

**CUSTOMER SATISFACTION MEASUREMENT WITHIN THE ROAD SECTOR –
FURTHER DEVELOPMENT OF CUSTOMER FEEDBACK SYSTEMS AND
A PUBLIC INPUT MODEL**

EVA LODENIUS

A master's thesis done at Aalto University's
Department of Civil and Environmental Engineering
under the supervision of Professor Tapio Luttinen
Espoo 28.3.2011

AALTO UNIVERSITY SCHOOL OF ENGINEERING PO Box 11000, FI-00076 AALTO http://www.aalto.fi	ABSTRACT OF THE MASTER'S THESIS	
Author: Eva Lodenius		
Title: Customer satisfaction measurement within the road sector – further development of customer feedback systems and a public input model		
Department: Department of Civil and Environmental Engineering		
Professorship: Transportation Engineering	Code: Yhd-71	
Supervisor: Professor Tapio Luttinen Instructor: Professor Emeritus Antti Talvitie		
<p>Abstract:</p> <p>Maintaining roads and delivering good quality are an essential part of the goals and aims of road authorities. In order to fulfill the expectations of the road users, road administrations need to continuously develop and improve their existing practices and services. This can be achieved by increasing public involvement and exploring road users' perception of the physical condition of the road network and the services provided on the network. By engaging the public, road authorities cannot only improve their practices but can also set the key focus objects and areas of their operations. Orientation toward cooperation with the customers is a key to effective organizational management.</p> <p>Nowadays, most road administrations are conducting market research surveys in one form or another. The major benefit with customer satisfaction measurements and surveys is that they can track trends and help an organization to focus on major improvement efforts. The problem with these surveys though are often that they only measure current levels of customer satisfaction and perception without capturing whether the customers' expectations and needs are actually being met.</p> <p>The thesis focuses on the customers of the road authorities, i.e. the road users, and on the importance of understanding and receiving feedback from the customers. The intent of the thesis is to establish a conceptual framework for customer satisfaction measurement within the road sector and to determine how consistent and applicable road user data from customer feedback and surveys is gathered internationally. Moreover, the aim is to determine how to utilize results from customer satisfaction measurements, future prospects and how to link customer input into the decision-making process.</p> <p>The research was undertaken as a qualitative study including both literature review and empirical research. The empirical research was based on an international benchmarking and case study approach where strategies and practices used by eight road authorities in different countries were analyzed and compared. The results from the study may provide insights to road administrations with regard to how other road authorities are capturing the attitudes and views of the road users and how a CSM program can be formed or improved. Increased focus on the road users and their satisfaction and needs are issues that will remain as important topics in the future as well.</p>		
Date: 28.3.2011	Language: English	Number of pages: 106 + 27 app.
Keywords: customer satisfaction measurement, public involvement, road authorities, road sector, international benchmarking		

AALTO-YLIOPISTO INSINÖÖRITIEIDEIDEN KORKEAKOULU PL 11000, 00076 Aalto http://www.aalto.fi	DIPLOMITYÖN TIIVISTELMÄ	
Tekijä: Eva Lodenius		
Työn nimi: Tienkäyttäjien tyytyväisyyden tutkiminen – asiakaspalautejärjestelmien kehittäminen		
Laitos: Yhdyskunta- ja ympäristötekniikan laitos		
Professori: Liikennetekniikka	Koodi: Yhd-71	
Työn valvoja: Professori Tapio Luttinen Työn ohjaaja: Professori Emeritus Antti Talvitie		
<p>Tiivistelmä:</p> <p>Tieverkon ylläpitäminen ja kehittäminen sekä hyvän palvelutason tuottaminen ovat olennainen osa tieviranomaisten tavoitteista. Vastatakseen tienkäyttäjien odotuksiin tieviranomaisten täytyy jatkuvasti kehittää ja parantaa nykyistä käytäntöään ja palveluaan. Tämä voidaan saavuttaa lisäämällä tienkäyttäjien osallistumista ja tutkimalla tieverkon kuntotaso. Seuraamalla tienkäyttäjien mielipiteitä ja tyytyväisyyttä, tiehallinto voi parantaa toimintatapojaan ja määrittää tärkeimmät kehityskohteet.</p> <p>Nykyään useimmat tieviranomaiset tekevät tienkäyttäjätyytyväisyystutkimuksia jossain muodossa. Ongelmana näissä tutkimuksissa on usein kuitenkin se, että ne mittaavat ja kartoittavat ainoastaan tämänhetkistä asiakastyytyväisyyttä ottamatta huomioon sitä, täytyvätkö asiakkaan odotukset ja tarpeet. Asiakastyytyväisyystutkimusten merkittävä etu on, että ne voivat seurata tyytyväisyystason kehitystä ja tukea organisaatiota keskittämään toimintansa niihin asioihin mitkä tienkäyttäjät kokevat tärkeiksi.</p> <p>Tämä työ keskittyy tieviranomaisten asiakkaisiin, eli tienkäyttäjiin, sekä asiakaspalautteen tärkeyteen. Työn tarkoituksena on luoda käsitteellinen kehys tienkäyttäjien tyytyväisyyden mittaamiseen sekä selvittää mitä kansainvälisiä käytäntöjä ja tapoja on olemassa asiakaspalautteen keräämiseen ja selvittämiseen liikennesektorissa. Lisäksi tavoitteena on selvittää miten asiakastyytyväisyysmittausten tuloksia voidaan hyödyntää ja miten ne voidaan liittää päätöksentekoprosesseihin.</p> <p>Tutkimus toteutettiin laadullisena eli kvalitatiivisena tutkimuksena. Työ sisälsi kirjallisuuskatsauksen ja empiirisen tutkimuksen. Empiirinen tutkimus perustui kansainväliseen vertailuun ja yksittäiseen tapaustutkimukseen. Yhteensä kahdeksan eri maan tieviranomaisten käytäntöjä ja menetelmiä kartoitettiin ja analysoitiin. Tutkimustulokset voivat luoda käsityksen siitä, miten eri maiden tiehallinnot selvittävät tienkäyttäjien tarpeet ja näkemykset sekä miten asiakaspalautejärjestelmää voisi mahdollisesti parantaa. Asiakaslähtöisyys ja tienkäyttäjien tyytyväisyys ovat tieviranomaisten toiminnan lähtökohtia ja säilyvät edelleen tärkeinä aiheina myös tulevaisuudessa.</p>		
Päivämäärä: 28.3.2011	Kieli: Englanti	Sivumäärä: 106 + 27 liitt.
Avainsanat: asiakastyytyväisyys, asiakastutkimukset, liikennesektori, kansainvälinen vertailu		

AALTO-UNIVERSITETET HÖGSKOLAN FÖR INGENJÖRSVETENSKAPER PB 11000, FI-00076 AALTO http://www.aalto.fi		SAMMANDRAG AV DIPLOMARBETE	
Författare: Eva Lodenius			
Titel: Mätning av kundtillfredsställelse inom vägsektorn – vidare utveckling av kundresponssystem			
Institution: Institutionen för samhälls- och miljöteknik			
Professur: Trafikteknik		Kod: Yhd-71	
Övervakare: Professor Tapio Luttinen Handledare: Professor Emeritus Antti Talvitie			
<p>Sammandrag:</p> <p>Utveckling och underhåll av vägnätet samt leverans av kvalitet spelar en betydande roll i vägmyndigheternas vardag, verksamhet och målsättningar. För att uppfylla samhällets och trafikanternas förväntningar och krav är vägförvaltningarna tvungna att kontinuerligt utveckla och förbättra sin verksamhet samt sina befintliga metoder och tjänster. Detta kan uppnås genom att öka växelverkan med trafikanterna och utforska trafikanternas uppfattning om vägnätets tillstånd och vägmyndigheternas tjänster. Genom att engagera allmänheten kan vägmyndigheterna inte endast förbättra sina metoder, utan även identifiera var utvecklingsarbete bör fokuseras.</p> <p>Nuförtiden genomför de flesta vägmyndigheter marknadsundersökningar i en eller annan form. Problemet med dessa undersökningar är dock ofta att de endast mäter och kartlägger rådande nivån av kundtillfredsställelse utan att mäta huruvida kundernas förväntningar och behov faktiskt uppfylls. En stor fördel med mätningar av kundnöjdhet är att de kan följa trender och utvecklingen av kundtillfredsställelse samt samtidigt hjälpa organisationen att fokusera sitt utvecklingsarbete på de faktorer som värderas högt och prioriteras av trafikanterna.</p> <p>Detta arbete fokuserar på vägmyndigheternas kunder, dvs. trafikanterna, samt betydelsen av kundrespons. Avsikten är att fastställa hur mätningar av kundtillfredsställelse och belåtenhet genomförs inom vägsektorn på ett internationellt plan. Syftet är även att avgöra hur resultat från dessa mätningar kan användas och hur kundrespons kan sammanlänkas med beslutsprocesser.</p> <p>Forskningen genomfördes som en kvalitativ studie inkluderande både litteraturstudie och empirisk forskning. Den empiriska forskningen byggde på en internationell benchmarking samt fallstudier där strategier och metoder i användning av vägmyndigheter i åtta olika länder analyserades och jämfördes. Resultaten från studien kan skapa insikter i hur andra vägförvaltningar går till väga för att kartlägga trafikanternas åsikter och attityder samt hur man eventuellt skulle kunna utveckla och förbättra kundresponssystemet. Kundorientering och trafikanternas tillfredsställelse skapar grunden för vägmyndigheternas verksamhet och dessa faktorer kommer även att förbli viktiga frågor i framtiden.</p>			
Datum: 28.3.2011		Språk: Engelska	Sidantal: 106 + 27 bil.
Nyckelord: kundtillfredsställelse, kundperspektiv, offentlig växelverkan, vägmyndigheter, vägsektorn, internationell benchmarking			

ACKNOWLEDGEMENTS

This thesis was carried out in the Department of Civil and Environmental Engineering in the Aalto University's School of Engineering.

I want to thank my instructor Professor Emeritus Antti Talvitie and researcher Pekka Pakkala at the laboratory of transportation engineering. Thank you for taking me on board this interesting project and for all your support and encouragement during the whole project. It has truly been a pleasure to work with you! I also want to thank the Swedish Transport Administration for initiating the project "*The road to Excellence*". Furthermore, several interviewees have contributed valuable time and information for this research. In addition, I want to thank Professor Tapio Luttinen for supervising my thesis.

Finally, I want to thank my family for supporting me during my whole life and my years of studies. A big thank you to all of my friends for always being there! Moreover, I would like to thank my fellow student friends, Annina, Erica and Johanna, for all the fun memories both from student life and the classes we have taken together. I owe a special thanks to my twin sister Helena who always listened to my concerns during this writing process.

Eva Lodenius

Espoo, 28.3.2011

TABLE OF CONTENTS

ABSTRACT
TIIVISTELMÄ
SAMMANFATTNING
ACKNOWLEDGEMENTS

PART I – INTRODUCTION AND BACKGROUND

<u>1</u>	INTRODUCTION	12
1.1	<i>Background of study</i>	12
1.2	<i>Objectives and scope of study</i>	14
1.3	<i>Structure of thesis</i>	14

PART II – LITERATURE REVIEW

<u>2</u>	OVERVIEW OF CUSTOMER SATISFACTION MEASUREMENT	16
2.1	<i>Customer satisfaction measurement as a concept</i>	16
2.1.1	Formation of customer satisfaction	16
2.1.2	General definition of customer satisfaction measurement	20
2.1.3	Identifying and defining the actual customer in the road sector	22
2.1.4	Private sector vs. public sector management	23
2.2	<i>Public input and measuring customer satisfaction</i>	24
2.2.1	The process of CSM	27
2.2.2	Segmenting the market	30
2.2.3	CSM models	31
2.2.4	Qualitative research methods	33
2.2.5	Quantitative research methods	36
2.2.6	Sampling methods	38
2.2.7	Reliability and validity of a survey	41
2.2.8	Response rates	42
2.2.9	Response formats and scale types	42
2.3	<i>Establishing a CSM program</i>	44
2.3.1	Required decisions	44
2.3.2	Identification of survey objectives	45
2.3.3	Choosing the best research method	46
2.3.4	Focusing and determining list of attributes	48
<u>3</u>	UTILIZATION OF CUSTOMER SATISFACTION MEASUREMENTS	49
3.1	<i>Field of application</i>	49
3.2	<i>Tools for implementing data</i>	50
3.3	<i>The functional roles of research in decision-making</i>	51
3.4	<i>CSM to support decision-making processes</i>	52

PART III – INTERNATIONAL BENCHMARKING

4	<u>DESCRIPTION OF THE INTERNATIONAL BENCHMARKING PROCESS</u>	54
4.1	<i>Benchmarking as a research method</i>	54
4.2	<i>Objectives of the benchmarking</i>	57
4.3	<i>Methodology</i>	57
5	<u>CURRENT CUSTOMER SERVICE PRACTICES WITHIN THE ROAD SECTOR</u>	60
5.1	<i>Alberta, Canada</i>	60
5.2	<i>Denmark</i>	61
5.3	<i>Finland</i>	64
5.4	<i>Minnesota, USA</i>	69
5.5	<i>Norway</i>	74
5.6	<i>Scotland</i>	76
5.7	<i>Slovenia</i>	79
5.8	<i>Sweden</i>	80
5.9	<i>Evaluation and comparison of current international practices</i>	84
5.9.1	<i>The role/importance of customer satisfaction within the road sector</i>	85
5.9.2	<i>CSM practices used by road administrations</i>	85
5.9.3	<i>Perceived challenges related to CSM</i>	90

PART IV – FUTURE PROSPECTS AND CONCLUSIONS

6	<u>FUTURE PROSPECTS FOR CUSTOMER SATISFACTION MEASUREMENT WITHIN THE ROAD SECTOR</u>	93
6.1	<i>CSM programs and processes within the road sector</i>	93
6.2	<i>The basic steps of a CSM-model</i>	94
7	<u>CONCLUSIONS</u>	98
7.1	<i>Summary of the key findings</i>	98
7.2	<i>Evaluation of the study</i>	99
8	<u>REFERENCES</u>	101
9	<u>ATTACHMENTS</u>	106

LIST OF FIGURES

Figure 2.	The customer satisfaction equation	17
Figure 3.	The Kano model	18
Figure 4.	How customer input is integrated into the traditional lifecycle of road management	19
Figure 5.	The process of CSM	28
Figure 6.	A satisfaction rating question followed by a question defining importance.....	29
Figure 7.	Customers' assessment on the importance and improvement regarding different variables.....	32
Figure 8.	The relation between sample size and standard error	40
Figure 9.	Level of measurement and response formats	43
Figure 10.	Market research for decision-making	52
Figure 11.	Benchmarking, a suitable method both for development leaps and continuous development	54
Figure 12.	The Benchmarking Process	56
Figure 1.	An overview of the project "The Road to Excellence" and the steps before proceeding with the Master's thesis.....	58
Figure 13.	Telephone interviews vs. exit polls	63
Figure 14.	The results from the customer satisfaction measurement 2002-2008	66
Figure 15.	The bonus criterions	69
Figure 16.	The results for selected issues from the Omnibus study 2003-2009	71
Figure 17.	Examples of authentic views used in Bare Lane Customer Survey	71
Figure 18.	Average scores for the General Public's responses concerning Rest Area Amenities	73
Figure 19.	An example of the Performance Management Framework with the possible measures, current and future targets	78
Figure 20.	Customer satisfaction rating and condition of trunk road network	79
Figure 21.	The basic steps of the CSM program.....	94

LIST OF TABLES

Table 1.	Differences between quantitative and qualitative research	26
Table 2.	Customer segmentation within the road sector	31
Table 3.	Advantages and disadvantages of qualitative and quantitative research methods 47	
Table 4.	Assessment of results from conducted CSM	50
Table 5.	Overall satisfaction levels in winter services in years 2005-2008	61
Table 6.	Satisfaction levels in selected issues in years 2004-2008	64
Table 7.	Results from customer satisfaction surveys conducted 2004-2008	75
Table 8.	The results for selected issues from customer satisfaction measurements in 2007 and 2009	77
Table 9.	Overall satisfaction levels in year 2006	80
Table 10.	The results from customer satisfaction measurement of private drivers in year 1999-2009	82
Table 11.	The results from customer satisfaction measurement of professional drivers in year 1999-2009	82
Table 12.	Key indicators of participating road administrations	84
Table 13.	Comparison of customer satisfaction measurement conducted in the participating countries	86
Table 14.	Methods used for customer satisfaction measurement	87
Table 15.	Main themes addressed in undertaken CSM	89
Table 16.	Summary of important questions in the various steps of the CSM framework ...	96

DEFINITIONS OF TERMS USED

Ad hoc	research undertaken as separate surveys typically as one-time studies designed to address specific problem areas or to provide understanding on a particular issue at a certain point in time
Balanced Scorecard	a performance measurement framework and management tool that is used to align business activities to the strategy and goals of the organization. Customer focus is one of the perspectives of the framework
Benchmarking	the process of comparing one's business practices and performance to best practices from other companies or organizations. The objective is to improve your own organization's performance and to develop your practices and processes
CSM	customer satisfaction measurement
Exploratory research	research carried out in order to gather initial observations, feelings and reactions and often to provide a basis for further research
Focus groups	a qualitative research method used for gathering of more in-depth data on public needs and perceptions. Usually a group of 10-20 people are brought together to represent the population
ISO standards	the International Organization for Standardization (ISO) develops international standards for many industries. The standards control e.g. how companies or organizations develop and manage their products, processes and services. The basis for quality management systems is generally ISO 9000, which requires an organization to fulfill e.g. customer's quality requirements (International Organization for Standardization 2010)
Omnibus survey	a survey or questionnaire which is made up of questions asked on the behalf of many different companies and run by a research agency
Open-ended question	an unstructured question to which the respondent answers in his or her own words. Unlike in a multiple choice question, possible answers are not suggested. Open ended questions are generally used in exploratory research to acquire qualitative information and where statistical validity is not the prime objective

Panel	a qualitative research method where the same group of people is interviewed on a given topic several times on a regular basis
Qualitative methods	research methods based on collecting more in-depth data typically with relatively small sample sizes. The results are usually presented in words or pictures. Qualitative research data has high validity but lower reliability
Quantitative methods	research methods based on collecting numerical data with relatively large samples. The results are usually presented in tables and graphs. Quantitative research data is generally less in-depth and with high reliability and low validity
Reliability	the degree to which the survey data is free from random error
Sampling	a statistical method of selecting a sample from the larger population. Sampling methods are usually divided into probability sampling and non-probability sampling
SERVQUAL	a service quality framework and a useful model for assessing customers' experiences and to determine the gap between expected and perceived service
SIMALTO	a model used to measure customers' expectations, experiences and the importance of different factors. It also allows customers to prioritize and assess the order of possible improvements
Standard error	standard error of the mean is the standard deviation of the means in a sampling distribution. In general a larger sample size results in a smaller standard error
TQM	total quality management is a customer focused management philosophy. The aim is to improve quality and performance and to increase customer satisfaction. According to the method, improvements in quality of products or services will lead to increased levels of customer satisfaction
Validity	the degree to which the survey data is free from both random error and systematic bias

PART I – Introduction and Background

1 INTRODUCTION

1.1 *Background of study*

Today, maintaining roads and delivering good quality by meeting target standards are an essential part of the everyday life and goals for road administrations and agencies. In order to fulfill the expectations of society and road users, road authorities need to continuously develop their operations and increase public involvement. The public sector is more actively moving on to adopting the private sector-style of “customer-focus” what has resulted in that organizations more and more use customer satisfaction ratings as an indicator on performance of services and products.

The aim for improvements in infrastructure and operations on roads is to improve the quality of the current road network and the welfare of road users and citizens. Investments and policy strategies or decisions regarding infrastructure and road network are often significant decisions within the government and other organizations operating in the public sector, mostly because of the large amount of money involved and the impact that the infrastructure network and the operations on the roads can have on the different stakeholders and the environment. Most of these decisions are made by the government organizations, but in the last years the public opinion and feedback have grown in importance. The involvement of different stakeholders and integration of their needs and values in the decision-making process is nowadays seen as a key to sustainable infrastructure and transport decisions. A successful integration of these opinions and interests of the general public is greatly influenced by the quality of communication between the governmental organization and the different stakeholders. (Stricker et al. 2003.)

Orientation toward cooperation with the customers is a key to effective organizational management. As a public authority, road administrations are funded directly or indirectly by the tax payer. Thus it is important that the services provided by the road administration can be related to the needs of the tax payers. For example Robinson et al. (1998) suggest that customer perception should determine the aims for the road sector. In addition, customer satisfaction is a necessary requirement for quality evaluation and the ISO 9001 standards. According to Garnham et al. (1999), quality of service can be defined as the capability of a product or a service to meet the potential or expressed needs of the customer. For various reasons, customers may change their perception of quality over time. Hence, customer satisfaction measurement is growing in importance in order to gather current and applicable road user data. The evaluation of customer-driven performance is mostly made by customer satisfaction surveys and measurements. In order to achieve its aims and public image, road

authorities need reliable and efficient methods for identifying the factors of service quality from the customers' perspective.

“Transparency, communication and co-operation with the customers are the basics of the modern democracy” (Ackley 2007).

As Ackley (2007) states in the citation, the awareness of customer needs and cooperation with customers are the basis for better customer service. According to the strategies of the Finnish Ministry of Transport and Communications, transport policy should be customer oriented. A customer oriented approach comprises continuous communication with the customers in order to develop an understanding of the customers' needs and perception with regard to their journeys and the infrastructural network. Customer focus also requires prioritization of the customers' needs. (LVM 2007.)

