable. This is required solely by the nature of strategic decision-making when decisions are made over a longer period.

Although the segmentation literature acknowledges several segment criteria, they are not included fully in the segmentation studies in the travel industry. Most of the

reviewed studies justified their segmentation solution and the number of segments with subjective measures, such as intuition, past experiences and interpretability of the final solution. However, different statistical measures play a significant part besides the subjective criteria. This makes sense as the segmentation research is very much oriented towards technical aspects of segmentation, such as clustering algorithms and optimization. The statistical measures evaluate the structure of segments, probabilistic significance of different variables as well as homogeneity within the segment and heterogeneity between segments. In this case, the statistical calculation and probabilistic values guide also the choice of segmentation variables and the number of segments considering the statistical robustness of the solution. The statistical aspects play an important part in evaluating the reproducibility of segmentation solution – another new criteria measure. According to the relevant literature, the segment solution can be considered successful when the segments are stable and reproducible.

Q3: What are the strategic reasons for doing segmentation in train travel and how the segments can be implemented in strategic decision making?

The strategic reasons for segmentation in train travel are increasing ridership of total population, attracting new riders, increasing turnover of existing customers or improving profitability by focusing on the most profitable customers. Despite these strategic goals, however, segmentation has mainly been a tool for marketing and its popularity has been steadily declining as the results of market segmentation studies have remained short-lived. This is to blame for the lack of correct implementation plans and strategic planning.

Segmentation solution depends on the strategic goals of the company and needs a strategic context to be implemented successfully. Practically this means that a company aiming to utilize market segmentation should establish an STP process to implement market segmentation to its value delivery process as a strategic tool for value identification, value creation and value delivery.

According to the literature, the strategic factors of market segmentation accounts for the majority of the whole segmentation. The technical analysis of data analysis and

extracting segments from the data play a minor part. These steps also consist of several strategic decisions, such as selection of segmentation variables and evaluation of segment criteria. Only after the strategic implications are considered, technical details of the analysis and segmentation process should be reviewed.

Despite the recognition of the strategic importance of segmentation in the theoretical literature, market segmentation is not fully exploited in sense of strategic planning in the travel industry. Relevant studies about segmentation in the travel industry have not addressed the strategic aspects of segmentation, leaving the research of implementation approaches almost non-existent. Most of the studies provide marketing-related insights about targeting found segments.

One of the major implementation barriers is not having comprehensive plans to design, develop, conduct and monitor segmentation study. Long-term segmentation requires appropriate communication channels inside the organization and top-management involvement. The transport company should be able to modify its organizational structure and marketing mix variables to implement segments to the strategic level. This means varying pricing, existing route structure and service plans on a segment level. The segment information should be implemented top-down to the customer service level and horizontally overall functions outside marketing. Instead of pushing segmentation solution from down to the top, the company should focus on the strategical side first and assessing the whole segmentation process. The case company has identified several success factors to segmentation, such as actionable and business-related segments. The case company recognizes the strategic implications of market segmentation outside marketing function. Yet, the main challenge seems to be the lack of STP process and aiming for an over-generalized solution.

6.2 Discussion

While modern clustering and other state-of-the-art algorithms are utilized in market segmentation studies, lack of proper focus in managerial aspects of market segmentation, such as implementation, continuous follow-up, reporting and correct

measuring tend to result in more market segmentation projects remaining short-termed, marketing-centric projects. In other words, customer segments are not effectively integrated into the company's value chain and strategic decision making. The findings of this study confirm this assumption. By studying the segmentation process of a case company, several implementation barriers were identified, such as lack of know-how or knowledge about market segmentation, tool-centric view of segmentation development, marketing-centric view of segmentation, insufficient integration of segmentation to STP process and value chain including other functions.

One of the main reasons to cause displacement of market segmentation from a strategic point of view is that market segmentation is perceived as a poorly exploitable activity consisting of multiple steps with high costs and low added value. The relevant concerns of management are insufficient data quality, budget adequacy, low utilization degree, possible changes in organizational structure, cross-functional implementation, the difficulty of verifying the accuracy of segments and that findings will not reflect the market in which the company thinks to operate.