Customer satisfaction has increasingly become an important indicator on how to develop or improve existing practices. The change to a more customer-oriented approach from a traditional product oriented road management approach requires new feedback input methods and involvement of the customer. A variety of methods are used to capture customer perception, with customer service being one of the most popular (Wisniewski 2001). In order to utilize customer feedback and information effectively, the road authorities need systematic and functioning methods to process and analyze data (Ackley 2007). The various forms of communication, such as discussions, focus groups, surveys, technical reports, newsletters, are the current basic methods for involving different parties and stakeholders. To identify and understand who the specific stakeholders are is an important step of the customer service management (Stricker et al. 2003).

This master's thesis is about customer satisfaction measurement within the road sector and how to develop a more functioning feedback system for obtaining customer perception. In addition, the target is to look into how to link customer feedback to the decision-making processes of road authorities. This thesis is related to and part of the project *“The Road to Excellence”*, which is an international benchmarking project, initiated by the Swedish Transport Administration in year 2009-2010. The research for *The Road to Excellence* was accomplished by a team from Aalto University's School of Engineering, at the Department of Civil and Environmental Engineering. The team included Pekka Pakkala, Eva Lodenius and Professor Antti Talvitie. The study was categorized in four different study areas with one concentrating on customer satisfaction. The other areas were energy and environment, effectiveness of rendered services, and competence development and research and development practices used by road administrations in different countries. In the thesis the focus is on customer orientation within the road sector, how road user satisfaction and perception is currently measured and possible future prospects in measurement methodology and utilization of results from surveys.

1.2 Objectives and scope of study

Customer perception is a growing and key issue for continuous improvement and different organizations are becoming more customer-focused. More and more companies and organizations are using customer satisfaction as an indicator on their performance of delivered products and services. The thesis focuses on the customers of the road authorities, i.e. the road users, and on the importance of understanding and receiving feedback from the customers. The intent of the thesis is to establish a conceptual framework for customer satisfaction measurement within the road sector and to determine how consistent and applicable road user data from customer feedback and surveys is gathered internationally. In addition, the goal is to identify what type of customer satisfaction surveys are more effective and represents the true customer perception. If we can truly understand the customer needs, then it is possible to provide quality services to the customers. Moreover, the aim is to determine how to utilize results from customer satisfaction measurements, future prospects and how to link customer input into the decision-making process.

1.3 Structure of thesis

This thesis consists of four parts. The first part gives an introduction to the study and describes the outlines of the scope. The second part presents the idea behind and concepts of customer satisfaction and the methods used to measure the degree of satisfaction. Furthermore, the differences in the customer focused management style between the public and private sectors are discussed. The third part of the thesis focuses on the international benchmarking that was undertaken in order to map current practices in use by road administrations in different countries. The fourth part discusses the results of the analysis as well as presents conclusions of this thesis.

In chapter 1, a background to the study is given and the objectives of the thesis are identified.

In chapters 2 - 3, literature relevant to the study area is reviewed. A literature study is conducted in order to get an overall view and gain an understanding of customer satisfaction measurement and the methodology used for measurement. Furthermore, the background of customer satisfaction measurement is covered and previous and recent research conducted in the area of customer satisfaction measurement is reviewed. A closer look is also taken at who the actual customers of the road authorities are. Written sources used in the research include academic articles, reports and management books.

The third part of the thesis consists of chapters 4 - 5, which cover a benchmarking initiative to establish best practices amongst customer satisfaction measurement methodologies and strategies within the road sector. Chapter 4 presents and describes the methodology used to compile the thesis. A description of the international benchmarking process of the study is also provided. Chapter 5 discusses the outcomes from the benchmarking, i.e. existing

practices used by national road authorities in different countries. In the same chapter, findings from the undertaken international benchmarking are also presented and evaluated.

The fourth and last part of the thesis includes future prospects and conclusions of the thesis. The main discussion focuses on how to develop customer satisfaction measurement practices to be suitable for the road sector and how to utilize the results from satisfaction measurements as road authorities are experiencing issues on how to manage and actually use the customer satisfaction measurement data. In addition, it is analyzed how customer feedback could be implemented in the decision-making processes of the road administrations.

PART II – Literature Review

2 OVERVIEW OF CUSTOMER SATISFACTION MEASUREMENT

This chapter introduces the concept and process of customer satisfaction measurement, its background, how customer satisfaction is formed and discusses who the actual customers of the road authorities are. In addition, the different methods and models related to satisfaction measurement and service quality are covered. Many public organizations have adopted the customer focused management style from the private sector and the challenges regarding the differences between the natures of public and private sectors are presented. Finally, the establishment of a system in gathering customer data is discussed.

2.1 Customer satisfaction measurement as a concept

2.1.1 Formation of customer satisfaction

Today, customer focus and satisfaction is a driving force for many companies and organizations. Measuring customer satisfaction provides an indication on how an organization is performing or providing products or services. Customer satisfaction has traditionally been studied within market research and the term customer satisfaction measurement is widely used in particularly business terminology. There are various definitions of customer satisfaction and according to Rope et al. (1994), to actually define satisfaction has proven to be hard and contradictory because of its multiple dimensions.

Customer satisfaction is generally understood as the satisfaction that a customer feels when comparing his preliminary expectations with the actual quality of the service or product acquired. In other words, customers are typically concerned with the value and quality of the product or service they receive. In addition, customers generally want the best possible product or service for a low cost. The perception of the best product or service and lowest price can, however, vary significantly by customer segment or industry. In order to obtain an overall picture of customer perception, a company or organization needs to measure the customer. (Czarnecki 1998.)

Expectations and experiences

Service quality or customer satisfaction is formed by the difference between the customers' expectations of a service and the actual perceived service. In other words, customer dissatisfaction occurs if the expectations are greater than the performance (Wisniewski 2001). An analysis of gaps between customer expectations and the performance of a

company or organization is a cornerstone to monitor the overall corporate performance (Czarnecki 1998). Customer satisfaction always requires an experience of the operations of a company or an organization. The level of customer satisfaction is formed by the correlation between a customer's expectations and his experiences. In other words, the customer always compares the experiences with the expectations he has of the company or organization. Customer satisfaction occurs when a customer's experiences of a service match the expectations and customers are impressed when they get more than they anticipated. In addition, the level of customer satisfaction is formed by the image of the company or organization. Many companies and organizations have made customer satisfaction their top priority by developing a carefully designed customer satisfaction framework. (Bergman et al. 1994.) Figure 1 provides a summarized overview of which key factors result in satisfied customers.

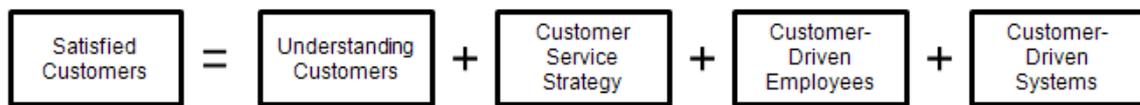


Figure 1. The customer satisfaction equation (redrawn from Craig 1993.)

In the 1980's, Professor Noriaki Kano developed the *Kano model*, which is visualized in Figure 2. The model describes how customer satisfaction is created and it separates quality dimensions into three different types of needs which together determine the customers' perception of quality. These needs are divided as followed:

- stated needs
- implied needs
- unconscious needs

According to the model, the stated needs are expected by the customer to be satisfied and these needs are regarded as important. Hence, customers are satisfied when the stated needs are satisfied. The implied needs are so obvious to the customer that the customer does not even mention these when asked for example in a survey. The implied needs do not create greater customer satisfaction as these needs are considered as obligatory to fulfill. But on the other hand, if these needs are not fulfilled, the level of customer satisfaction will decrease dramatically. The unconscious needs are needs that are unexpected by the customer but what may result in high levels of customer satisfaction. The absence of these needs will, however, not lead to dissatisfaction. (Bergman et al. 1994, Sandholm 2000.)

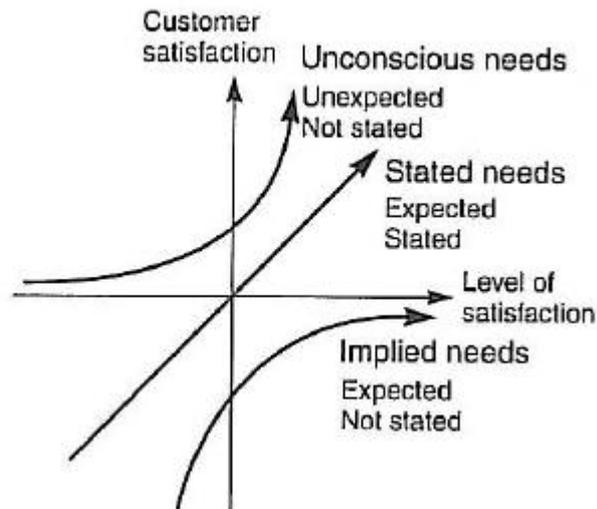


Figure 2. The Kano model (Sandholm 2000.)

The level of satisfaction is determined by comparing the expectations of the customer with the experience generated from the contact or encounter between the customer and the company or organization. If a customer's expectations were higher than the actual experience, the level of satisfaction is negative, i.e. the customer is not satisfied with the company. If the level of satisfaction is very negative, the company or organization often gets negative feedback and complaints. When a customer's expectations meet the experiences, the level of satisfaction is neutral. If the customer had high expectations, the customer relation with the company will strengthen. A customer with low expectation from before will not be fully satisfied, even if he is not disappointed with the company or organization. If a customer's experiences exceed the expectations, the level of satisfaction is positive and the customer is satisfied. The essential thing is to influence the customers' expectations in order to have an effect on the level of satisfaction. This because the same level of action and operation with different levels of expectations will result in different degrees of satisfaction. (Rope et al. 1994)

Because the level of satisfaction is highly affected by customers' expectations, it is essential to understand how the expectations are formed. A company or organization is in many cases able to influence these expectations so that a higher or maximum level of satisfaction can be achieved. According to Sörenqvist (2000), the following factors have shown to have a great impact on the customers' expectations:

- previous experiences
- marketing and publicity
- image and reputation
- significance and interest
- information from others
- the price of the product or service

Other factors that affect the customer's expectations are for example the characteristics of the customer, such as socio-demographic characteristic like age, residence, gender, marital status, education or income level (Lotti 1998). Some researchers have, however, criticized the great emphasis and focus on customer's expectations (e.g. Vuorela 1988). The customer's expectations might be unclear, vague, unrealistic or inappropriate. Some customers might not even have specific expectations of certain products or services. The customers' expectations are only the tip of the iceberg. Thus, it is also necessary to ascertain the needs and problems experienced by the customers. (Öster 2008, Matzler et al. 1998.)

Customer satisfaction within the road sector

The definition and active use of a customer oriented approach and concept in itself varies among different road administrations. However, the same benefits are acknowledged by the road administrations: the customer oriented approach improves efficiency, saves resources and promotes innovation (Ackley 2007). Recently the focus in the road sector has shifted from simple road maintenance and product development to a more customer oriented approach. According to Ackley (2007), this change in focus requires utilization of new inputs and involvement of customers. Systematic analysis and correct timing are essential for an effective and functioning customer feedback system. Examples of new methods for acquiring input from customers of the road sector are presented in Figure 3. The same figure also includes the traditional lifecycle of road management.

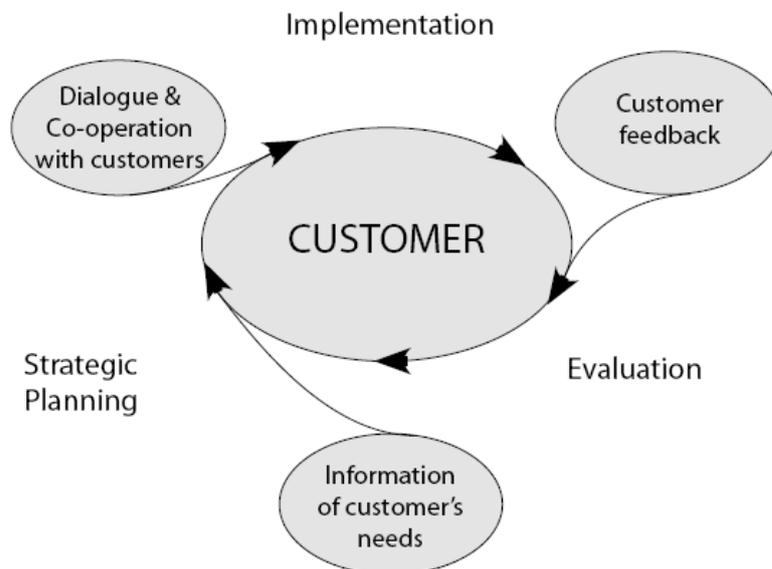


Figure 3. How customer input is integrated into the traditional lifecycle of road management (Ackley 2007.)

On the other hand, customer satisfaction can also be framed as rebuilding credibility with customers and stakeholders. Schwartz (2006) argues that achieving happiness among customers is unlikely given the broad range of customer and stakeholder interests. Credibility

could describe the topic better as it is formed by mutual understanding between the road administration and its customers and stakeholders. In addition, to be credible, the road administration needs to develop performance measures that relate to the customer's ideas about what is important. This can be achieved by co-operating with the customers to create a shared understanding of the expectations. In order for the co-operation to work, i.e. for the road user's to have the opportunity to participate in the decisions, it requires changes in staff attitudes and trust in the process. (Schwartz 2006.)

The way the road users perceive the road is formed and influenced by multiple factors, such as the structural characteristics of the road, the maintenance condition, surroundings and factors caused by the other road users, e.g. congestion level. Other factors that also influence the user's perception are characteristics of the user itself, i.e. socio-demographic characteristics. In addition, the vehicle also affects the level of satisfaction through its own comfort, size or dynamic performance. The assessment of the road condition is mainly influenced by surface quality, number of lanes, maintenance and cleanliness. (Garnham et al. 1999.)

Conducted qualitative surveys on users' satisfaction with the road network have identified the following correlations regarding the differences in satisfaction levels of different stakeholder groups: (Garnham et al. 1999)

- the road users tend to be less satisfied if the trip is work related
- age do affect the overall degree of satisfaction (the youngest and the oldest are usually most satisfied)
- level of satisfaction decreases with increase in annual mileage (the less the driver uses the road, the more satisfied he is)
- the satisfaction level of HGV (heavy goods vehicle) or professional drivers tends to be slightly below the average

2.1.2 General definition of customer satisfaction measurement

Satisfaction has quickly become the key factor to a competitive position within an industry and companies survive if they have customers that are willing to buy their products or services. The increasing competition, both in nonprofit and for-profit industry sectors, is forcing companies and organizations to develop customer focused management and to pay more attention to satisfying customers. An important part of customer service within a company or organization is to capture the voice of the customer and to obtain information of the needs and values of the customers. Hence, customer satisfaction measurement has a central role in customer service and service quality. (Sörqvist 2000.)

Customer satisfaction measurement (CSM) has multiple roles and is formed by both information and communication. Vavra (1997) states that the primary intention for measuring customer satisfaction is to collect information regarding either what customers report that

needs to be changed or to assess how well an organization is currently delivering on its understanding of these customers' needs. Furthermore, the very act of surveying customers' satisfaction and views conveys a positive message, as the organization shows interest in its customers' opinions and needs. (Vavra 1997.)

Today, CSM is usually a central part of quality management. As Kessler (1996) has stated: *"If you are not measuring it, you are not managing it"*. Measurements support companies or organizations to create an understanding for the demands and needs. Furthermore, CSM discovers the issues that need to be improved and reveals the factors that affect and create a successful relation between the company or organization and its customers. A good customer relation requires extensive quality image, which is formed by the organization's ability to handle the processes that are prioritized by customers. Lotti (1994) sums it up and states that customer satisfaction measurement is pointless if it does not result in such produced quality that satisfies the customers. (Lotti 1994.)

Customer satisfaction measurements are often complex to perform. There is always a risk that the results obtained from the measurements diverge from the reality. Measurements can be carried out with a focus on the attitudes of the customer, the behavior of the customer or the effects that the customer has on the company or organization in question. Companies and organizations that regularly measure customer satisfaction show that they care about their customers and that they want to improve their products or services. The CSM process is continuous and the measured and received feedback forms a base for ongoing work. Based on the results from CSM, new goals are set and these are then measured and monitored. (Lotti 1994, Sörqvist 2000.)

In the evaluation of the level of customer satisfaction, the following factors are generally measured:

- overall satisfaction with products or services
- satisfaction with specific parameters of a product or service

These specific attributes measured in the surveys should be based either on results from earlier undertaken studies or established by an expert in the field. This evaluation of level of satisfaction can also be expanded by an analysis of the importance or priority of each of the parameters to the costumers. Typical issues to focus on when measuring customers' needs and views are which current services of the organization are seen as most important, what deficiencies the services have and what kind of services are still missing. (Krivobokova 2009, Sandholm 2000.)

Customer satisfaction measurement is an effective approach when it comes to learning about one's customers. This is important especially within the road sector, where the road users as customers are using the road network nearly daily. In addition, the standard and overall condition of the road network has improved during the last decades, what has resulted in higher expectations of the road users. Hence, the importance on how to measure both the state and quality of the road and the road users' views and needs have increased.

(OECD 2001.) Some road administrations, for example the Department of Transportation of Minnesota, have a long history and a lot of experience of customer feedback systems and conducting market surveys. One of the main emphases in their studies has been on the satisfaction regarding the condition of the roads.

2.1.3 Identifying and defining the actual customer in the road sector

When a company or organization decides to measure customer satisfaction, a key step is to look into and specify who exactly an organization's customers are. According to Vavra (1997), it is essential that all customers are known for the customer sample to be as statistically random as possible. For a sample to be random and not biased, every customer must have an equal chance of being selected for surveying. Traditionally a customer has been defined as a person who pays for a service or a product. This viewpoint cannot fully be applied for example in public organizations. Nowadays, everyone that in some way is affected by the operations or the products and services offered or produced by a company or an organization, are regarded as customers. (Sörqvist 2000).

The road as an object is not an ordinary product and the road and infrastructure network is a part of a complex overall process, in which the political aspects of land use planning, socio-economic and environmental protection are also included. Furthermore, the road sector has multiple customers and hence the beneficiaries of road quality cannot solely be limited to the road users. According to Garnhamn et al. (1999), the beneficiaries that are generally taken into account in the evaluation of quality of service in the road sector are:

- the road users
- external beneficiaries (not only residents but also, from the perspective of land use, all taxpayers and elected representatives)
- the road owners
- the road managers that are in charge of operating and maintaining the road (including the police)

One has to remember that the customers of the public sector also are citizens. Thus the relationship with the customers in the public sector is more complex than in the private. The customers of the public sector receive value from government organizations in form of "public" value, which is consumed jointly. Because there are differing interests among people and citizens, it is not simple to identify what the public wants as a collectivity for instance through customer surveys. (Alford 2002.)

Customers are generally considered to be people who used the specific goods or services. Stakeholders, on the other hand, can be defined as "interested parties" or as people who have a "stake" in an outcome. Schwartz (2006) groups the stakeholders of DOTs (the state Departments of Transportation) into the following major groups:

- *Political sponsors*: people who are responsible for funding the road administration's programs (e.g. transportation commissions, state legislators)
- *Locals*: people who are affected by the road administration's actions (e.g. city councilors, county commissioners, local transportation agency officials)
- *Facility users*: people who use the facilities of the road administration or other transportation facilities. Can further on be divided into customer subgroups:
 - Modal constituents (automobile and truck drivers, bicyclists, pedestrians)
 - Functional constituents (commuters, business travelers, recreational travelers)
 - Special populations (physically challenged, elderly and children)
- *Businesses*: people who depend on the road administration and other transport facilities for movement of goods and customers
- *Media*: people who report to the public on road administration activities and who shape public opinion
- *Transportation industry*: people whose jobs are affected by the road administration activities (road administration employees, contractors, construction workers, transportation/engineering consultants and researchers)
- *Advocates*: people who have particular perspectives about how transportation funds should be spent (e.g. advocates for environmental stewardship)
- *Taxpayers*: people who pay taxes to support government operations (i.e. the "general public")

Few companies or organizations have customers who all have exactly the same needs and views. For example the modal constituents are particularly concerned with relative investments in modal solutions, while functional constituents regard time-of-day travel (e.g. morning and evening peak) and access as important topics (Schwartz 2006). A problem with public involvement is to identify the views from all different customer groups, as a statewide customer or stakeholder perspective does not exist. Thus it would be good to focus communication strategies to particular groups of customers whose interests are most engaged in a particular situation, geography or time period (Schwartz 2006). Usually the people who are most concerned about an issue or project, e.g. road network improvements, are the people who tend to actively take part in stakeholder discussions and interviews. People who are accepting a project or the operations of the road administration are usually not motivated to spend time in group discussion or to fill in surveys. (Stricker et al. 2003, Wisniewski 2001.)

2.1.4 Private sector vs. public sector management

The road administrations are generally a part of the public sector. Recently, many public organizations have adopted the customer focused management style from the private sector. Many critics (e.g. Stewart et al. 1988.) have questioned the use of customer model concepts in the public sector organizations and have argued that the nature between the private and the public sector is different. The private sector is typically market oriented and customer

satisfaction is seen as an essential factor in the survival and success of a company (Wisniewski 2001). The significant features of the private sector proposed by Alford (2002) are the following:

- an exchange takes place between the company and the customer (for example money provided in return of a product or service)
- the product/service comprehends private value (in other words they can be consumed by the customer as an individual)
- the customer normally has a choice among a number of competing substitutes
- the company seeks to maximize sales of products/services

Most customers of the public sector do not directly pay money in return for the service and consequently there is no traditional exchange between the organization and the customer. Moreover, the organizations operating in the public sector are not seeking to maximize their sales or to increase profitability in the same way as private firms, but to regulate the volume of service delivered within the constraints of the budget. Hence, the customers of the public sector could better be described as beneficiaries. Because the beneficiaries do not directly pay money for their benefits or services, government agencies generally have little incentive to pay attention to customers' needs. On the other hand, organizations in the public sector are expected to provide service quality and to meet the needs of multiple stakeholders. These multiple interests should also eventually be integrated into the decision-making processes. Due to the comprehensive area of responsibility of the public sector, customer satisfaction measurement is often considered more complex and difficult than in the private sector. (Alford 2002, Wisniewski 2001.)

According to some researches, the difference between the public and private sector only enables limited use of the private sector customer model in the public sector. However, social exchange still occurs between government organizations and clients and public agencies do have an incentive to pay attention to customers' needs. Even if the customers of the public sector do not directly pay money for services, the customer still can provide other things that the organizations need, such as information, compliance and co-operation. Customer service in the public sector essentially requires the government to be responsive to the needs and wants of the citizens and thus the private sector customer model provides a useful way of thinking regarding the relations between the government organizations and their customers. (Alford 2002.)

2.2 Public input and measuring customer satisfaction

The basic objective of any measurement activity in general is change. A company or organization cannot improve, develop or change what is not measured. In order to get a clearer picture of the different customers, the improvement efforts should be based on relevant information provided by extensive research and measurement. In all measurement

systems, data must be collected, analyzed and reported. The analyzing of data is a central step of the whole process. (Czarnecki 1998.)

According to Sandholm (2000), there might be some differences between actual customer behavior and views they express. Thus information describing customers' actual behavior is often more valuable than customer input expressed in other ways. In addition, Sandholm (2000) suggests that a good way of finding out what customers need is to see yourself as a customer, i.e. to put yourself in the customers' situation.

The attitudes of customers can be measured in several ways, but the budget usually dictates the methods that can be used. The measurement methods are generally divided into qualitative and quantitative methods. The primary aim of qualitative research is to develop an in-depth understanding of specific problem areas or to understand what motivates people to behave in a certain way or what they base their decisions on. Qualitative surveys are generally carried out with small but focused samples rather than large samples. This is because the aim of qualitative research usually is to explore a range of ideas on an issue, rather than to measure how widely held the issues are. Quantitative research aims to quantify responses and information that can be analyzed statistically. The sample size in quantitative research is usually large and the questions are usually asked so that the responses can be counted and coded in some way, for example answers expressed in scales from 1 to 5 or yes/no. An overview of the differences between quantitative and qualitative research is presented in Table 1. (Adams et al. 2006.)

Table 1. Differences between quantitative and qualitative research (McGivern 2006)

<i>Topic</i>	<i>Quantitative research</i>	<i>Qualitative research</i>
Research enquiry	Exploratory, descriptive and explanatory	Exploratory, descriptive and explanatory
Nature of questions and responses	Who, what, when, where, why, how many Relatively superficial and rational responses Measurement, testing and validation	What, when, where, why Below the surface and emotional responses Exploration, understanding, and idea generation
Sampling approach	Probability and non-probability methods	Non-probability methods
Sample size	Relatively large	Relatively small
Data collection	Not very flexible Interviews and observation Standardized Structured More closed questions	Flexible Interviews and observation Less standardized Less structured More open-ended and non-directive questions
Data	Numbers, percentages, means Less detail or depth Context poor High reliability, low validity Statistical inference possible	Words, pictures, diagrams Detailed and in-depth Context rich High validity, low reliability Statistical inference not possible
Cost	Relatively low cost per respondent Relatively high project cost	Relatively high cost per respondent Relatively low project cost

When considering if one should use qualitative or quantitative methods or a combination of these, one should reflect the type of results that are needed, i.e. facts and figures or opinions and feelings or both types of information. Public input and customer feedback is generally gathered by using a combination of multiple research methods. Even if qualitative and quantitative research often are seen as opposing approaches, many projects do require both types of information. Qualitative research is often included in the beginning of a project to establish the different perceptions and opinions that are connected to a certain issue. These results can then be used as a basis for a quantitative research, where it is determined how many of these opinions are shared by a larger sample. A measurement of attitudes and level of satisfaction can for example initially consist of qualitative studies to determine relevant and significant customer needs that form the basis for the development of a survey or questionnaire. Next a quantitative study can be carried out with the aim to obtain a generalized picture of the views and attitudes of the customers. (Adams et al. 2006, Sörqvist 2000.)

Listening to customers and the awareness of customer's needs and wishes form the basis for customer service. The most commonly used tools for gathering public input and the main approaches to understanding the customers' needs and views are polls or surveys, focus groups and interviews. Surveys are useful especially in measuring the level of satisfaction and in gauging the issues that are important to the customers. Focus groups are gatherings of small groups of different stakeholders recruited to discuss certain topics and issues. In-depth interviews are typically used to interview key individual stakeholders where the aim is for example to collect individual case stories. (Stricker et al. 2003.)

Another source of customer feedback is complaints. Customer complaints can often be used as a basis for improving quality of existing services. Thus, it is important to ensure that it is easy for the customers to express their views, for example by having a telephone number known by the customers. However, it is not certain that all customers complain when they are dissatisfied. Nevertheless, the type and occurrence of the complaints can provide an overview and give some idea of where problems regarding the quality of the organization's products or services might be occurring. Hence, Sandholm (2000) suggests, that it could be a good idea to actually compile, study and process the complaints. The absence of complaints regarding specific issues does not mean that the quality of the service or product would be satisfactory. (Sandholm 2000).

Each of the survey approaches has their different strengths and the method to use depends on the circumstances of the research. When choosing the survey method to use, one also needs to consider how the method affects the customer. Some methods are more challenging and time consuming than others, what might result in lower response rates. Response rates also depend on the level of interest the respondent has in the topic or for example on the layout of the questionnaire. (Adams et al. 2006, McGivern 2009.)

2.2.1 The process of CSM

In order to be successful in providing quality of one's services or products, it is important to obtain feedback from customers. According to Fink (1995), a survey is a system for collecting information, to describe and compare knowledge, behavior and attitudes. Surveys generally involve determination of objectives for the data collection, choosing a reliable data collection method, analyzing gathered data, reporting and presenting the results. The objectives of a survey are usually identified though detected needs, but might also be defined through other surveys, reports, experts or focus groups and panels. (Fink 1995.)

Measuring customer satisfaction is now an important area of research for most organizations. The first step of customer satisfaction measurement is to link the measurement to organizational strategy. If the measurements don't reflect the aspirations and goals of the organization, they are of little value and do not support improvements work. Hence, the

organization needs to define long-term goals and develop these goals and objectives that should be measured and followed in terms of the various stakeholders. (Czarnecki 1998.)

The process of measurements includes several steps. First, the objectives of the research have to be identified and defined. Next steps include the development of a research plan, the definition of attributes that are to be measured and which research method to use, the gathering of data and the processing and analyzing of data. Finally the data should be utilized, results reported and presented. Furthermore, the results from the CSM and findings from all the various steps should be used to improve the current CSM program and practices. (Naumann et al. 1995.) Figure 4 presents the different steps and the general process of customer satisfaction measurement.

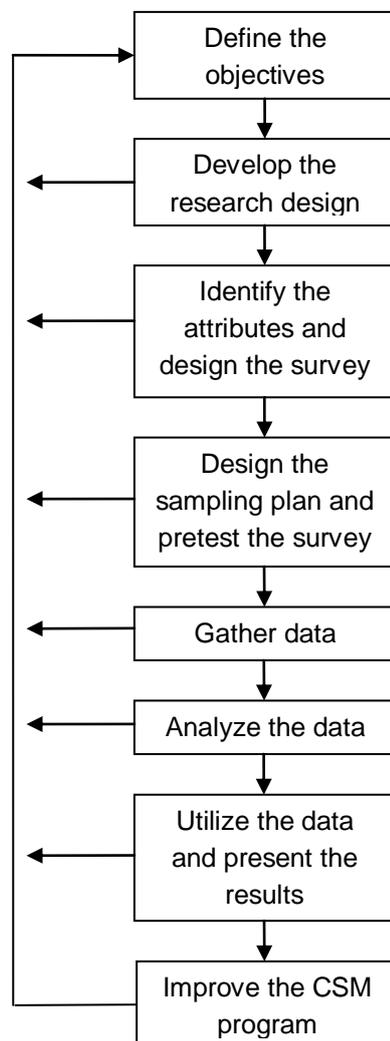


Figure 4. The process of CSM (modified from Naumann et al. 1995)

CSM is often a popular program to outsource because it may take extensive labor to undertake a survey. Moreover, the work does not occur consistently, only one or a few times per year. However, when developing and defining the factors to measure in the surveys,

specialists and employees from within the organization are best suited. This because the internal specialists are most familiar with the goals and day-to-day activities of the organization. (Czarnecki 1998.)

Surveys produce public input and data in the form of comments or numbers. The comments are based on feedback and responses in the respondents, i.e. the persons who have agreed to participate in the research, own words. Numeric data is obtained when respondents are asked to rate or rank items and it is often analyzed by statistical methods (Fink 1995). Customer satisfaction is typically formed by two components: the satisfaction rating in itself and the importance rating by the costumer. The satisfaction rating is generally described with different scales, e.g. excellent, good, fair and poor. According to Czarnecki (1998), the importance can be discovered in several ways:

- priority ranking (asking the customer different questions designed to determine the importance)
- attribute ranking (forcing the customer to make trade-off decisions)
- statistical analysis (testing the relative impact of changes to your products or services over time)

By having the customers to rank and determine the relative importance of products or services, you can establish your priorities for service and product development and find out where improvements are needed (Matzler et al. 1998). Companies and organizations typically don't have enough resources to make all the improvements simultaneously and thus prioritization can help the organization to focus on the issues that are valued most by its customers. An example of a satisfaction rating question followed with a priority ranking question is presented in Figure 5.

How satisfied or dissatisfied are you with the visibility of road markings?	<input type="checkbox"/>				
	5	4	3	2	1
	Very Satisfied				Very Dissatisfied

How important is the visibility of road markings for you?	<input type="checkbox"/>				
	5	4	3	2	1
	Very Important				Completely Unimportant

Figure 5. A satisfaction rating question followed by a question defining importance

Market research is usually used either for constant tracking of activities or for determination of specific problem areas. Constant tracking research is for example customer satisfaction measurements conducted on a regular basis or typical omnibus surveys. Research undertaken in order to determine specific problem areas are separate or so called *ad hoc* surveys that generally are one-time studies and carried out occasionally. The sample in *ad hoc* surveys can be specified by regions or certain customer groups such as for example professional or private drivers. Usually these separate surveys may be more costly and time-consuming. (Lotti 1994.)

Conducted CSM can often be seen only as a single “snapshot” in time, but by undertaking surveys regularly trend information over time can be obtained. Trend data can help the company or organization to identify issues that need to be addressed or improved. Open-ended questions can also provide valuable information on specific issues. In order to get real benefits from customer feedback, customer satisfaction measurements cannot only be a one-time activity. It is necessary for the company or organization to form an ongoing and constantly reviewed quality management system and customer feedback framework. (Czarnecki 1998, Krivobokova 2009.)

2.2.2 Segmenting the market

Organizations from all different sectors, whether they are commercial companies or government agencies, deal with a wide range of people. This means that the organizations have a customer base with diverse needs. By segmenting and identifying different groups within their customers, organizations can adjust their services to meet the different needs. According to Garnham et al. (1999), different customers and stakeholder groups have different expectations and needs on the road network. Hence, segmenting the customers allows the road administration to determine the specific needs for the different groups of customers. When conducting market research, it can be useful to compare different customer groups and to explore if the organization is achieving higher levels of customer satisfaction with one customer segment compared to the other segments etc. (Adams et al. 2006, Garnham et al. 1999.)

Table 2 lists examples of typical customer and road user segmentation used in customer satisfaction measurement by road administrations in for example Finland, Scotland, Norway and Minnesota, USA.

Table 2. Customer segmentation within the road sector

<p>Primary:</p> <ul style="list-style-type: none"> - Age - Gender - Working Status - Income level - Education level - Possible disabilities or handicaps 	<p>Household / car ownership:</p> <ul style="list-style-type: none"> - Possibility to regular access to a car - Nr. of cars in household - Type of residential area (densely vs. sparsely populated) - Nr. of persons in household - Nr. of licensed drivers in household - Region/county
<p>Driving habits:</p> <ul style="list-style-type: none"> - Professional or private driver - Kilometers driven per year - Regular use of car - Commuter or not - Use of different modes of transportation (bus, bicycle etc.) 	<p>Other:</p> <ul style="list-style-type: none"> - How long the trip to the workplace takes - How easy it is to predict duration of trips - Knowledge and image of the road administration

2.2.3 CSM models

Customer satisfaction measurements have had a central position especially in the United States. The focus on service quality as a concept has increasingly grown mostly because of its relation to costs, profitability, customer satisfaction, customer retention and positive word of mouth (Buttle 1996). The original idea of CSM has its roots in the concept Total Quality Management (TQM). According to Vavra (1997), the TQM approach was introduced in the late 1970s and the basis of the concept is to improve quality and performance and to increase customer satisfaction. Key principles of the concept are customer focus, continuous improvement and decision making. According to the method, improvements in quality of products or services will lead to higher levels of customer satisfaction. Decision-making processes and quality decisions in a company or organization should thus be based on measurements and market research. (Vavra 1997.)

Another well-known and extensively applied model in customer satisfaction and service quality measurement is the SERVQUAL model. SERVQUAL is a service quality framework developed by Parasuram et al. in the 1980s. The main idea of the model is to identify service quality gaps by measuring both perceptions and expectations of customers (Lotti 1994). The model comprises 22 attributes and the service quality is measured by using five dimensions: Tangibles, Reliability, Responsiveness, Assurance and Empathy (Wisniewski 2001).

By using the model SERVQUAL, managers can define which areas need to be targeted for performance improvement. Wisniewski (2001) argues that performance improvements can be prioritized by combining the largest negative gaps with an assessment of where expectations are highest. Wisniewski (2001) further argues that positive gaps indicate that the expectations are not just being met but also exceeded, which provides managers with a tool to review whether they might be “over-supplying” a specific feature or “over-performing” in a specific area of service. This aspect of the model is particularly relevant for the public sector as they are dealing with increasing budget cuts.

Furthermore, Wisniewski (2001) suggests that the gap analysis approach can be useful at comparing the needs of different customer segments or of customers in different regions. For example if a regional office consistently has smaller gaps than the rest of the regional offices, it is more likely to meet the customers’ expectations than the other offices. The functionality of SERVQUAL has, however, also been criticized both on theoretical and operational grounds by a number of researches (e.g. Buttle 1996). For example according to Buttle (1996), SERVQUAL’s five dimensions are not universals. Moreover, he argues that there is a high degree of intercorrelation between the different dimensions.

SIMALTO (Simultaneous Multi-Attribute Level Trade-Off) is a model developed in England in the late 1970s. The model measures customer’s expectations, experiences and the importance of different factors. But in addition to this, the model also allows the customer to prioritize and assess the order of improvements (Lotti 1994). Figure 6 presents a hypothetical example of how results produced by using SIMALTO could be presented. According to the hypothetical example, the customers or in this case road users would be most interested in the variable “*General condition of road surfaces*”.

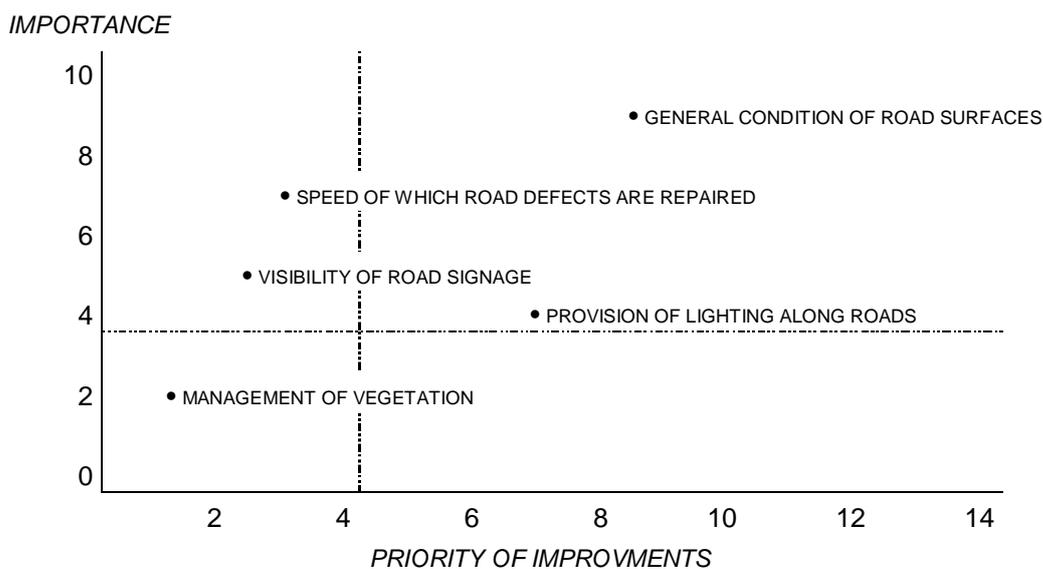


Figure 6. Customers’ assessment on the importance and improvement regarding different variables

Organizations operating in the public sector are constantly working under financial and resource constraints and thus it is essential that customer expectations are properly measured and understood. Although for example SERVQUAL is a useful model and tool for managers to identify gaps in service quality, it will not provide a complete overall picture of the customers' perceptions, needs and expectations. Moreover, it is essential not only to explore the expressed needs of the customer but also the unexpressed needs or perceptions and how resources should be allocated and prioritized. (Wisniewski 2001.)

2.2.4 Qualitative research methods

Qualitative research is often conducted to gain understanding and insight into customer behavior and the motives behind customers' decision-making processes and to identify patterns in those behaviors and thoughts. Furthermore, it aims to gather more in-depth information and to answer questions such as why and how. In other words, one could say that qualitative research is less superficial compared to quantitative research. It was noted by McGivern (2009) that a great difference between qualitative and quantitative research is that qualitative methods are usually more flexible and less structured what allows the interviewer to make more detailed questions or to modify the interview to suit the way in the direction in which the research is developing. This less structured and standardized approach, however, has to be taken into consideration and monitored when controlling the reliability of the research. Qualitative research methods are used in a wide range of settings such as to explore and develop ideas for products and services, to create understanding of social issues and to provide information to help develop policies and strategies. (McGivern 2009.)

There is a wide range of different qualitative methods, but the most common and used are observational research, focus groups and in-depth interviews (Swarc 2005). Qualitative research generally involves relatively small sample sizes and the results are typically expressed as words or pictures. The smaller sample sizes has led to that qualitative research methods have been criticized for not being representative of the whole population from which the sample was chosen. McGivern (2009) claims, however, that this is misguided criticism as results from qualitative research are not meant to be statistically representative. (McGivern 2009.)

Many researches do suggest that it is beneficial to conduct explorative qualitative research before undertaking further surveys regarding customer service in order to capture initial observations, feelings and reactions and to provide a basis for further research. The benefits are that the researcher will hear how the customers talk about an issue or a product and about the range of issues that frustrate or satisfy the customers the most in their own words as the questions in qualitative research generally are asked as open-ended questions. This information can then be useful when structuring quantitative research and designing the questionnaire. Qualitative studies are often considered to be more costly as the cost per respondent is greater than in quantitative studies. However, the smaller sample sizes in

qualitative research mean that overall project costs can be smaller. (McGivern 2009, Szwarc 2005.)

Observational research

Observational research, i.e. collecting data about people by observing them, can take many forms and the main objective with these kinds of studies is to gather valuable information that customers would not recall if answering questions in a survey. In other words observational research can be used to record how people behave and react and to manage customers' expectations or to understand the difference between what customers answer or say and what actually happens. As a result, observational research can be a useful tool for discovering exactly how people use services or goods (Adams et al. 2006). A disadvantage with observational methods is that they can be more costly and time-consuming and that the observations can be interpreted differently. (Szwarc 2005.)

There are two types of observational research: simple observation and participant observation. Simple observation includes watching and recording people and their activities in whatever setting that is relevant to the research. The difference between simple and participant observation is that in simple observational studies, the researcher does not interact with those being observed. According to McGivern (2009), the knowledge of being observed might alter the behavior of the people being observed. It is important to try to minimize this effect by making the participants more comfortable with the situation of being observed. McGivern (2005) suggest that this can be done in the following ways:

- explaining the process and the end use of data to the participants
- giving a general overview rather than a precise description of the purpose of the research
- allowing the participants to take some time to get used to the idea of being observed

It can be a good idea to observe the participants of a study in different environments interacting with different people in order to see if variations can be detected (McGivern 2009).

Interviews and focus groups

Focus groups are often used in market research to explore what a particular customer group needs or what they will consume. Usually a group of 10-20 people are brought together to represent a particular population such as members of a particular profession, potential customers or senior citizens (Fink 1995). The group size is kept relatively small for a discussion to evolve but still large enough for different views to be formed (McGivern 2005).

The aim is to allow the participants to interact with each other and discuss the topics appointed for the research. Focus groups can result in relatively in-depth understanding of and insight into the different aspects of customer perception, satisfaction and service (Szwarc 2005). However, the findings may not be applicable to the larger population if the focus group is unique in unanticipated ways, e.g. more educated included, Fink (1995) states.