As the findings of the case study show, the market segmentation concept is generally well-established but the lack of expertise in strategic implementation poses a challenge for companies. Managerial implications of segmentation are broadly recognized in relevant scientific literature and case company, but the majority of the research and work focuses on the technical execution of segmentation analysis. None of the prior studies addressed in this study did examine the strategic implementation of segmentation albeit the topic was sidelined in these studies from the point of view of marketing efforts. This may be a problem as too high a marketing focus may limit the full potential of segmentation study, since marketing functions in public transport are relatively small departments with relatively small budgets (Molander et al., 2012, p.167).

This development has led to a situation where the companies struggle to conduct successful segmentation studies, as there exist several possible variables, methods and criteria to utilize. The case company studied in this thesis fall also in this category. As much as the companies try to maximize the heterogeneity of different segments

and the homogeneity within a segment, as much they struggle to balance the technical and strategical focus of the segmentation process.

A significant finding of this study is that general solutions are not likely to offer any real value – the level of generalization, correlation and approximation increases to an unsustainable level risking the stability and actionability of the segmentation solution. Another focus area is the monitoring of segmentation solution and the development of segments through time. Monitoring the changes of a general solution is an ultimate task – the original fixed solution starts to fall apart quickly. The emphasis therefore should be aimed to form a dynamic, measurable and stable segmentation solution that can be reproduced. This further reinforces the assumption of how market segmentation is evolving its way into companies' value and marketing processes, extending beyond its preceding tactical role as a sole marketing task. To conclude, an additional final phase of the value delivery process is the control phase both on marketing and segment-level, emphasized by McDonald & Dunbar (2013). As important as it is to know the customer segments of a market - it is to measure, report and take corrective action to better serve customers and create long-lasting value (Kumar, 2004).

The lack of monitoring practices reflects the practice of market segmentation; the case company does not have any planned monitoring processes in place. A huge number of transactions are made by consumers every day, that generate new data and reflect the changes in consumer behaviour as well as the changes in segments or the overall market. The profitability and business potential of a segment is affected by the changes in the marketplace and the development of the segment's content. Although companies are otherwise used to measure change, the monitoring aspect is not handled in relevant segmentation literature despite its importance to continuous improvement. As Kumar (2004) points out, modern segmentation should be conducted iteratively when the product or service already exists.

The abundance of segmentation criteria is a common challenge companies face during a segmentation project. Many subjective criteria measures were found to be used in segmentation analysis with low justifications for the choice of the number of the segments in the relevant literature and the case company. This is a significant

observation and points out that the segmentation analysis is almost always a business or study-dependent task, in which certain objective measures such as statistical outputs are weighted together with subjective criteria about the feasibility of the solution.

There exists a clear consensus that a segmentation solution should be implemented across the organization. The segmentation process provided by Dolnicar et al. (2018) underlines the fact that most of the segmentation work is strategic. However, several strategic decisions hide under the technical analysis, such as the selection of segmentation variables. The first strategic decision of segmentation analysis is whether or not to pursue segmentation strategy. The case company should internalize the impact of segmentation strategy on organizational structure and strategy formulation. The case company should weigh their organizational capabilities, business processes and decision-making processes whether they allow implementation of segmentation solution.

6.3 Reliability and validity of research

The quality of research is typically reviewed based on reliability and validity. A study can be considered reliable if similar results and findings can be produced the same research design, and the validity refers to the correctness of used measured, the accuracy of analysis and the generalizability of the results. Different biases might affect the reliability of the study; a researcher might allow her or his subjective views to affect the recording of data or analysis of results. A researcher might make false assumptions risking the reliability of the study; this could be prevented by ensuring a clear research process and transparent recording of each part of the research work. (Saunders et al., 2016, pp. 202-207)

For a researcher to ensure the credibility of the study, a researcher must provide clear research questions, select appropriate study design as well as collect and analyze data in a clear and structured way (Baxter & Jack, 2008, p. 556). Since a qualitative research study is usually conducted in certain setting and context, which are not intended to be replicated, it is important to describe the research design, method and

context in detail to ensure reliability (Saunders et al., 2016, p. 205). The validity criterion deals with the generalization of the study's findings; the researcher's responsibility is to evaluate whether and how the study's findings can be generalized beyond the original case study (Yin, 2018, pp. 78,81).

In this thesis, a thorough description of the research process, design and methods has been included in terms of reliability. One risk regarding reliability concerns the data sources since only proprietary data was provided. Primary data sources, such as a larger interview study, would have been beneficial as it could reduce possible unilateral opinions and conclusions. The risk of unilateral thinking has been however addressed by having multiple discussions with the case company, the supervisor and between all these groups. Multiple colleagues passed on their information in meetings and discussions. A comprehensive literature review further supports the conclusions made in this study by comparing case study findings to the literature.