Moreover, Szwarc (2005) points out that findings arising from the focus group cannot be assumed to statistically represent the whole population from which they have been sampled. Factors that affect the success of focus groups are for example having a good moderator to facilitate the discussion, recruiting the right participants and having customer-focused topics prepared to be discussed (Szwarc 2005).

In-depth interviews are a more suitable choice than focus groups if the respondents are geographically scattered or if the aim is to collect individual case stories or if it is important to avoid other people to influence the participant's responses (Szwarc 2005). Szwarc (2005) further suggests that the use of interviews might also be more appropriate if the topic is more sensitive such as talking about personal wealth or where more extensive comments are needed from the participant.

Panels and workshops

Workshops can be useful when exploring selected issues more in detail, solving problems and developing or coming up with new ideas. Workshops generally involve a group of people of about 15-20 and which often include clients as well as consumers. The group can also be divided into smaller sub-groups during the workshop in order create discussions on different aspects of an issue. (McGivern 2009.)

A panel is a qualitative research method where a same group of people is recruited to take part in interviews to discuss a given topic, product or service over a certain period of time. Panels are commonly used in market research and a typical feature of qualitative panels is that the respondents in a panel stay unchanged (Lotti 1994). This is an important aspect when researching for example consumer habits and the changes related to these habits. A panel usually consists of about 20 people that meet on a regular basis to discuss about an assigned subject (McGivern 2009). A benefit with panels is that these can be less expensive to use compared to other qualitative methods where the same number of separate groups have to be recruited every time. By using panels, the same respondents participate several times and no additional recruiting costs arise. Furthermore, the respondents learn to know each other and might be more forthcoming to present and bring forward their opinions. (McGivern 2009.)

Online qualitative research

The most common online qualitative research methods are web-based group discussions and bulletin board discussions. The recruitment of people to participate in such online research can be accomplished via traditional methods or direct online for example via "pop-ups" on specific web-sites or by e-mail invitation (McGivern 2009). The benefit with online surveys is that the data is directly fed into the researcher's computer program but a problem related to online surveys is that not all potential respondents have computer skills or access to the internet (Adams et al. 2006).

2.2.5 Quantitative research methods

Quantitative research is concerned with measurements of quantitative properties. It can be used to measure things such as the size of the market or segment, to validate a finding or to test hypotheses (Szwarc 2005). Quantitative measurements usually aim to describe the characteristics of a population and to answer the questions how many, how much, how often and how important something is. Furthermore, the aim is to generalize the acquired results by using statistical methods and analysis. There is a wide range of different quantitative methods, but the most common and used methods are mail surveys, face-to-face interviews, telephone interviews and Internet surveys. Quantitative research typically consists of collecting data from a relatively large sample in a standardized way and the results are usually presented as numbers in tables, graphs or charts (McGivern 2009).

The benefits with quantitative research are for example that it usually is more inexpensive and easier to conduct and that the acquired data is easier to handle and more simple to transfer to computerized form. In addition, the results can easier be compared with prior results from undertaken surveys. The disadvantages are that it can be hard to track who from the sample has actually responded to the survey and who has decided not to participate. In other words, there is a risk that some population groups are over or under represented. (Öster 2008.)

Mail surveys

Mail surveys, also called postal surveys, are as a research method relatively inexpensive to use and a benefit with this kind of method is that extra material, such as maps etc, can be included (Szwarc 2005). By delivering the questionnaire directly to the potential respondents, you can avoid interviewer costs and thus decrease the costs. Hence, these types of surveys are very popular among small projects with restricted budgets. Also large-scale research project use mail surveys often due to the fact that a large number of respondents are required and where the costs and time involved in the data collecting are essential issues. Another advantage with mail surveys are that respondents usually perceive this research method as less intrusive, as the option not to respond to the survey is easier to make (Szwarc 2005). Mail surveys are also more flexible as the respondents can complete the survey at a time convenient to them. (Adams et al. 2006.)

However, mail surveys do have some limitations. One problem that affects the collection of initial thoughts is that the respondent is able to see all the questions being asked in the questionnaire beforehand. In other words, the respondents will get ideas that would not have occurred to them spontaneously before what might affect his or hers answers. Another limitation with mail surveys as a research method is that it might be more time-consuming as you have to give the respondents sufficient time to send back their completed questionnaire. Moreover, the response rates tend to be lower when using mail surveys as data collection

method. Thus, reminders and incentives are often used to boost response rates. (Szwarc 2005.)

Face-to-face interviews

Face-to-face interviews can take place in different settings depending on the nature of the survey. Typical places are for example the respondent's home, in the street, in a shopping mall or other similar central locations. The place to choose for a particular survey depends on factors such as the length of the survey. If it is a longer survey, a face-to-face interview at the respondent's home might be most appropriate place. (McGivern 2009.) Another type of face-to-face interviews is exit surveys. These are surveys conducted outside stores or other facilities to determine what products have been purchased or how the respondents felt about the particular facility (Adams et al. 2006).

The advantages with face-to-face interviews are that the more personal approach may encourage people to participate as respondents (Adams et al. 2006). However, according to Szwarc (2005) these kinds of personal interviews may also lead to social bias as the respondents might feel that they need to provide a particular answer to a question in order to be seen in a good light by the interviewer. Another advantage with face-to-face interviews is that response rates usually tend to be relatively high. In addition, extra material can be used and the face-to-face method allows more flexibility in the interviewing process. (McGivern 2009.)

Limitations and weaknesses associated with face-to-face interviews are that the interviews need to take place at a time when it is most likely to meet the range of people that need to be interviewed and that face-to-face interviews generally are rather time-consuming. Moreover, it is a relatively expensive method as it requires highly skilled and trained interviewers. If the respondents are geographically scattered, there are travel and other related costs that needs to be taken into consideration (Szwarc 2005). Another disadvantage with face-to-face interviews is that errors might occur. This can happen in cases when the interviewers fail to screen the potential respondents carefully, i.e. the selected respondents do not fit the sample profile, or if the interviewer fail to record the data accurately. According to Adams et al. (2006), any mistakes in the recording of information may have a major impact on the accuracy of the results. (Adams et al. 2006.)

Telephone interviews

Telephone research is a popular research method but today it is facing new challenges due to the increasing popularity of mobile phones (Szwarc 2005). According to Statistics Finland (2002), almost four of five households used traditional fixed line telephones in the late 1990's. In year 2002, the commonness of fixed line telephones had decreased to less than 70%. At the same time the usage of mobile phones had increased from 60% to 90% (Tilastokeskus 2010). The problem with conducting telephone interviews over mobile phone is that people

might feel embarrassed about answering different questions in public locations (Szwarc 2005). Moreover, it is harder to gather a truly random sample, as everyone does not have the same chance of being selected if they do not have a listed fixed line telephone (McGivern 2009).

Telephone interviews are usually conducted from special call centers what can be considered as an advantage according to Szwarc (2005). This because there is more supervision and control over the quality of the interviewing at such centers compared to face-to-face interviews that are conducted at respondents' homes or shopping malls. Furthermore telephone interviews are generally more inexpensive than face-to-face interviews, as there are no travel or distribution costs. It is also relatively easy to determine the response and refusal rate as well as to monitor the sample and check that it is still representative (McGivern 2009). Another advantage with telephone interviews is that respondents might feel more comfortable in answering questions of sensitive nature over the telephone. (Szwarc 2005.)

Like all data collections methods, telephone interviews as a research method can have its limitations. The weaknesses related to telephone interviewing is the difficulty to include stimulus or extra material and the structure and content of the questionnaire. If for example the questionnaire contains too many attributes to rate, the interview can be very tedious and tiresome both for the respondent and the interviewer, Szwarc (2005) states.

Internet / e-mail surveys

Online research is research conducted via the Internet and typical methods are Internet surveys and e-mail surveys. The respondents are usually recruited to participate to Internet surveys via "pop-ups" or specific websites and to e-mail surveys via e-mail invitation where the questionnaire is sent directly to potential respondents (McGivern 2009). The strengths associated with Internet or e-mail surveys are that the data is directly fed into the researcher's computer and that these methods usually are quick and effective at reaching a wider audience (Adams et al. 2006).

Internet and e-mail surveys do have a number of disadvantages. According to Szwarc (2005), the online methods share similar disadvantages as mail survey, for example non-response bias and the uncertainty of who actually responded to the survey. Furthermore, respondents may want to remain anonymous and hence do not want to return a questionnaire from their own e-mail address (Adams et al. 2006).

2.2.6 Sampling methods

An important step in a research project is to define who to include in the research, i.e. whom to collect data from. Due to financial constraints, it is not possible to administer a survey to all customers. Samples are created because it is generally impossible to interview everyone

who are interested in or affected by the subject of the research project. A sample is a selection or a portion of a larger group or in other words the population. However, the sample needs to be representative of all of these different groups of people. These groups of people form a so called population of interest and the sample should represent the whole population of interest for the survey to be accurate. The process of sampling ensures that the results of a survey based on a sample of customers are generalizable to all customers. This aspect is particularly important when undertaking quantitative research, as the data produced from such research need to be reliable and valid. However, no sample is completely accurate as it usually includes some degree of error or bias. (Adams et al. 2006, Hayes 1998.)

Sampling plans are usually developed because of the difficulties related to identifying the sample to be surveyed. In other words, a sampling plan is usually established in order to know how many respondents are required to participate in the study, whom to include in the survey and how to contact these respondents. According to Adams et al. (2006), another benefit with a sampling plan is that it can help identify any potential problems early on in the research process. Further on, Adams et al. (2006) list the following steps that should be included in an effective sampling plan:

- to identify precisely the population of interest
- to choose the sampling method or methods to use
- to decide how many respondents that need to be surveyed from each group
- to identify how the sample will be contacted

Another essential step is to calculate how much it will cost to gather all the data from the sample as this generally is one of the largest costs in a research project (Adams et al. 2006).

Sampling methods are usually divided into two types: probability sampling and non-probability sampling. The most common types of probability sampling are simple and stratified random sampling. In simple random sampling, everyone of the population has an equal chance of being selected for the survey. Hence, probability sampling provides a statistical basis for the sample to be representative of the whole target population. The advantage of simple random sampling is that you are able to get an unbiased sample without too much difficulty. The disadvantage is that a simple random sample may not include all of the attributes of a population that are of interest. If you for example have results from previous studies showing that younger and older drivers differ in their customer satisfaction, the risk in simple random sampling is that you might not get a large enough proportion of e.g. older drivers in your sample. (Fink 1995.)

Stratified random sampling can be used when you need to be sure that you select and get the right proportions of people with certain characteristics such as age, gender, residential area, level of education, health status, etc. In stratified random sampling the population is divided into subgroups and a random sample is then selected from each of these subgroups. The disadvantage with this type of sampling is that it is more complicated than simple random sampling. Furthermore, the subgroups must be selected correctly as too many subgroups may lead to a large and expensive survey. Another type of probability sampling is

cluster sampling. In cluster sampling, clusters are randomly selected and all members of the selected cluster or clusters are included in the sample. You can decide either to survey all the members or to select randomly among the members. Cluster sampling is generally used in large surveys and can for example be used to focus on and survey randomly selected regions or counties. The difference between stratified sampling and cluster sampling is that you in stratified sampling have to create the groups. (Fink 1995.)

Non-probability sampling is the second type of sampling. In non-probability sampling, samples are chosen based on the aims of the survey and on the different characteristics of the target population. In other words, some members of the population have a chance of being chosen to participate in the survey whereas some do not. A typical example of non-probability sampling is the use of focus groups. Focus groups are often used especially in market research to examine the customers' views and needs. (Fink 1995.)

The size of a sample reflects the amount of people or places (e.g. regions, departments, schools etc) that need to be surveyed to get accurate and reliable results. Factors that affect the sample size are time, costs and how exact the information needs to be. For example if you increase the size of the sample, you will also increase the costs of the data collection and analysis. There are different formulas and statistical calculations to use to estimate the needed sample size for a survey, but often it is based on experience. In smaller surveys, a sample size of 500 already provides a good picture of the overall results. If the goal is to analyze a sample according to different customer or population groups, the sample size needs to be bigger. An increase in the sample size also has a positive effect on the standard error, i.e. the standard error or sampling variation decreases. The relation between these two variables is presented in Figure 7. (Fink 1995, Lotti 1994.)

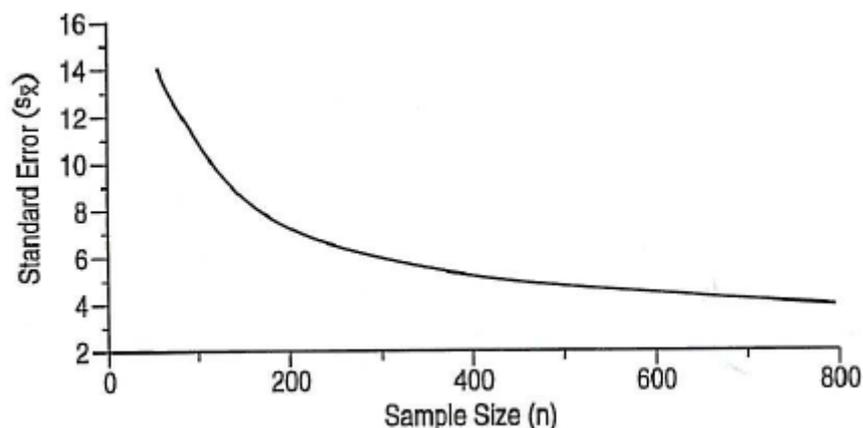


Figure 7. The relation between sample size and standard error (Fink 1995.)

Whichever sampling method that is chosen to be used for the survey, there is generally a loss of information because of non-response. In other words, all of the selected members of the target population will most likely not respond to the survey. The ideal would be a response rate of 100%, but this is usually impossible and would require increased costs and

time. The proportion of the non-responses should always be reported by the determination of how substantial it is and to which customer groups it is focused. (Lotti 1994.)

According to Naumann et al. (1995), determining of the appropriate sample size is a complex decision involving many tradeoffs. An important aspect is the amount of time available for the survey. The larger the sample, the more time it takes to gather and analyze the data. Other factors that influence the choice of sample size are money, type of questionnaire and staffing (if research not outsourced). (Naumann et al. 1995.)

2.2.7 Reliability and validity of a survey

Measurement instruments can help us better understand and measure the level of satisfaction of our customers to uncover any perceived problems with our services or products. In order to obtain our customers' opinions and current level of satisfaction, we need to accurately measure these attitudes. The goal of every CSM program is good-quality data. In other words, when developing the measures to be used for CSM, it is important to ensure that the data and results obtained from measurements provide reliable and valid information. There are a number of factors that influence the quality of various type of data for example the chosen measurement method as data gathering techniques and these again relate to sample selection, question complexity and identification of correct respondents. (Hayes 1998, Naumann et al. 1995.)

According to Hayes (1998), the term reliability is used to describe the degree of error associated with a measure. There are various factors affecting the level of reliability, for example sample size, sample of people and numbers of items in the scale. A decreased sampling error can be achieved with an increased sample size. Similarly, an increased number of items in the questionnaire will lead to a higher reliability. Furthermore, Hayes (1998) states that reliability of scales is especially important when exploring the relationship between different variables. Low reliability leads to lower observed correlation between two variables. In other words, if the reliability for one or both of the variables is low, incorrect conclusions concerning relationships between different variables can be made. (Hayes 1998.)

A good and accurate sample represents the whole population, i.e. if important characteristics of the population are distributed evenly by all groups. This is an important aspect particularly in quantitative research. No matter how exact the sample is chosen, the sample will most likely include errors or biases. Typically these errors are non-sampling errors. Usually they occur due to imprecision in the definition of survey objectives or to errors in measurement methods and in design of survey. Another source of non-sampling errors or biases is non-response. Everyone selected to the sample will not participate in the survey and not all of the respondents will answer all questions, which is called item non-response. Other factors that may result in biases are poorly worded questions and untrained interviewers. (Fink 1995.)

No results based on surveys are absolute and factors such as sample size may influence the research's reliability. By increasing the sample you can increase the reliability, but on the other hand this will also lead to increased costs. There are statistical methods that can be used to "correct" or compensate non-responses either to entire surveys or just some questions. A common method is "weighting" where the aim is to weight the data to correctly represent the population. (Fink 1995, Lotti 1994.)

2.2.8 Response rates

When conducting customer satisfaction measurements or surveys, it is unlikely that all customers will return a completed survey. According to Hayes (1998), response rate can be defined as the percent of returned and completed surveys of all the surveys that were administered or distributed. Especially for mail surveys, response rates tend to be low. When planning the survey and sampling process, you must take into account the response rate. Hayes (1998) suggests that to obtain and achieve a certain sample size, you need to distribute more surveys than otherwise would be needed for the analysis. Furthermore, Hayes states that the following formula can be used to calculate the distribution sample size:

$$\text{Distribution size} = \text{Needed Sample Size} / \text{Response Rate}$$

The formula does acquire us to estimate the expected response rate beforehand and to conclude the needed sample size for a given level of confidence. The estimated response rate can for example be based on similar surveys conducted in the past. (Hayes 1998.)

In order to encourage people to participate in a survey and to increase the response rate, companies or organizations can try to offer and use incentives such as a chance to enter a prize draw. Other techniques used to increase response rates are for example to include a personalized cover letter, pre-notification of the survey and reminders. Especially in mail and online surveys at least one reminder is often sent usually to those who have not returned the questionnaire before a certain date. (Adams et al. 2006, McGivern 2009.)

2.2.9 Response formats and scale types

An important step in a survey's development process is to select a response format, i.e. how customers can respond to the items or questions in the survey. This because the response format determines how the data gathered from the survey can be used (Hayes 1998). According to Burns et al. (2008), there are three basic question-response formats and each one of these has two variations. These different response formats and their variations are presented in Figure 9.

When using open-ended response format questions, respondents are instructed to respond in his or her own words. This kind of response format is suitable for and used especially in exploratory research. Open-ended questions can be divided into unaided and aided response formats. Categorical response format questions provides specific response options and this kind of format is used when the researcher already knows the possible response to a question. Response options ensure that respondents can answer questions quickly and effortlessly. Metric response questions usually provide the respondents to choose from a scale developed by the researcher. Respondents can for example be asked to rate their level of satisfaction in a scale from 1-10 or in scale descriptors such as “poor”, “fair”, “good”, “very good” and “excellent”. Alternatively, metric response format questions can be of a natural type where respondents may be asked to provide numbers in their answer. (Burns et al. 2008.)

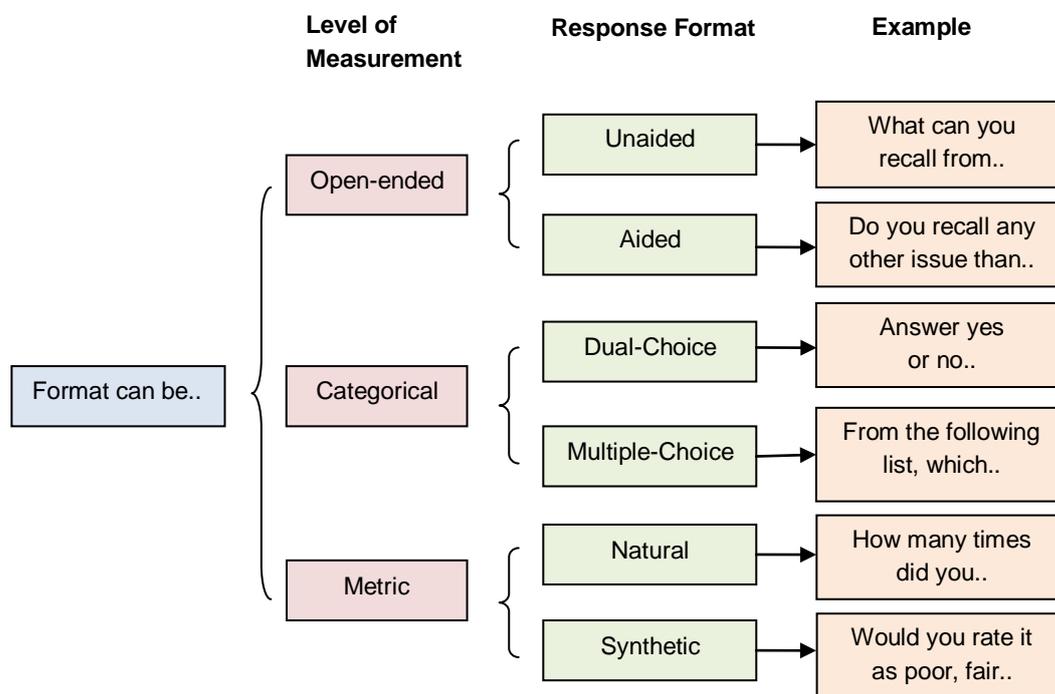


Figure 8. Level of measurement and response formats (modified from Burns et al. 2008.)

Probably the most widely used scale in survey research is the *Likert Scale*. When using the Likert Scale, respondents are asked to specify their level of agreement to a statement. In other words, the Likert Scale is designed to allow customers to respond in varying degrees. According to McGivern (2009), the response format of a typical Likert Scale consists of five points which can be listed as followed:

- 5 Agree strongly
- 4 Agree
- 3 Neither agree nor disagree
- 2 Disagree
- 1 Disagree strongly

According to Hayes (1998), the advantage of using a Likert-type format or scale rather than for example a “yes-no”-scale is the possibility to more variability of the scores. Moreover, scales with only two response options have, from a statistical perspective, less reliability than scales with five response options. Hayes (1998) also points out, that reliability seems to level off after five scale points, which suggests that there is not too much need to use more than five scale points. Another advantage is that the Likert-type format allows you to determine the percentage of positive or negative responses for a certain attribute or issue. This can be done for example by combining the responses on the ends of the scale (e.g. combining strongly agree and agree to positive responses). (Hayes 1998.)

Another example of a response format or scale is ranking. In order to measure opinions or attitudes, respondents can be asked to rank a set of attitudes relevant to the issue. Ranking can thus provide an idea of how a person evaluates an object or a set of criteria. The main difference with regard to a Likert-type format is that with ranking we cannot establish the distance or intervals between the rankings. Problems with scales are also possible. Respondents might for example have the tendency to avoid using the extreme values of the scales. (McGivern 2009.)

2.3 Establishing a CSM program

Customer satisfaction is formed by the customers’ subjective experiences of the organizations’ products or services. Moreover, customer satisfaction is strongly connected with the present and that is why customer satisfaction has to be claimed again and again in daily contacts with the customers. Customer perception should thus be measured on a systematic and continuous basis. If the gathering and obtaining of customer feedback and information are not ongoing, a management system reacting on customer input cannot be established. According to Sandholm (2000), customer perceptions and customer feedback regarding their needs and expectations must be fed back to the organization and used as a basis for improvement work in order for a company or organization to be successful in quality management. (Rope et al. 1994.)

2.3.1 Required decisions

An important step in the CSM process is to identify customers’ requirements or quality dimensions and the appreciated characteristics of a product or service. In other words, the customer requirements will define the quality and level of standard of our services. According to Hayes (1998), knowledge of customer requirements and expectations is essential to provide a better understanding of how customers define the quality of your services. If you understand these requirements, you are in a better position to develop measures to achieve satisfied customers. (Hayes 1998.)

In order to determine the level of customer satisfaction, continuous and systematic measurement is required. If customer feedback is not measured continuously and only gathered one time with the intention to identify possible problem areas, an organizational strategy based on and reacting to customer input cannot be formed. Systematic and continuous measurement activity is also required if the aim is to maintain the standard of an organization's operations by using information concerning customer satisfaction. (Rope et al. 1994.)

According to Rope et al. (1994), certain decisions are required in order to design and construct a system for gathering customer data. Decisions are needed in the following areas:

- how often to measure: constantly or in certain time intervals
- which customers to include in the sample : everyone or special segments/customer groups
- what issues or attributes to measure (satisfaction levels concerning issues defined and decided beforehand or overall level of satisfaction)
- which measurement method to use

All of these issues affect what type of data that will be gathered and with which level of precision. The data gathering system will always be a compromise that is designed depending on and taking into consideration the possibilities to utilize the data, the economical aspect and functionality of the system. If the customer satisfaction measurement system is designed to be too complicated, it will be hard to execute and the data will be difficult to handle and analyze and the system will not be cost-effective. (Rope et al. 1994.)

2.3.2 Identification of survey objectives

The first and most important step in a CSM program is to clarify and define the objectives. Only by clarifying the objectives, you will be able to select and design a good and functioning CSM program (Naumann et al. 1995). Otherwise, there is a risk that you are collecting too much low-impact data. Moreover, clarifying objectives allows a company or organization to adopt a clear direction for the CSM program and efforts. According to the views of Naumann et al. (1995), the following three questions must be answered in order to develop good and concise objectives:

- why are we doing this (i.e. why are we undertaking CSM)
- who will use the data
- in what form should the data be in order to be valuable

The most common answer to the question “why are we doing this?” is that a company or organization is trying to better understand the customers' needs and preferences or to determine whether there have occurred any problems related to the provided products or services. Some organizations might want to measure the customers' perception of delivered quality to learn whether improvement works have been noticed by the customers and

resulted in higher levels of satisfaction. Naumann et al. (1995) summed the most common CSM objectives up and state that these are:

- to get closer to the customer
- to measure continuous improvement from the customer's perspective
- to use customer input as the driver for process improvement
- to link CSM data to internal performance measures

2.3.3 Choosing the best research method

The goal of most CSM programs is good-quality-data. The quality of data gathered in customer satisfaction measurements is influenced by a number of different factors. One factor is the data-gathering technique, i.e. are the measurements undertaken by mail, telephone or personal surveys. But how do you decide which is the best survey method for a particular research project? The data-gathering technique also relates to issues like sample selection and identification of respondents, Naumann et al. (1995) states.

When you are planning to undertake some form of market research or measurement, there are multiple factors that need to be taken into consideration when choosing the best, most appropriate and optimal survey mode or research method for your project. Each data gathering method has unique advantages, disadvantages and special features (Burns et al. 2008). According to Adams et al. (2006), the following factors affect what type of research method is the best research method for you:

- the type of information that you need – qualitative, quantitative or both
- the resources you have access to – both technology and human resources
- the type or groups of people you need to interview
- the methods and resources that can be used for the data handling and analyzing

Furthermore, Adams et al. (2006) states that your choice of method to use is also constrained by the time and money you have available for the project.

There are many options to consider when choosing the best and most appropriate research method. Before you make your decision regarding what research method to use to collect information, you ought to compare the strengths and limitations of each method. An advantage of a written survey is the relatively low cost of administration and data analysis. For telephone surveys the key advantage is good quality control and reasonable cost. The advantages and disadvantages related to different qualitative and quantitative research methods are summarized in Table 3. The use of especially qualitative research methods has grown in popularity. According to Elmore-Yalch (1998), this is mostly due to the lower costs, the excellent means to understand the in-depth motivation and feelings of customers and the benefit of improving the efficiency of quantitative research. (Czarnecki 1998.)

Table 3. Advantages and disadvantages of qualitative and quantitative research methods

	<i>Advantages</i>	<i>Disadvantages</i>
Observational Research	useful tool for discovering exactly how people use services or goods	costly; time consuming; observations can be interpreted differently
Interviews and focus groups	costly; in-depth interviews useful if the respondents are geographically scattered	cannot be assumed to statistically represent the whole population
Panels and workshops	panels can be less expensive as respondents don't have to be recruited every time; encourage creativity	require a greater time commitment from the participants; the group setting may intimidate some participants
Online qualitative research	cost effective; data is directly fed into the researcher's computer program	not all potential respondents have computer skills or access to the Internet
Mail surveys	cost effective; extra material (e.g. maps) can be included; respondents usually perceive this method as less intrusive; possible to conduct longer surveys; efficient to reach a large audience	time-consuming; affects the collection of initial thoughts; lower response rates; no control over who is actually responding
Face-to-face interviews	a more personal approach; higher response rates; extra material can be used; flexibility possible in the interviewing process	time-consuming; costly; hard to get a wide enough geographic coverage; hard to conduct with large sample sizes
Telephone interviews	higher response rates; reasonable cost; easy to include respondents from wide or different geographical regions; good quality control	more households are becoming cell-only; difficult to include stimulus or extra material
Internet / e-mail surveys	data is directly fed into the researcher's computer program; effective method to reach a wider audience	uncertainty of who actually responded to the survey in Internet research; harder for respondents to stay anonymous when using e-mail surveys

2.3.4 Focusing and determining list of attributes

As a basis for improvement work, both data and analysis of these data are required. In order to have a substantial basis for decision-making, sufficient collection of data is needed. It is essential, that the data collected apply to the topic in question. It can be tempting to try to gather information concerning a variety of issues when undertaking market research and customer satisfaction measurement. All of these studied issues might not even be relevant to the research problem and if one tries to concentrate on too many issues it will most likely result in increased costs and longer deadline for the delivery of research findings (Adams et al. 2006, Bergman et al. 1994.)

A critical component of customer satisfaction research is to determine the extent of which existing services and products meet the needs and expectations of the customer. These expectations can be formalized as a set of attributes that capture and represent issues that are seen as important by the customers. When determining the attributes that should be included in the CSM, it is important to look at the issue both from the internal or organizational perspective and the external or customer perspective. According to Elmore-Yalch (1998), a combination of qualitative and quantitative research methods and techniques can be used to identify the critical performance attributes.

The organizational knowledge should, however, be the first source of information in the process, as the internal employees know their work and their customers. Moreover, the employees are often also customers, Elmore-Yalch (1998) points out. An internal exploratory research will help the organization to finalize the study objectives and survey questionnaire, make meaningful recommendations for quality improvement and recommendations that are consistent with the organization's strategy. By undertaking research concerning the customers' views, the organization can form an understanding of the perceptions and organizational performance from the customers' perspective. (Elmore-Yalch 1998.)

Focusing and determining the list of performance attributes is potentially the most important step the whole CSM process (Elmore-Yalch 1998). In other words, the essential thing is to ask the right questions so that the improvement focus within a company or an organization relates to what is important to the customers (Kessler 1996). Focusing on a handful of measures is much more important than too many detailed questions. The customer management plan should be reviewed on a regular basis to ensure that it still is relevant and valid (Stickler et al. 2003).

Ultimately, usefulness of CSM survey and research methods comes from improved decisions and customer/stakeholder satisfaction, including their use to determine contractor performance and possible bonuses. It is important that survey and research methods are related to outcomes. Experimentation is desirable because even if the methods have shortcomings, as all of them do, some may be more effective than others for effective decision-making or good outcomes.

3 UTILIZATION OF CUSTOMER SATISFACTION MEASUREMENTS

Even if most companies and organizations are measuring customer satisfaction nowadays, many of these have problems to develop a framework or strategy on how to utilize the results from the measurements effectively. This chapter will discuss the different aspects of the utilization of results from conducted CSM. In addition the importance and possibility of linking CSM results to decision-making processes will be presented.

3.1 *Field of application*

Customer satisfaction measurement is not solely sufficient. In order to really increase the level of satisfaction, actions based on monitoring and follow-ups are needed. When the gathering and analyzing of the data are done, the actual work of implementing the customer input comes in. According to Naumann et al. (1995), it is not enough to know what affects customer satisfaction. The essential thing is to improve the critical processes that affect customer satisfaction. Naumann et al. (1995) further on state: “With commitment and planning, use of data can provide a focus and a direction for continuous improvement throughout the entire organization.” Lotti (1994) sums it up and states that customer satisfaction measurement is pointless if it does not result in such produced quality that satisfies the customers.

The goal of CSM is to not let the survey be the end of the program, but rather the start of a quality improvement initiative. Findings from undertaken customer satisfaction measurement can be used for a wide range of purposes. According to Rope et al. (1994), the fields of application can be listed as followed:

- to determine the problem areas in a company’s or organization’s quality of operations
- to maintain the standard of operations
- to form a basis for the management strategies and policies
- to identify customer values and priorities by gathering customer feedback systematically

McGivern (2009) state that other important aspects are to understand the wider environment, to identify and monitor changes and trends, to build knowledge for longer-term benefit, to identify relevant stakeholders, to understand how to influence stakeholder attitudes and behavior. Moreover, customer feedback can be used to understand how best to communicate with the different stakeholders. By developing a priority setting, organizations have the possibility to plan and direct the use of resources. (McGivern 2009.)

3.2 Tools for implementing data

The results from undertaken CSM will not transform into practice on its own. First one has to identify the measures needed and draw up an action plan based on the analyses. If the level of satisfaction is good, this level should be maintained. Market and customer research is further on also needed, as the customers' level of satisfaction is always changing. When considering the actions needed and the order of implementation of different factors regarding the level of satisfaction, the prioritization of the product or service in question must be taken into consideration. Table 4 presents a basic concept on how the results from undertaken CSM can be assessed. (Ylikoski 1999.)

Table 4. Assessment of results from conducted CSM (redrawn from Ylikoski 1999.)

		Level of satisfaction	
		Low	High
The importance of an attribute	Low	<i>Improvement work not urgent</i>	<i>Unnecessary strengths – can be weakened</i>
	High	<i>Attributes with highest priority for improvement</i>	<i>The strengths of the organization</i>

In order to achieve better performance and higher levels in customer satisfaction, continuous improvement and commitment to the development of current organization or practices are needed. According to Czarnecki (1998) there are several types of improvements:

- enhancing the value to customers through new and improved services or products
- reducing errors, defects or other problems related to products or services provided
- improving responsiveness
- improving the company's or organization's reputation or position in fulfilling its public responsibilities

Hence, improvement is not only driven by the goal to have better services or products, but also by the aim to be effective and responsive. Czarnecki (1998) also states that in order to meet these objectives, an information basis (preferably quantitative) is needed. Once the data and customer information has been acquired, an analysis should be completed. This analysis should especially focus on the differences between the customers and the road administration's perception and views. (Stickler et al. 2003.)

3.3 The functional roles of research in decision-making

Plans and decisions regarding policy or public services like for example infrastructural network are nowadays issues subjected to scrutiny and often also require justification. Therefore decisions regarding these issues should be based on robust information and defensible evidence. Managers today have an increasingly large amount of information available to them to help them in their decision-making processes. Social and market research can provide information regarding knowledge of what is going on in the wider environment and understanding people's attitudes. This data can further on be used for effective planning and decision making in relation to policy development and implementation. In other words market research can be seen as the link between the organization's decision-makers and the organization's customers or stakeholders. (Elmore-Yalch 1998, McGivern 2009.)

All organizations, whether they are commercial companies, not-for-profit organizations or government agencies, need to find ways to develop and improve their practices and strategies in order to meet the demands of a changing environment. However, to decide what and how to improve can be a complex task. In order to make appropriate decisions and help organizations in their business decision-making processes, organizations need relevant information. In other words, effective research can provide organizations with support to identify possible solutions and to solve a variety of problems. Usually the organization's business problem defines what information that needs to be gathered and measured. But to truly succeed with the research, it is important to gain a real understanding of the decision or decisions that have to be made. (Adams et al. 2006, Czarnecki 1998.)

According to Czarnecki (1998), the most important aspects of any successful measurement program are:

- to link measurements to a well-planned organizational strategy
- to integrate measurements into daily decision-making
- to use the measurements to encourage desired behavior

For the road administration as a governmental organization it is essential to develop suitable strategies and policies in order to set priorities and make decisions. By determining the policy framework through the definition of objectives, standards and intervention levels, the road administration can more easily identify and clarify their aims (Robinson et al. 1998). Furthermore, it can assist the road administration to achieve its goals and assist in the decision-making processes. Market and customer research can serve three important functional roles, Elmore-Yalch (1998) states. According to her, these roles are:

- **descriptive function** – includes gathering and presenting statements or facts
- **diagnostic function** – data and actions are explained
- **predictive function** – used to “predict” the results of a planned decision or policy change

However, Elmore-Yalch (1998) continues that most importantly, market and customer research improves the quality of decision-making by shedding light on the desirability of various alternatives. Market research cannot guarantee success for a single decision, but reliable and valid data can eliminate bad alternatives. In addition, it can provide input concerning the strengths and weaknesses of other potential alternatives and reduce uncertainty in the decision-making processes. (Elmore-Yalch 1998.)

There are many types of research that organizations can undertake, depending on the nature of the decisions. According to Elmore-Yalch (1998) these are: Environmental surveillance, Problem and opportunity definition, Identification and assessment of alternatives, Testing and refining and finally Performance Monitoring and evaluation. These different types of research and their relation to the decision-making process are also presented in Figure 9.

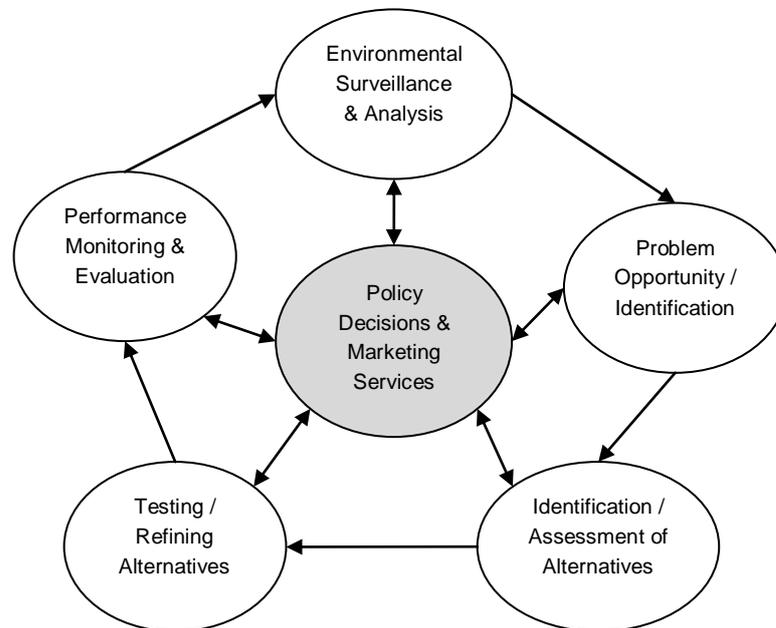


Figure 9. Market research for decision-making (redrawn from Elmore-Yalch 1998.)

3.4 CSM to support decision-making processes

Market research involves the gathering of information that provides the management with solutions and aid for their business decision-making processes. This type of research aims to pinpoint problems or possible objects for improvement and to gather and analyze information needed for the work. In addition, the goal is to diminish the risks related to decision-making by undertaking market research and receiving customer input. Bergman et al. (1994) discusses the importance on making decisions based on facts that are well-known and not to allow any random factors to be of decisive importance. This can be achieved by undertaking thorough market research concerning the actual needs and views of the customers. (Bergman et al. 1994, Lotti 1994.)

Decision-making practices in public and private organizations may be influenced by different factors, as Nutt (2000) suggests. Research findings play an important role in the decision-making processes as they provide evidence to help solve a business problem (Adams et al. 2006). Hence, a thorough understanding of the organization's background and the business problem is essential in order for the researcher to conduct successful research, to find the information required and to distinguish how the research findings will affect the decision-making process. The following questions need to be answered and considered in order to identify the research problem (Adams et al. 2006):

- what is known already – important to investigate background information and to identify research areas
- what decisions need to be made – the business problem needs to be defined
- is the research really possible – it may not always be possible to conduct all the research the client wants due to factors such as ethical, financial or time constraints.

According to OECD (Organization for economic co-operation and development) (1996), the general view is that it is the road administration who collects data, undertakes analyses and makes day-to-day decisions. But on the other hand, government officials and the public do have direct input into decision-making processes for example through surveys conducted regarding attitudes and perceptions. In other words, the public are ultimately responsible for ensuring that the data collected reflect their concerns and affect project selection as well as actions performed. (OECD 1996.)

Public input and information regarding customers' views are generally presented in reports. Sandholm (2000) suggests that as these reports normally are used for decisions, it is essential that these are drawn up so that they support the decision-making process. In other words the reports should be structured according to information that the reader needs and that the information is easily understood. This can for example be done by using tables and diagrams. In the case major decisions made by top management, the width of information in a report should be broad. Lower down in an organization, the decisions generally concern specific details and thus the depth of the information should be greater. (Sandholm 2000.)

Organizations that explore their customers' perceptions and attitudes will greatly enhance their opportunity to make better business and organizational decisions. According to Hayes (1998), this is because these organizations will know their customers' requirements and expectations and will thus be able to determine if they are meeting those requirements. But the means for customer satisfaction measurements must accurately measure the attitudes and perceptions in order for the companies to be able to use these results to assess the quality of their services and products. In other words, organizations with accurate information about the customers' views and perceptions concerning the quality of the services can make better decisions to better serve their customers. (Hayes 1998.)

PART III – International Benchmarking

4 DESCRIPTION OF THE INTERNATIONAL BENCHMARKING PROCESS

This chapter briefly describes the concepts behind benchmarking, the objectives of the international benchmarking approach, the process and the methodology used in the research. Furthermore, benchmarking as a research method is discussed and advantages of using benchmarking are presented.

4.1 Benchmarking as a research method

Today, benchmarking is a widely used research method that gives an organization an opportunity to develop and improve its practices and strategies. By comparing oneself to other organizations or companies, one can obtain valuable ideas for improving existing products, services or working practices. The basic concept of benchmarking is to identify, understand and adapt other organizations' "best practices", which can result in success in your own organization. Benchmarking involves looking outward from your own organization with the objective to improve your organization's performance by examining how others achieve their performance. As a research method, benchmarking can be used in the organization's many various business processes. Figure 10 presents the idea that benchmarking can be suitable and applicable both for "development leaps" and continuous development. (Sandholm 2000, Tuominen 1993.)

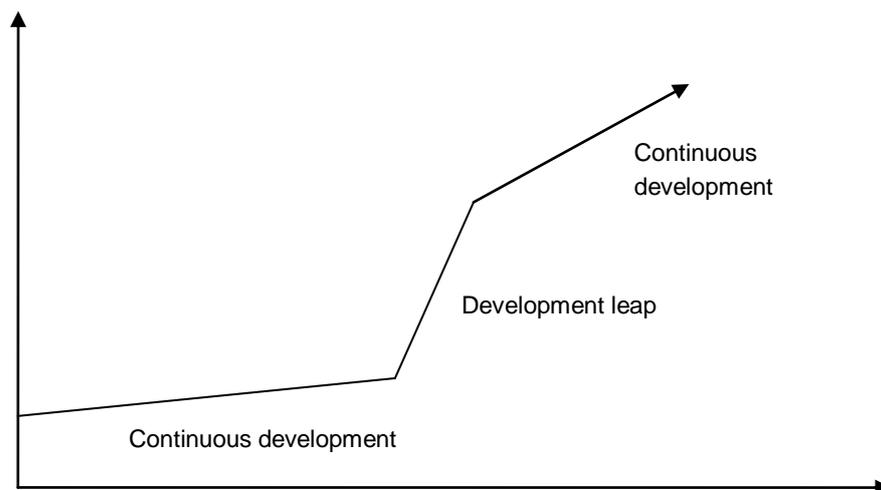


Figure 10. Benchmarking, a suitable method both for development leaps and continuous development (redrawn from Tuominen 1993)

Most companies and organizations have realized that in order to obtain information they have to give information. Benchmarking for better practices enables continuous improvement of a company or organization. By going outside the organization, one can bring back new practices which will help the organization to move forward (Zairi 1996). According to Zairi (1996) benchmarking is used in the following ways:

- as an enabler to achieve and maintain competitiveness
- as a measurement of performance through constant review of processes, practices and methods
- as a continuous process of measuring products, services and practices

Furthermore, Zairi (1996) mentions that benchmarking exposes organizations to state-of-the-art practices and is a very good tool to explore creative potential in the area of innovativeness. In other words, benchmarking allows a company or organization to continually improve their business processes by finding and adapting best practices. Many organizational managers are also using benchmarking to ensure that they are doing everything that they can be doing for the organization (Czarnecki 1998). Customer focused quality requires that a company is constantly developing their practices and products/services in order to meet the customers' expectations.