Since this study is a case study, it has a unique nature to some extent. In this specific study, the research methods are chosen solely on the research objectives. This research has been done to solve a real-world business case. The study was able to fill the research objectives and answer the research questions with the chosen approach and methods.

6.4 Limitations of the study

The segmentation process consists of several phases and tasks. This study does not address the technical aspects or challenges of segmentation analysis but instead focus on examining the strategic nature and implementation of market segmentation by focusing on the selection of segmentation variables and evaluation of segment criteria. Also, the implementation of a segmentation solution is analyzed from a strategic point of view. It should be noted that the implementation and segmentation process consist of many technical details left unaddressed in this study. Technical topics such as data quality, data collection methods and optimal clustering algorithms are not included in this study. The implementation of a segmentation solution requires targeting and positioning activities, which are not analyzed.

In addition to limiting the study to deal with few topics inside the segmentation process, the research data is the second limitation of this study. To get a more comprehensive view of the situation, series of interviews should be conducted. This thesis focuses on the segmentation in the travel industry, which is another limitation in terms of the generalizability of the results and the available data used in research.

6.5 Suggestions for further research

Modern segmentation problems are not related to the identification of market segments but rather to their manageability and the abundance of data. The relevant literature only identifies the problem of using too few variables, but not a single study was found to deal with the problem of the abundance of variables. The abundance of segmentation variables is a real problem faced by the case company and a process to find the right variables should be studied more.

More research focus should be aimed at the combination of strategic and tactical decision making in addition to the implementation of segmentation solution. The concept of strategic segments presented by Kumar (2004) offers a framework to implement strategic segments with value chain integrations. More research should be aimed at the monitoring of segment solution and data collection methods outside the analytical scope of the majority of the studies made. As mentioned by Dolnicar et al. (2018), the segmentation solutions are as good as their data. Most modern research focuses on the clustering algorithms and optimization of statistical measures, but more focus should be aimed to combining multiple data sources and data pre-processing, for example, considering categorical variables used in surveys, since the surveys act as an important data source for customer segmentation.

The literature review showed that segmentation criteria are not often even recognized as important components of segmentation analysis outside theoretical literature. Therefore, the application of segment criteria could be studied more. Another challenge addressed in the literature is the risk of random market segments. Ernst & Dolnicar (2017) studied a total of 78 segmentation studies that appeared in scientific

journals between 2010 and May 2016. Of those 78 studies, 68% were a posteriori segmentation studies. They found out that the risk of random market segmentation solutions is high, as high as 92% The fact that naturally occurring market segments rarely exist means that most segments are generated. It could be interesting to study the monitoring methods used to measure the changes happening in segments. More research could be aimed to study to what extent are the segments artificial products or real-life phenomena – a matter pondered by Dolnicar (2014) and Dolnicar et al. (2018).

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APPENDICES

Appendix 1. Implementation barriers identified in the case company

Implementation topic	Identified implementation issue	Proposed solution in literature
Lack of resources / expertise	Lack of training, lack of processes, poor understanding of market segmentation process, lack of high quality data	Internal training, hiring new workforce, establishing new positions, establishing segmentation team, using external workforce,, data development
Organisational culture	Inadequate information sharing across organisational functions, short-term thinking	Clearly communicating the benefits, the changes required and the effects of market segmentation project to personnel of different functions, change management, establishing interfunctional communication, process development
Organisational integration	Low level of organisational integration, poor fit to tactical programmes	Establishing customer driven processes, strategies and unique value chains to integrate segmentation solution to organisation
Segmentation approach and process	Too technical approach estranging senior management and risking overall usefulness to business, too high emphasis on building customer profiles and not focusing on business-related variables such as products, too low focus on customer buying behaviour, focusing on too deep or high level of analysis, final segments are not actionable	Well-designed segmentation planning, involving senior management, focusing on the quality of segments, taking the organisational structure into account
Senior management	Lack of leadership and involvement, inability to make strategic changes, unflexible organisational structures, focusing too much on the cost side	Pro-active commitment and involvement in the market segmentation process and decision making. Adequate planning of the implementation of segmentation results. Providing needed resources for segmentation study itself and for its implementation. Facilitating necessary changes to organisation's structure and culture. Clearly communicating the concept of segmentation, segmentation process, the consequences and costs of its implementation and the plans for implementation to engage management