According to Czarnecki (1998), benchmarking as a tool creates value by focusing the organization on key performance gaps, bringing in ideas from other organizations, identifying opportunities, establishing new standards of performance and making better decisions based on a wider knowledge. In addition, benchmarking for better practices enables the organization to sell ideas that may not otherwise be approved by political actors. Generally it is used in the beginning stages in the improvement of specific operations or in the finding of new solutions to experienced problems. Tuominen (1993) states that, for a benchmarking to be successful, it should comprise the following elements:

- the management's steering towards important development areas
- the personnel's thorough adaptation of the benchmarking idea and involvement in the benchmarking processes

There are, however, some concerns and misconceptions regarding benchmarking as a research method. According to Tuominen (1993), the greatest fear associated with benchmarking is to be marked and known as a copycat who "steals" ideas from other companies. However, benchmarking is far from replication and copying. It requires deep knowledge of processes and ability to understand, modify and adapt methods and practices that might work perfectly in other circumstances but not necessarily as such in your organization, Tuominen (1993) argues. In other words, benchmarking requires and enables creativity and innovation. Other objects of doubtfulness concerning benchmarking as a process are for example the assumption that it is hard to get inside another company and acquire significant knowledge and the concern that important information will transfer from your own company. Furthermore, Tuominen (1993) states that too much self-confidence can

result in indifference and that a company might not be interested in development or improvement work or programs.

There are several different types of benchmarking with international benchmarking being one of them. International benchmarking is used for identifying best practices and practitioners around the world. The more extensive observation area is particularly useful if there are too few benchmarking partners within the same country, which is the case for example with road administrations. However, international benchmarking as a research method might be more costly and time consuming. Moreover, the results need to be analyzed cautiously due to possible national differences. Within the road sector, the differences can appear in for example the road classifications and standards, road lengths, etc. Other types of benchmarking are for example strategic benchmarking, performance benchmarking and process benchmarking. (Tuominen 1993.)

According to Watson (1993), a benchmarking process can be divided into four different steps. These steps are presented in Figure 11. The first step is to plan the benchmarking study, i.e. to define the process that is to be studied and to evaluate one's own capability at the chosen process or processes. Moreover, it should be determined, which companies or organizations that should be included in the study. The second step is to conduct research related to the benchmarking in form of for example questionnaires, face-to-face interviews or telephone surveys. The third step of the process is to analyze the gathered data, to identify the key findings and to understand what the findings mean in relation to the research objectives. The fourth, and final, step in the benchmarking process is to improve the existing processes by adapting and implementing the findings. (Watson 1993, Adams et al. 2006.)

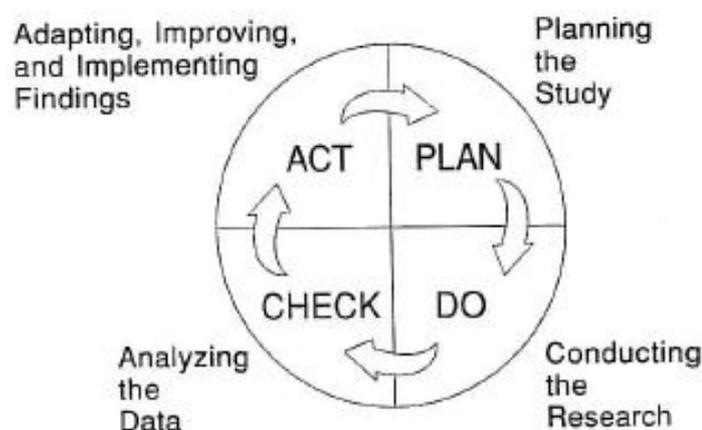


Figure 11. The Benchmarking Process (Watson 1993.)

4.2 Objectives of the benchmarking

Bergman et al. (1994) state, that benchmarking is a way of finding opportunities for process improvements. One aim of the thesis was to benchmark and compare various international customer service practices used by different road authorities. Efficient knowledge sharing and learning from one another is of great value and allows the determination of better practices. This can be accomplished via benchmarking and allowing contributions from other countries and finding newer or different ways in executing for example customer satisfaction measurement. Hence the international benchmarking approach was chosen as a research method for this particular study.

4.3 Methodology

The research was undertaken as a qualitative study including both literature review and empirical research. The empirical research was based on an international benchmarking and case study approach where strategies and practices used by eight road authorities in different countries were analyzed and compared.

The road administrations included in the study were selected by the teams from the Swedish Road Administration and Aalto University. Each of the participating road administration appointed a contact person for their organization and these are presented in Annex 1. Furthermore, most of the organizations included other persons and experts as well in the answering of the questionnaires and interviews. The eight road administrations included in the study are:

- Alberta Transportation, Canada
- Danish Road Directorate, Denmark
- Finnish Transport Agency (former Finnish Road Administration), Finland
- MnDOT (Minnesota Department of Transportation), USA
- Norwegian Public Roads Administration, Norway
- Transport Scotland, Scotland
- Slovene Roads Agency, Slovenia
- Swedish Transport Administration (former Swedish Road Administration), Sweden

The steps of the project “*The Road to Excellence*” and how it concluded with this Master’s thesis are presented in Figure 12.

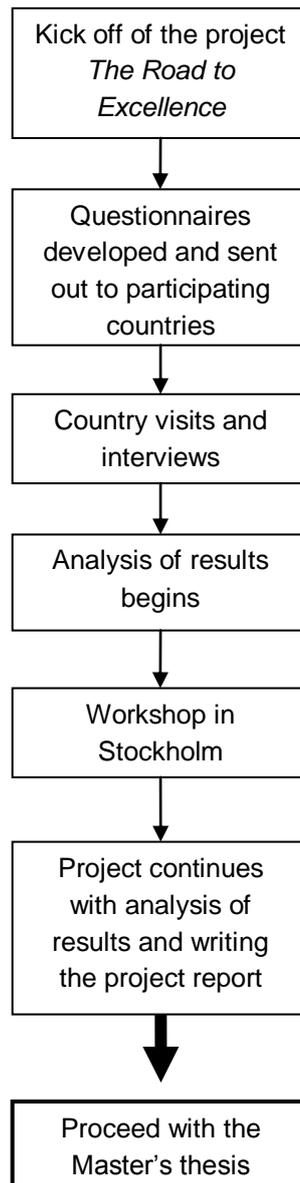


Figure 12. An overview of the project “The Road to Excellence” and the steps before proceeding with the Master’s thesis

The empirical research of the thesis is based on an international benchmarking process and consists of a *survey*, *interviews* and a *workshop*. The research was a part of the project “The Road to Excellence” and the data collected in that project is further on used for the thesis.

For the *survey*, a questionnaire was jointly developed by a team from the Swedish Transport Administration and the research team from Aalto University. A pre-research interview was undertaken in order to pre-test and improve the questionnaire. The structure of the questions was slightly changed and modified based on the findings from the pre-test. The questionnaire was sent to the participating road administrations via e-mail. The questionnaire included both

closed-ended and open-ended questions and it was designed to address the following topics and areas:

- customer satisfaction measurement strategies, practices and methods
- data collection methodology and structure of survey
- results from surveys and how the results are utilized
- how the results are used in decision-making processes
- how differences in satisfaction levels between e.g. regions and customer segments are identified
- challenges related to conducted customer satisfaction measurement

Open-ended questions were mostly used in the questionnaire, as the prime objective was to acquire qualitative information. Closed-ended questions were mainly used only to gather statistical information concerning for example the size of the participating road authorities or the results from undertaken customer satisfaction measurements. The final questionnaire, as it was sent out to the participating road administrations, is included as an attachment at the end of the thesis in Annex 3. The questionnaire cover letter is included in Annex 2.

Due to the detailed and comprehensive questionnaire, it was necessary to *interview* and follow-up with each participating country's assigned delegate and visit the countries for further clarification and final additions. All of the participating countries were visited and interviewed face-to-face by the team from Aalto University.

A *workshop* was arranged as a part of the project "*The Road to Excellence*" and was managed by the Swedish Transportation Administration in Stockholm, Sweden. Aalto University's team also supported the Swedish Transportation Administration's development and efforts with the workshop. The innovative idea of the workshop was to gather participants and experts to present their results and highlights. The second day of the workshop concentrated on a brainstorming exercise to create discussion based on the challenges or concerns that the road authorities are experiencing. During the workshop current practices, ideas and challenges were discussed.

After all the material from the literature review and the data from the empirical research were gathered, analysis was performed. The interviews were all recorded and notes were taken. The data was coded and analyzed using the method of thematic analysis. The relevant themes were identified from the texts and these themes were then categorized for a closer and more detailed exploration. Background reading also formed a part of the analysis process to help to explain a new emerging theme.

5 CURRENT CUSTOMER SERVICE PRACTICES WITHIN THE ROAD SECTOR

This chapter covers and describes current customer satisfaction measurement practices in use by the eight participating road administrations. The aim of the chapter is to provide an overview of different international practices that are used today in order to benchmark effective and innovative methods and strategies. Furthermore, the goal is to present how results and data from customer satisfaction measurements are utilized by road authorities in different countries. The data for this chapter was gathered through the international benchmarking process. Chapter 5.9 discusses the findings from chapters 5.1 - 5.8 and compares the various methodologies and practices in use.

5.1 Alberta, Canada

General information

Alberta is one of the 10 provinces in Canada and has a population of around 3.5 million people. The majority of the population is concentrated in two larger cities, Edmonton and Calgary. Much of the rest of the land area in Alberta is sparsely populated and undeveloped. The continental climate is dry and cold and the average annual precipitation is 30 cm. In Alberta there are normally winter weather conditions for 6 months. The normal winter period is from early October to late April. (Otto 2010.)

Prior to the year 2001, the provincial government was responsible mainly for Primary Highway Network, which was about 18 000 km. This network included higher class roads, freeways, expressways and major two-lane highways. The Secondary Highway Network was the responsibility of municipal governments, which include mainly minor two-lane highways. In the year 2001, the provincial government took back the administration of the Secondary Highway Network. Thus the size of the road network that Alberta Transportation manages nearly doubled. Today the public road length is approx. 31 300 km. (Otto 2010.)

Customer service

Alberta Transportation does not have a formal customer satisfaction feedback system. Regular public surveys are done by provincial government, but these surveys are not specific to the road sector. Nonetheless a limited number of general questions regarding highways are included in the surveys. Over the past four years, seven regular customer satisfaction surveys have been conducted. These surveys have included questions regarding winter highway maintenance in Alberta. Questions regarding pavements or rest areas were not included. The surveys were initiated as part of the Departments' Safer Winter Highways Campaign and they were generally conducted during winter months (November – March).

All of the surveys were conducted as telephone interviews and each had a sample size of 800 Albertans living throughout the province and results are displayed in Table 5. No special target groups were set, but the sample may have included some commercial drivers. The scaling factor levels used are: agree - neutral – disagree and true – neutral – false.

Table 5. Overall satisfaction levels in winter services in years 2005-2008

CUSTOMER SATISFACTION	2005	2006	2007	2008
winter period	54%	53%	57%	64%
summer period	-	-	-	-

Another method to determine road user satisfaction is public complaints. These are mostly only tracked and not further used as information to develop practices or strategies.

Utilization of results from survey

The results from the customer satisfaction surveys are mostly used for internal review and to confirm that current standards still hold. They are not directly linked to the department's business plan or to the setting of service levels. The results do not affect the budgets directly, but the Minister is briefed on the outcome from the surveys.

Differences in the satisfaction levels between for example different regions are not identified. By using the same questions in the surveys, trends in satisfaction can be monitored. If shifts in the satisfaction levels would be noticed, an internal review concerning identifying the likely causes to the shift would be done.

5.2 Denmark

General information

Denmark is the southernmost of the Nordic countries and has a population of about 5.5 million people. The winter period is defined for the time period of October 1 to April 30. The average temperature for winters is usually 1.5 – 2.5°C. As the temperatures tend to circle around 0°C, Denmark often have problems with slippery roads and the use of studded tires is permitted during winter period.

The state road network has a length of 3 790 km, which is around 5% of the entire road network in Denmark (73 331 km). The state roads are divided into motorways (1120 km), expressways (319 km) and other trunk roads (2391 km). Although the length of roads managed by the road authorities is quite small, the traffic volumes on these roads are

substantial with 45% of the entire road traffic in Denmark running on the state roads. (Danish Road Directorate 2009.)

In year 2006 the structure of the counties was dissolved and the Road Directorate took over approximately 2000 km of former county roads, that lead to an increased network to be managed by the road authority and increased responsibility. Thus different road and traffic related data has to be carefully examined when comparing data from before and after year 2006. (Danish Road Directorate 2009.)

Customer service

The first road user satisfaction survey was completed in year 1992 and since year 2000 the standard has been to undertake two surveys, winter and summer satisfaction surveys, per year. By conducting satisfaction surveys the road directorate optimizes the satisfaction among customers within the given budget. Furthermore results from road user satisfaction surveys are set as a requirement in yearly performance contracts to the Ministry of Transport. In addition to national satisfaction surveys, the road directorate also takes part in and performs EU-surveys (CEDR/ERUS). Other surveys that are conducted are Exit Poll Survey (concerning service areas), specific surveys concerning construction of new roads and surveys performed by TIC (the traffic information center). (Thorsgaard 2010.)

The surveys are conducted by consultants and performed by telephone interviews, where the respondents are interviewed for 20 minutes each. The Road Directorate has almost exclusively used telephone interviews as these have been found very effective. The effectiveness and functionality of telephone surveys have been studied and in year 2008 telephone interviews were compared with exit polls by performing both of these survey methods at the same time. Figure 13 indicates that no significant differences between the satisfaction levels measured by the two methods could be seen.

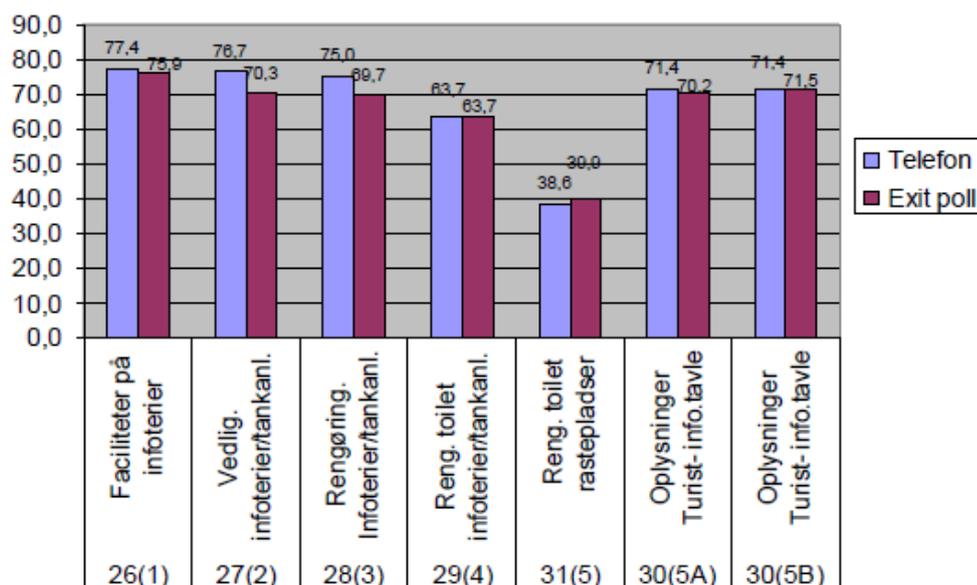


Figure 13. Telephone interviews vs. exit polls (Thorgaard 2010)

The road user groups included in the survey are car drivers, cyclists/pedestrians and neighbors (i.e. people who live next to a road). 1500 (900 before year 2009) drivers, 200 cyclists/pedestrians and 200 neighbors are interviewed. Thus the total sample size for all the user groups from year 2009 is 1900. The respondents for the survey are selected as a random sample from all registered phone numbers in the specific target group. Satisfaction levels for different regions are determined by the numbers of interviews conducted in one area by the six local road centers. The survey material is nevertheless too narrow to make more in-depth analyzing.

The types of questions asked in the surveys are regular questions related to satisfaction, importance, priority and background. In addition, different ad hoc questions can be included. The questions are usually structured as multiple choice and open-ended questions. The scale of the questions is divided in 5 categories for example for different levels of satisfaction.

Table 6 indicates that the results in the customer satisfaction in winter maintenance and maintenance of rest areas from the last few years have been relatively stable. The customers have shown most dissatisfaction in rest areas, especially in the cleanliness toilet facilities in unmanned service areas. Overall the results from customer satisfaction measurement show that drivers prioritize traffic safety, accessibility and service. The road directorate has stated the priority of all of these factors with the addition of protection of investments and assets.

Table 6. Satisfaction levels in selected issues in years 2004-2008

CUSTOMER SATISFACTION	2004	2005	2006	2007	2008
Overall satisfaction	67,0	66,9	66,0	65,4	65,8
winter period	67,1	67,4	66,6	65,6	65,9
summer period	66,9	66,5	65,5	65,1	65,8
Winter services	71,0	70,0	68,7	64,3	71,3
antiskid treatment	70,2	69,9	69,5	65,1	71,1
snow ploughing	71,9	70,0	68,0	63,5	71,6
evenness of the road	54,9	58,0	59,3	55,7	57,4
Rest-areas	56,8	56,4	55,4	54,0	54,1
winter period	56,4	57,5	57,8	55,4	54,3
summer period	57,2	55,3	53,0	52,6	53,8

Utilization of results from survey

The results from customer satisfaction measurement are used for budgeting and prioritizing. In some cases the results can also be used to adjust service levels.

In Denmark the road users have showed dissatisfaction in the cleanliness on unmanned service areas. The road directorate has tried to improve satisfaction levels concerning this issue by campaigning against mess, cleaning frequently, removing smell, recruiting staff and building new facilities. The important issue is to check if these actions actually work by implementing one action at a time and check the effect of this.

5.3 Finland

General information

Finland has a population of 5.3 million people and the total length of the public Finnish state road network is approximately 79 000 kilometers. The road length of the entire country is around 46 7000 km, which includes the length of the private roads (about 350 000 km). The vehicle mileage on highways is 34 billion vehicles kilometers and 44% of this volume occurs during winter time. Traffic volumes have been increasing throughout Finland with the strongest growth on highways, main roads and regional roads. (Finnish Road Administration 2008.)

Winter traffic conditions usually occur for 5–6 months. The actual winter period is defined for the time period of October 1st to April 16. 6000–7000 km highways are mainly kept free of

ice and snow with the help of de-icing material. The other roads can be partly or completely covered with a layer of compacted snow, but the wheel paths are typically cleared with the assistance of studded tires. Winter maintenance traffic policies and standards are based upon the assumption that most cars use studded tires during winter months. (Finnish Road Administration 2008.)

Customer service

Road user satisfaction is a key indicator of the success of the Finnish Transportation Agency. The agency states that their winter maintenance concerns all citizens and all sectors of society and the economy. Thus the basic level of winter maintenance must provide the opportunity for reasonable mobility and transport, without compromising safety and the condition of the environment. (Finnish Road Administration 2006b.)

The former Finnra has performed annual customer satisfaction measurements for over ten years. The customer satisfaction survey measures the level of satisfaction on the maintenance on both main roads and other roads. The level of satisfaction is also measured for other factors like for example the removal of snow, the prevention of slipperiness, the evenness of the road surface and traffic safety. (Finnish Road Administration 2006c.)

Customer satisfaction measurement is accomplished through road user satisfaction surveys. Surveys are conducted every winter and every other summer. The sample size for the winter survey is 24 600 (300 individuals for each contract area) and for the summer survey 15 000. 3300 professional drivers are included both in winter and summer surveys. Compared to other European countries, the Finnish road user satisfaction surveys have sample sizes and results defined by contract area. Thus the national sample size is quite large. This method has been used since 2005.

The surveys are conducted by mail/postal with a four-page long questionnaire. The Finnish Transportation Agency has chosen this method as they have the opportunity to send a map of the contract area as an attachment with the questionnaire. This is because they think it is important that the respondent focuses on the right area and the results of the winter satisfaction levels are used as basis for the bonuses they pay to contractors.

The questions in the questionnaire are mostly structured as multiple choice or open-ended (written response). The scale in satisfaction questions varies between 5 (very satisfied) to 1 (very unsatisfied). In "how often type questions", the scale varies between "daily or almost daily" to "never or hardly never". The response rates usually vary between 30% and 40% and a declining trend has been noticed. Figure 14 shows the results of the most recent surveys.

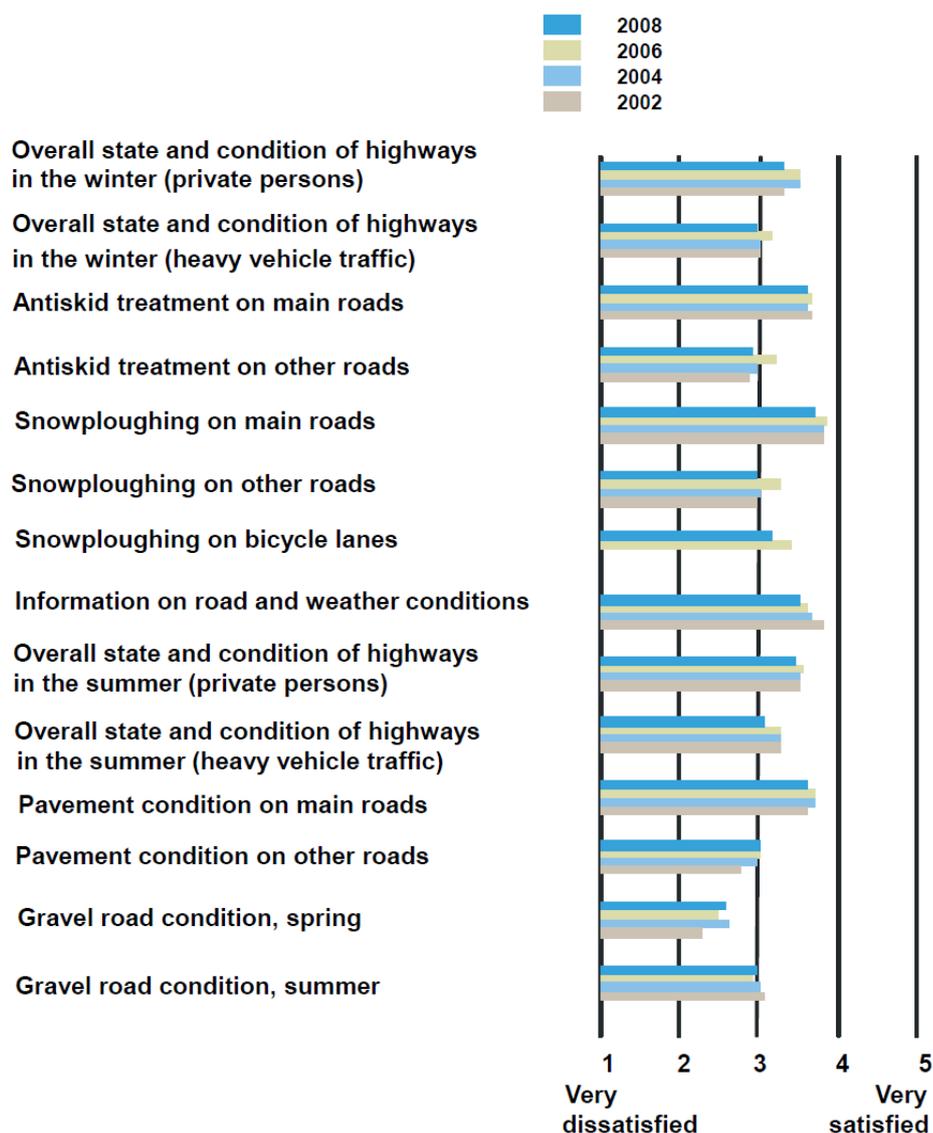


Figure 14. The results from the customer satisfaction measurement 2002-2008 (The Finnish Road Administration 2008)

The respondents to the winter survey are chosen as a random sample of the whole population (15-74 years old) by contract area. For the summer survey the respondents are not chosen by contract area, but by county. As there are only 19 counties in Finland, the sample size is smaller than the one in the winter survey. The professional drivers are chosen randomly from the members of Finnish Transport and Logistics (SKAL), Finnish Bus and Coach Association and Transport Workers' Union.

Other methods, especially qualitative methods, for measuring the satisfaction level and the expectations of the road users are for a customer feedback system, a feedback telephone, group discussions and cooperation groups with drivers of heavy goods transport.

Focus groups are used when preparing the maintenance area contract. The importance lies in discussing the area maintenance and what the biggest problems related to this area. Possible participants of such a meeting are the road authority, local residents, taxi drivers, local entrepreneurs, senior residents, school teachers and kids.

Regional forums are a method used during the area maintenance contract. These discussions are based on the results from the customer satisfaction measurement, the quality of the maintenance, and possible local problems. The participants are usually representatives from the road authority, the area maintenance contractor, professional drivers, entrepreneurs and other stakeholders.

The latest developed method for qualitative measuring of customer satisfaction is a driving panel for qualitative reporting. The method is still at a pilot stage but has showed promising results. A group of frequent drivers in a certain region are given GPS-devices, which has six different “feedback-buttons”. These buttons give feedback on slipperiness, unevenness, snow, damage in pavement, damage in gravel road and other issues. The study participators are chosen from drivers for taxis, milk lorries, municipal home care, postmen, delivery cars, timber trucks and library buses. The idea of the system is to get direct feedback on the quality of maintenance at the actual locations. The feedback also directs the focus and location of spot checks that should be done by own personnel and consultants. Thus the quality control for the maintenance contractors is more effective. In addition, the contractors have the possibility to see and utilize the feedback directly. (Viinikainen et al. 2010.)

In the future there might be a need to undertake bigger changes to the customer satisfaction survey due to the new organization structure. There might be a need of a new kind of questionnaire concerning the customers’ needs and expectations of the whole transportation system and mobility in general, not only limited to the road sector. However, even if this kind of questionnaire would be developed, the measurement of satisfaction on roads would still continue. These are only possible developments and no actual decisions regarding this issue have been made yet.

Utilization of results from survey

The results of the customer satisfaction measurement have several purposes. The trends of the satisfaction levels are monitored throughout the years in order to improve and develop the understanding of needs and expectations of the customers. In general one could say that the results give a good overview on the customers’ opinions on services provided by the agency. Furthermore the opinions can also be collected for more specific *ad hoc*-questions.

The results of the customer satisfaction measurement together with other customer feedback steer the work of the Finnish Transport Agency in following ways:

- customer satisfaction performance goals are set yearly at a national level by the Ministry of Transport and Communication

- the agency sets annual goals for the road regions. The regions choose six issues that they want to focus on and improve. These items are then monitored
- the satisfaction levels are used as factors in the customer satisfaction bonus system for the area maintenance contractors
- the results are used to develop the winter maintenance policy and to revise the level of the quality requirements
- the level of customer satisfaction, especially for winter services, is presented and discussed together with the area maintenance contractors. Specific feedback is also used in the planning of the local maintenance and requirements
- the results are compared to the quality control measurements and with road condition data
- the results are discussed with the main customer groups
- the results are presented and published to the public every year through different information channels as for example press releases, information letter or at the webpage of the agency

To influence the political actors the Finnish Transport Agency arrange presentations for and send out newsletters to their different stakeholders, which includes politicians. The goal is to use the results for budgetary purposes by these means.

Identifying differences in satisfaction levels

When conducting customer satisfaction measurement the results are differentiated between regions (summer survey) or even by contract area (winter survey). The results are also differentiated between customer groups. Statistical differences are usually calculated for these. The road agency has tried to identify what causes the satisfaction levels to increase/decrease by for example comparing the results from the survey with road condition data and quality control measurements. If these correlate, the reasons behind satisfaction/dissatisfaction can be determined quite easily. Other possible factors that can cause dissatisfaction are severe winter weather, serious accidents that get broad media coverage or other negative media publicity.

Correlation studies concerning the satisfaction level and road condition data have been conducted. One study focused on the experienced level of service of day-to-day traffic where the objective was to clarify how road users experience the available service level and the relation between service level and the technical instruments used in road maintenance. One of the outcomes for winter maintenance was that the slipperiness of the road surface correlated best with the service level experienced by the road user. In the conclusion of the study it is stated that a road user satisfaction survey and technical road maintenance instruments measure quality partially from a different point of view – both from a subjective and from an objective one. Thus it is more or less impossible to combine these without losing valuable information for directing and developing road maintenance. This would mean that in

future measuring and road maintenance follow-up, both points of view on quality should be maintained. (Forsblom et al. 2006.)

Customer satisfaction bonus system

In 2004 the Finnish Road Administration developed a bonus model in order to encourage the maintenance contractors to a better customer orientation. The customer satisfaction bonus system is included in all new contracts and it is paid annually. Figure 15 shows the customer bonus criteria. The evaluation is based on 6 different criterions: (Finnish Road Administration 2006a.)

- 4 factors based on customer satisfaction measurements
- 2 factors based on evaluations carried out by a group of experts

Main roads compared to the previous year (survey result: customer satisfaction for the winter maintenance)	+ / neutral
Other roads compared to the previous year (survey result: customer satisfaction for the winter maintenance)	+ / neutral
Main roads compared to the average of the Road Region (survey result: customer satisfaction for the winter maintenance)	+ / neutral
Other roads compared to the average of the Road Region (survey result: customer satisfaction for the winter maintenance)	+ / neutral
Timing of the winter maintenance works (estimation of the evaluation group)	+ / neutral
Summer maintenance works (estimation of the evaluation group)	+ / neutral

Figure 15. The bonus criterions (The Finnish Transport Agency 2010)

In order to receive a bonus, the contractor needs to have at least three positive factors of which at least two have to be based on the customer satisfaction level. The actual size of the bonus is maximum of 2.0% of the annual contract. The bonus system is not used as a basis to penalize for lower customer satisfaction. (Finnish Road Administration 2006a.)

5.4 Minnesota, USA

General information

Minnesota is situated in the northern portion of the Midwestern United States and has a population of around 5.2 million people. More than half of the population lives in the Minneapolis-Saint Paul metropolitan area. The state has a continental climate with cold winters and warm/hot summers and the average temperature in January is about -11°C and in July it is about 23°C. The winter period is defined for the time period from November 1 to March 31.

The state road network has a length of 19 126 km, which is around 8.5% of the entire road network in Minnesota (227 304 km). The state roads are divided into Super Commuters (AADT over 30 000), Urban Commuters (AADT 10 000 - 30 000), Rural Commuters (AADT 2000 – 10 000), Primary Collectors (AADT 800 - 2000) and Secondary Collectors (AADT under 800).

Customer service

MnDOT tries to involve and engage the public in order to improve their services and practices. The MnDOT Market Research office conducts several various studies among its customers on different topics. There are overall three distinct areas of market and customer focused research: (Lund 2010.)

- Business planning (products and services): '94 to '05
- Omnibus (customer tracking): '86 to '09
- Bare lane (snow and ice focus): '99 and '07

Maintenance performance satisfaction measures and other transportation topics are in general tracked with the annual Omnibus Study. This survey is conducted once a year since year 2000 (except 2007) in late fall/early winter, usually in November/December. The time has been chosen carefully in order to get both summer and winter related issues included. The study is undertaken as a telephone survey with the average interview length of around 20 minutes and the average sample size is 800. Respondents are screened to be 18 years of age or older and not work in a profession where knowledge of the research process or topic may present biased responses. The response rate typically varies between 40 - 60% and both private drivers and the trucking industry is included. The questions in the survey are usually a combination of multiple-choice and open-ended questions, for example open-ended questions that immediately follows with a scaled question to help create understanding for the reasons behind given scores. The scale used is 1 – 10, with 10 being the highest rating.

Figure 16 presents the results from the Omnibus survey on selected issues as for example snow and ice removal, smooth surface, striping and litter. The annual levels of satisfaction indicate a correlation between the overall satisfaction level and the factor “smooth surface”.

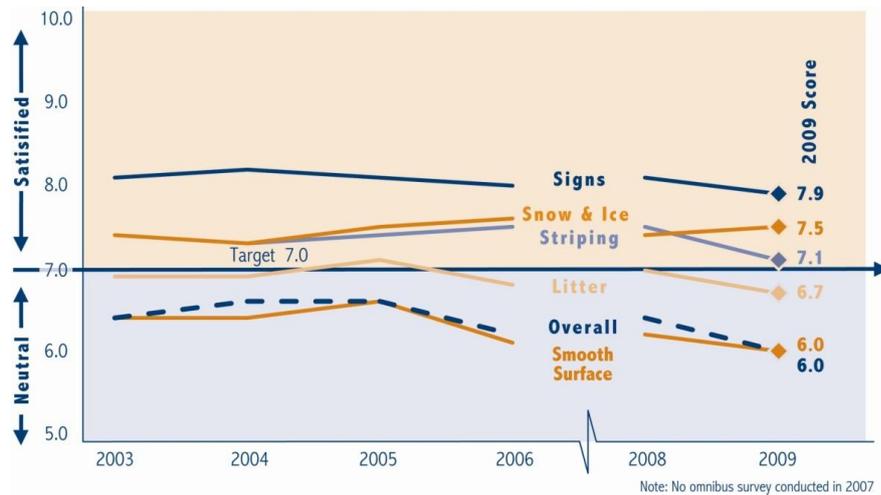


Figure 16. The results for selected issues from the Omnibus study 2003-2009 (MnDOT 2010)

The bare lane customer survey is focused on snow and ice removal and is used for developing winter maintenance performance satisfaction measures and targets. The study is a separate study from the Omnibus Study and has been undertaken year 1999 and 2007. This type of survey is an example of a drill down effort to incorporate data from customer surveys into decisions. The objective is to capture the expected level of service by type of road and time of day. The study is conducted by showing authentic conditions in form of videos or pictures to the participants of the study. Examples of videos/pictures used are shown in Figure 17.

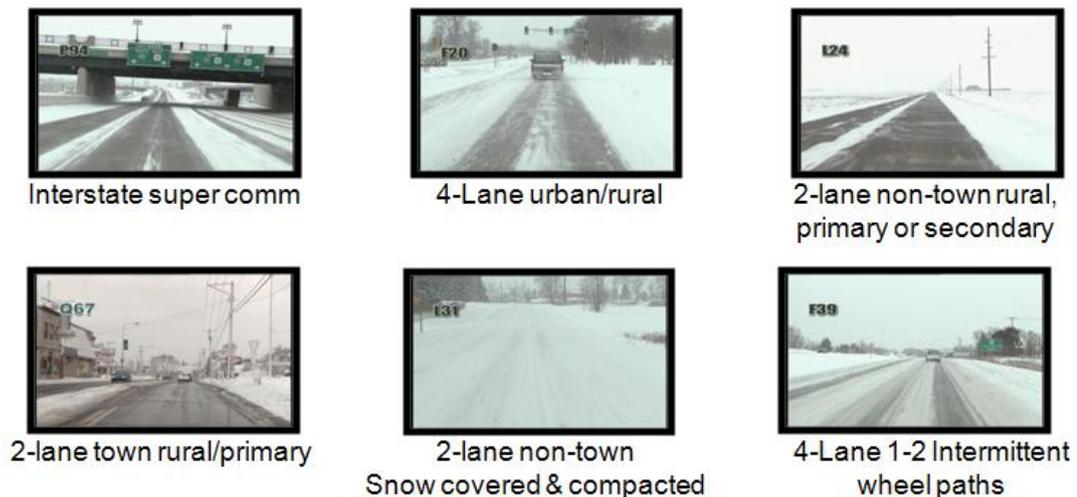


Figure 17. Examples of authentic views used in Bare Lane Customer Survey (MnDOT 2010)

The Bare Pavement Market Research conducted in 1999 resulted in the establishment of the current snow and ice regain time target levels used by MnDOT. In the study undertaken in 2007, road users were brought together into central locations around the state in 12 different cities to view varying levels of winter road conditions via video. The sample size was 780 and there were all in all five different tested levels of service that ranged from conditions of snow covered and compacted to fully bare pavement. The 2007 study also confirmed the results from the study undertaken in 1999 and thus target regain times were not changed.

Numerous other research studies are conducted on selected topics that help to drive planning and resource decisions. MnDOT has undertaken a variety of special research studies related to rest areas, for example concerning rest area amenities. Between 1969 and 2001, MnDOT conducted customer intercept surveys at rest areas throughout the state. This data was used as a basis for determining the size of buildings and parking lots. In addition the research has validated and identified services at safety rest areas that the public users' wish and desire. Furthermore, a State-wide Rest Area Telephone Survey was conducted 1998 to identify the proportion of Minnesota citizens who use rest areas and to identify reasons why some do not. The sample size of this survey was 503.

In 2009 a study was conducted with the primary objective to better understand what customers want and to determine the expectations related to the amenities, products and services at rest areas. The survey was undertaken as a telephone interview. Figure 18 shows the features that are most likely to encourage a driver to stop at a rest are. This example concerns the average scores for the general public divided by visitor frequency subgroups. The top features are for example direct access from highway, adequate parking, flush toilets and signs on highways listing amenities and services. Features that were rated lower were for example travel brochures, maps and 24-hour onsite staff presence. (MnDOT 2009.)

Q1. Rate the following features on a 1-10 scale, with '10' being the mostly likely to encourage you to stop at a rest area with that feature, and a '1' being least likely to encourage you to stop.

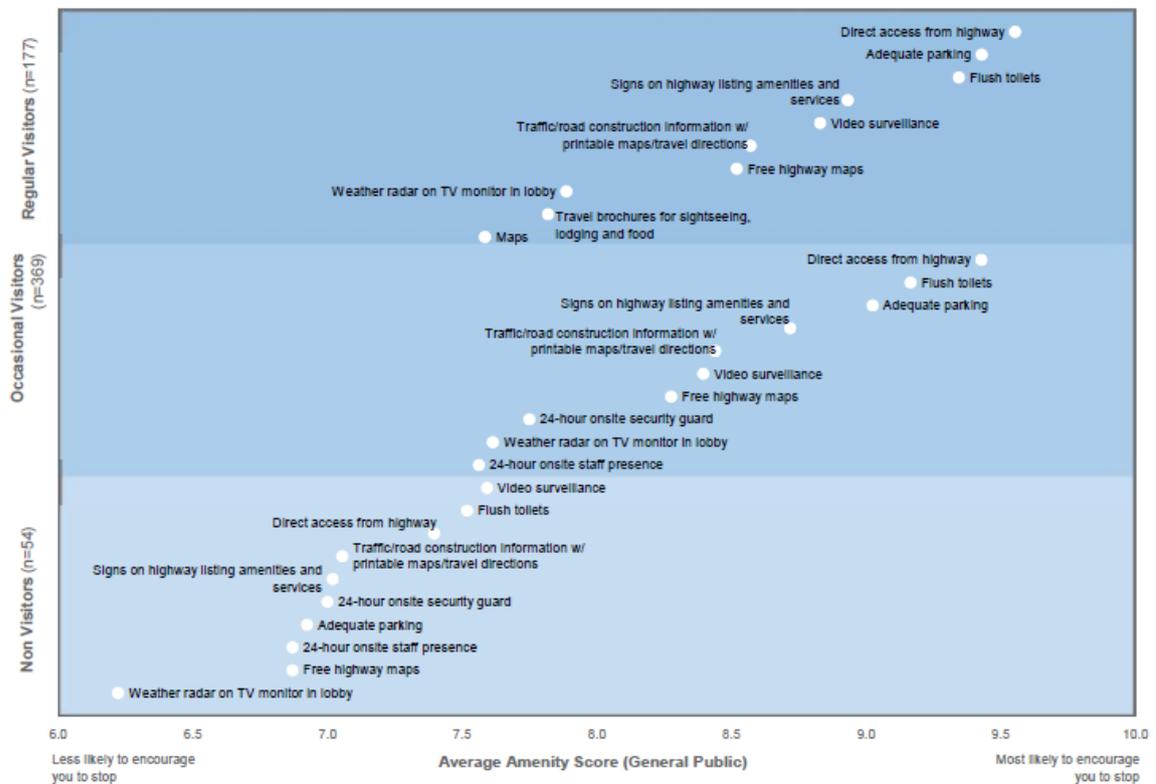


Figure 18. Average scores for the General Public's responses concerning Rest Area Amenities (MnDOT 2009.)

MnDOT is currently developing a new strategy for customer input in form of an online community. This new system would include 600 randomly recruited people who would communicate with each other while the transport department could “listen in”. In addition, MnDOT would have the opportunity to conduct short and frequent surveys among the online community members. (Lund 2010.)

One of MnDOT's biggest challenges concerning customer satisfaction measurement today is the increasing reduction in telephone land lines among U.S. households as telephone interviews are the basis for most of the department's surveys. Therefore, MnDOT is beginning to test new and corrective sampling strategies. In some studies MnDOT have tried seeding cell samples into the call lists.

Utilization of results from survey

The results from the Omnibus study are used as a barometer to track yearly variations in the level of satisfaction among the road users and performance over time. If something is significantly down, more research effort will be put into understanding what the public is reacting to. In addition, the Omnibus is used for tracking if changes in service levels affecting

customer ratings and to explore where the public would allocate the services or where additional investments should be spent.

MnDOT has included a new question concerning mowing into the latest Omnibus. This was done because the results from the Maintenance Business Planning study showed that mowing and eliminating of roadside weeds were perceived to be significantly less valued/less important than all other services. Most recently community members have been wondering why the department is mowing less compared to before, and therefore MnDOT decided to include a mowing measure in the annual Omnibus study to get a statewide measure on the mowing performance. This measure will be tracked overtime and help MnDOT to set the proper level of service.

Customer satisfaction surveys related to rest areas are mostly used as indicators of changes in usage patterns over time and as a relative measure of the value of existing rest area products, services and amenities.

Identifying differences in satisfaction levels

When conducting quantitative surveys, MnDOT ensures the collection of geographically balanced and representative samples in order to have the opportunity to statistically compare the eight counties of Minnesota Metropolitan Area to the rest of the state (Greater MN). Each major question in the survey is reported with statewide totals and by major geographic areas. The data is also analyzed by key demographic variables, for example age and gender, and significant differences are reported. For example, clearly visible road stripes and marking have been viewed differently by the aging population and as more important in the greater Minnesota area.

Focus groups among road users are also used to some extent to help the department to understand issues in greater depth.

5.5 Norway

General information

Norway is situated in Northern Europe and has a population of 4.8 million people. *Statens Vegvesen* (The Norwegian Public Roads Administration - NPRA) manages the planning, construction and operation of the national road network. In addition the administration is responsible for vehicle inspection, driver training and licensing. Previously the NPRA was responsible for the road network of approximately 27 000 km. From January 1st 2010 the length of state roads decreased to 10 500 km. The total road length for the entire country is around 93 000 km. The winter period is defined for the time period of December 1 to

February 28. Some state roads are closed during winter, but these are usually situated in mountainous areas.

Customer service

NPRA strives to set key objectives and priorities for different focus areas. This is done by surveys and studies. Customer satisfaction measurement is conducted two times a year, one in winter time and one in the summer. From 2010 forward, customer satisfaction surveys are undertaken only every 4th year.

The road user satisfaction surveys are performed as telephone interviews with a total sample size of 8000 people and a response rate of 100%. The total sample is divided between 30 districts with 270 respondents in each district. The respondents are chosen randomly from all Norwegian residents over 18 years old. The questions in the surveys are structured as multiple choice questions with a scale of 1 to 6 (with 6 being the best). Questions concerning winter services and the condition of pavements are included in the questionnaires, while no questions relating to rest areas are asked. The surveys are generally conducted in January–March. The results from the surveys are shown in Table 7.

Table 7. Results from customer satisfaction surveys conducted 2004-2008

		2004	2005	2006	2007	2008
Overall satisfaction	winter period	-	3,6	3,4	3,8	3,6
	summer period	3,8	3,7	3,4	3,7	3,6
Winter services	antiskid treatment	-	3,9	3,7	3,6	3,6
	snow ploughing	-	4,2	3,9	3,7	3,6
Condition of pavements main roads	(summer period)	3,0	3,0	2,4	2,7	2,7

Utilization of results from survey

The results from the customer satisfaction measurements have been used to set the key focus objects, for example on the need of improving the quality of winter operations. The results are also presented in yearly budget discussions and used on a regional level to develop the operations in the districts.

Identifying differences in the satisfaction levels is done on a regional level. The road user satisfaction surveys measures satisfaction levels for each of the 5 regions and more specifically for the 30 districts. Identifying differences between different stakeholders and client groups are not differentiated in the actual survey.

5.6 Scotland

General information

Scotland is part of the United Kingdom and it has a population of about 5 million people. It is surrounded by the North Sea in the east and to the Atlantic Ocean in the north and west. The climate tends to be very changeable. The average temperature for winters varies usually between -2 and 10°C. The winter period is defined for the time period of October 1 to May 15.

Transport Scotland is responsible for managing the trunk road network, which has a length of 3432 km. The trunk road network make up to around 6% of the total road network. The network is divided into motorways (AADT generally > 25 000), dual carriageways (AADT generally > 10 000) and single carriageways (AADT generally < 10 000).

Customer service

The objective of customer satisfaction measurement in Scotland is to explore and compile views about the trunk road network. More specifically the survey tries to investigate road users' perception of specific aspects of the trunk road network such as physical condition of road surface and services provided on the network. Furthermore, it is important to establish the level of service expected from the trunk road network and to identify the priority areas for improvement on the trunk road network. (Ipsos MORI 2009.)

To date, two surveys have been undertaken. The first customer satisfaction survey was conducted in year 2007. Prior to this survey Transport Scotland organized in-depth interviews and a series of focus group discussions, where different stakeholder groups were represented. Based upon these discussions a set of core questions and key focus areas for the survey was developed. Both the questions and results from the survey performed in 2007 were used for the developing of the next customer satisfaction survey, which was undertaken in 2009. The future surveys will be conducted annually or biennially using the 2009 survey format. Thus trending and comparison between surveys can be made.

The surveys consist of face-to-face interviews in respondents' homes. Each survey is conducted in two waves to reduce the potential impact of seasonal effects as seasonality may be reflected in responses. The first wave has been undertaken in February/March and the second wave in June/July. The results from these two waves are combined and there is no split between winter and summer periods. The surveys have been outsourced to a contracted consultant.

The total sample size for the survey has been approximately 2000 road users. In the survey conducted in 2009 the sample was 1861 adults with a response rate of 100%. The respondents are randomly selected from the four different Scottish Areas, which are the same as the Operating Company Areas. The questions in the survey are structured as

multiple choice questions where the responses are categorized as: Very Satisfied, Fairly Satisfied, Neither Satisfied Nor Dissatisfied, Fairly Dissatisfied, Very Dissatisfied, Don't Know. Table 8 shows the results of the two surveys conducted.

Table 8. The results for selected issues from customer satisfaction measurements in 2007 and 2009

	2007	2009
Overall satisfaction	52%	46%
Winter services		
antiskid treatment	55%	57%
snow ploughing	51%	56%
Condition of pavements	52%	46%

Another method used for customer feedback is for example additional surveys after special events. Phone polls and surveys have been conducted after a major accident. With these polls, Transport Scotland tries to determine the public's perception and how they think the accident was managed. People's perception of the agency shows that they care and are involved in managing the network.

Utilization of results from survey

As only two customer satisfaction surveys have been undertaken, Transport Scotland has yet to fully develop how the results will and should be utilized. It is planned that the results from the customer satisfaction measurements will be part of a Performance Management Framework, which is currently being developed. An example of how the Performance Management Framework could look like is presented in Figure 19. The results are not currently used for political or budgetary purposes.

AM Objective	Backward Analysis		Forward Targets			
	2007/08	Current 2008/09	2009/10	2010/11	2011/12	2012/13
Safety	Fair (2.4)	Good (2.6)	Good (2.7)	Good (2.8)	Good (2.9)	Good (3.0)
	IMPROVING					
Condition	Good (2.9)	Good (2.9)	Good (3.2)	Good (3.4)	Excellent (3.6)	Excellent (3.7)
	STABLE					
Etc.	Good (2.5)	Fair (2.3)	Fair (2.4)	Good (2.5)	Good (2.6)	Good (2.7)
	DECLINING					

Figure 19. An example of the Performance Management Framework with the possible measures, current and future targets (Transport Scotland 2009)

Identifying differences in satisfaction levels

The trunk road network is split into four different regions and a representative sample of road users are interviewed from each area. Thus regional differences can be identified, compared and analyzed. As other key statistics of respondents are reported, for example gender, age, type of user, frequency of usage, working status and social class, further in-depth analyses in identifying differences in satisfaction levels could be made. Transport Scotland is nevertheless now concentrating on identifying regional differences.

Transport Scotland has specifically developed a number of questions concerning road surface condition in which the customer satisfaction survey is linked to road user satisfaction levels with technical engineering measures. Figure 20 indicates that correlation between technical road condition data and satisfaction levels, but these results should still be treated with cautious as only two customer satisfaction surveys have yet been undertaken. Transport Scotland will continue to follow if trends concerning this issue can be seen in coming surveys as well.

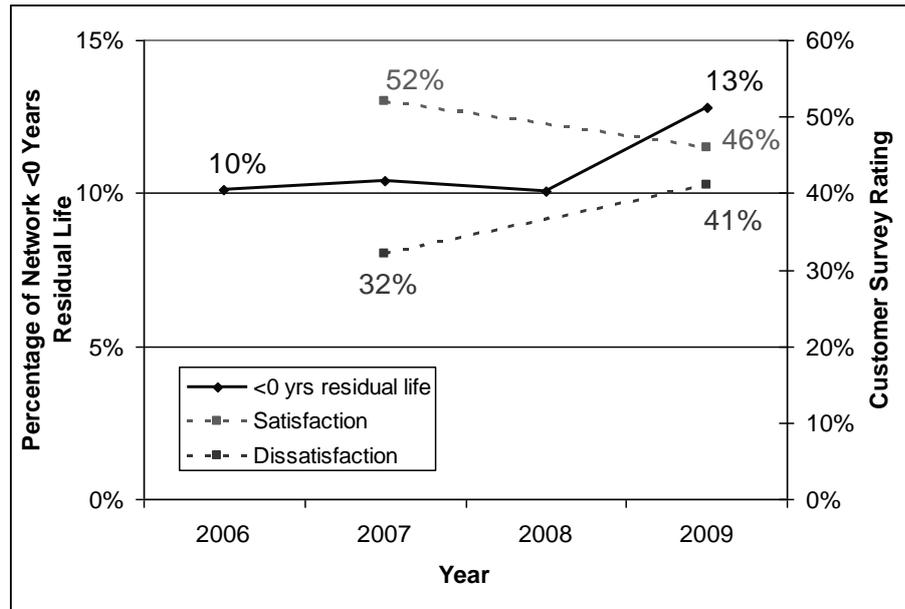


Figure 20. Customer satisfaction rating and condition of trunk road network (Transport Scotland 2009)

5.7 Slovenia

General information

Slovenia is situated in Central Europe near the Mediterranean and has a population of 2.06 million people and consists of diverse climatic regions. The winter period is defined for the time period from November 15 to March 15. The state road network has a length of 5978 km, which is around 15% of the entire road network in Slovenia (38 694 km). The Slovenian road network can be divided into motorways, high-speed roads, two-lane high-speed roads, main roads, regional roads, local roads and public paths. The motorways are managed by the Motorway Company in the Republic of Slovenia (DARS) and the local roads and public paths are managed by municipalities.

Customer service

The Slovenian Roads Agency does not have a formal customer satisfaction feedback system yet, but are planning to undertake annual road user satisfaction surveys in the future if possible. The main reasons for not conducting satisfaction surveys on a regular basis have been the shortage in funding and personnel.

The first more serious customer satisfaction measurement was undertaken in 2006. This survey included questions regarding winter maintenance and condition of pavements. The results of the 2006 survey are presented in Table 9. The measurement was conducted both as an Internet survey and as a direct interview. The target sample size for the internet survey

was 300 and the response rate was around 20%. The sample size for the interview was 50, which makes a total sample size of 109 and a response rate of 30%. In both of the survey methods used, different stakeholders were included like private drivers, pedestrians/bikers and the trucking industry. The question type used was multiple choice questions.

Table 9. Overall satisfaction levels in year 2006

CUSTOMER SATISFACTION	Overall satisfaction		Winter services		Condition of pavements	
	winter period	summer period	antiskid treatment	snow ploughing	winter period	summer period
2006	3	4	3.5	3.5	4	4
scale: 1 – 5 (with 5 being the highest rating)						

Utilization of results from survey

The results from conducted customer satisfaction measurement have been utilized for:

- critical estimation of public opinion about levels of service
- improvement in deployment of information to the road users
- improvement of efficiency of winter maintenance and other services
- assessment of expectations of road user regarding winter maintenance

5.8 Sweden

General information

Sweden is a Nordic country with a population of about 9.3 million people. Temperatures vary greatly from north to south of the country. Usually snowfall occurs between December to March in southern parts of Sweden and between November and April in central Sweden. In some of the northern parts it might even snow from October through May. The actual winter period is defined for the time period November 1st to March 31st.

The total length of the national Swedish road network is approximately 98 400 km. The road length for the entire country is 216 000 km. There are about 41 000 km of municipal streets and other public roads. In addition to the public roads, there are around 76 200 km of private roads and some are publically subsidized and even many more private roads that are not subsidized. These are generally forestry or other industry roads.

Customer service

The Swedish Transport Administration has been using surveys to measure the satisfaction of road users since year 1995. At the national level, two general surveys regarding road user

satisfaction and satisfaction of rest areas are undertaken. Both of these surveys are divided by region and county. One of the surveys (*Trafikantbetyg*) measures satisfaction on maintenance and road conditions, while the other one concentrates on satisfaction with rest areas. Both quantitative and qualitative methods are used in the studies. The actual conducting of the customer satisfaction survey is outsourced on a one-year-contract. The customer satisfaction survey is divided into a summer and a winter questionnaire. These are conducted every other year as there has not seemed to be significant yearly variations between respondents' answers. Satisfaction surveys concerning rest areas are conducted three times a year.

The road user satisfaction surveys are performed by mail and sent out to both private and professional drivers. A map of the road region in question is attached to the survey. The sample size of private drivers included in the survey is generally around 2000 per survey and the response rate is usually about 73%. The number of professional drivers surveyed is approximately 1500 and the response rate is about 77%. The private drivers are chosen as a random selection from the driving license register and the professional drivers from the vehicle registration register.

Satisfaction levels at rest areas are generally measured on the Internet by an online panel, which is recruited from the Swedish national address register. The sample size for these surveys is approximately 6000 respondents with a response rate of 64%. Satisfaction surveys for rest areas have different stakeholders and include private drivers, pedestrians, bicyclists, trucking industry and public transport.

The questions in road user satisfaction surveys are structured as multiple choice questions and the results are usually divided into five different categories, for example very dissatisfied (1), quite dissatisfied (2), neither satisfied nor dissatisfied (3), quite satisfied (4) and very satisfied (5).

In general the professional drivers have been more dissatisfied than private motorists. Usually the results from the overall customer satisfaction levels in the surveys have varied between 50 and 60 percent (out of a maximum of 100) for private drivers and between 35 and 45 percent for professional drivers. The rating scale is the percentage of respondents who answered quite good (4) or very good (5). Another main finding has been that both private and professional drivers are especially dissatisfied with potholes and rutting. The actual results for overall satisfaction in winter and summer time, rest areas and pavement conditions are presented in Tables 10 and 11. As the questionnaires have been changed through the years, direct comparison cannot be made to five years back in time.

Table 10. The results from customer satisfaction measurement of private drivers in year 1999-2009 (The Swedish Road Administration 2009)

Private drivers

Customer satisfaction	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Overall satisfaction	61		55		57		62		54		54
- Summer											
Overall satisfaction		59		57		61		62		53	
- Winter											
Winter											
- Snow clearing		69		66		74		68		55	
- Slush clearing		52		49		54		53			
- Gritting		62		61		67		61			
Rest areas	74		73		76		74		47		50
- Summer											
Rest areas		71		70		71		70		48	
- Winter											
Rutting	37		29		32		34		34		37
- Summer											
Rutting		37		33		35		34		28	
- Winter											

Table 11. The results from customer satisfaction measurement of professional drivers in year 1999-2009 (The Swedish Road Administration 2009)

Professional drivers

Customer satisfaction	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Overall satisfaction	46		35		45		43		43		46
- Summer											
Overall satisfaction		40		39		45		40		34	
- Winter											
Winter											
- Snow clearing		53		49		57		47		39	
- Slush clearing		42		39		43		38			
- Gritting		54		48		52		42			
Rest areas	72		72		73		67		42		44
- Summer											
Rest areas		68		72		69		65		44	
- Winter											
Rutting	19		18		22		20		22		23
- Summer											
Rutting		14		17		19		21		17	
- Winter											

Note: Rest areas had until 2006 been based on rest area visits

No analyses have been undertaken in order to identify differences and possible correlations in satisfaction levels between different society-related factors as for example urban areas vs. sparsely populated areas.

There are no actual additional methods used at national level to determine road user satisfaction, but some are performed on regional level. A trial has been undertaken in form of an observation study, in which both private and professional drivers were followed and observed for a few days.

The Swedish Transport Administration is working hard on finding a new and improved model for conducting customer satisfaction measurements. First of all, a change of scale might become current as the underlying evaluation as the survey can vary between different individuals and groups, which would indicate that the current scale used is not accurate. Respondents have different “form-filling patterns”, as some put themselves in the middle of the scale and other might use extreme values. In addition some respondents use the middle values of the scale to express that they do not have an opinion of the question. In other words, the type of survey used has a low validity and there is an uncertainty regarding what is actually being measured. In order to set the actual goals to achieve, the “customer standard” has to be set, for example, by determining these in laboratory or simulator conditions. With customer standard, it is referred to what level of quality should be delivered to ensure that the customer is satisfied.

The biggest challenge for the administration has been to be able to transform the survey findings into measures that deliver increased road user benefits and higher satisfaction levels. Road users have a tendency to notice when a journey encounters a problem or something that deviates from the norm and it is these occasions that affect the level of satisfaction or dissatisfaction. Furthermore, it is challenging to quantify how road users experience a measure.

Utilization of results from survey

The Swedish Transport Administration aim to achieve increased customer orientation and greater customer benefits and thus customer satisfaction measurements are important means to guide the administration in the right direction. The administration has been using the balanced scorecard for many years and customer orientation with higher demands for increased customer benefits sets an essential goal in the scorecard. An annual report is published on what have improved from the customers’ point of view and what could still be improved. With regard to customers’ views, the Swedish Transport Administration is planning to set new goals for some of the maintenance standards, as for example:

- higher standards for road conditions in winter time, especially with regard to accessibility, reliability and safety
- higher standards especially required on roads important for commuter traffic and for tourism
- continued investments in road travel information solutions

As the demands on operations and maintenance work are not static, the administration strives for continuous development and develops standards and specifications through

dialogues with various road user groups. Various methods are used for translating customer views into practical action regionally, for example:

- convoy driving
- road user dialogue and reduced disruption
- regional panels
- dialogue governed operations

5.9 Evaluation and comparison of current international practices

This part of the chapter discusses the findings from chapters 5.1 - 5.8 and compares the various methodologies and practices in use. Disadvantages and advantages related to different survey methods are also listed. Furthermore, challenges that the road authorities are facing related to customer satisfaction measurements are presented. The actual level of satisfaction of the road users is not compared across the different countries due to varying definitions of for example the factor “road user satisfaction” and the differentiating measurement scales. However, trends in the level of satisfaction can be compared and differences concerning road-user surveys and feedback systems can be explored.

In order to have an overall picture of the different in size of the participating road authorities, the key indicators and figures of the administrations are presented in Table 12.

Table 12. Key indicators of participating road administrations

Country	Length of NRA road network (km)	Length of road network in entire country (km)	Size of administration in year 2008
Alberta, Canada	33 000	-	790
Denmark	3 800	103 332	850
Finland	79 200	467 400	916
MnDOT, USA	19 126	227 304	4 553
Norway	27 000	92 891	5 100
Scotland	3 432	58 432	307
Slovenia	5 978	38 694	-
Sweden	98 400	216 000	3 246

*NRA = national road administration

5.9.1 The role/importance of customer satisfaction within the road sector

Maintaining roads and delivering good quality are an essential part of the goals and aims of road authorities. In order to fulfill the expectations of the road users, road administrations need to continuously develop and improve their existing practices and services. This can be achieved by increasing public involvement and investigating road users' perception of the physical condition of the road network and the services provided on the network. By engaging the public, road authorities cannot only improve their practices but can also set the key focus objects and areas of their operations.

The public sector and governmental organizations have more actively shifted to the private sector-style of customer focus and this study shows that all of the participating road authorities are undertaking customer satisfaction surveys by using different means and methods. Most of the road authorities are using a well developed and scientific survey system and some countries are even developing and testing new qualitative methods. The evaluation of performance is mostly made by customer satisfaction surveys and associated measurements.

5.9.2 CSM practices used by road administrations

A variety of methods are used today to capture customer perception and there are differences in how the participating countries perform and evaluate customer satisfaction measurement. The key figures of customer satisfaction measurement practices in the participating countries are presented in Table 13. The table shows that most of the road administrations are performing customer satisfaction measurement annually or every second year. The most common methods used are telephone interviews, postal surveys and face-to-face interviews. Some countries have tried to use the Internet as a survey channel, but experiences have not been satisfactory and the response rates tend to be lower when using Internet surveys. Examples of real undertaken mail surveys in Scotland and Finland are attached in Annex 4 and 5.

Other typical methods used for gathering customer feedback are for example road side interventions, driving panels, focus groups, public complaints and additional surveys. For example Transport Scotland has conducted phone polls and surveys after major accidents and with these polls, the road authority tries to determine the public's perception and how they think the accident was managed. Some countries are developing new qualitative methods where it would be possible to get direct feedback from the customers. An example of a new and innovative qualitative method is the driving panel method developed by the Finnish Transport Agency for qualitative measuring of customer satisfaction. The method is still at a pilot stage but has showed promising results.

Table 13. Comparison of customer satisfaction measurement conducted in the participating countries

Country	Frequency of conducted CSM	Method of surveying	Average sample size	Average response rate	Other methods of performing CSM
Alberta, Canada	2 per year	telephone interviews	800	100 %	public complaints
Denmark	2 per year	telephone interviews	1 900	44 %	public complaints
Finland	winter: 1 per year summer: every other year	postal surveys	winter: 24 600 summer: 15 000	40 %	focus groups, regional forums, driving panel
Mn DOT, USA	1 per year	telephone interviews	800	50 %	focus groups and several specific surveys on selected topics (e.g. assist in targeted maintenance)
Norway	1 every 4 th year (from year 2010 forward)	telephone interviews	8 000	100 %	-
Scotland	2 per year	face-to-face interviews in respondents' homes	2 000	100 %	additional surveys after special events (e.g. major accidents)
Slovenia	1 every 3 rd year	Internet and face-to-face interviews	109 50	20 % (Internet) 100%	-
Sweden	1 per year (varying with winter and summer surveys)	postal surveys	3 500	75 %	observation study, regional panels

*CSM = customer satisfaction measurement

When choosing the method to be used for customer satisfaction measurement, the costs of surveys are an important factor and need to be taken into consideration. The samples are often constrained by the number of customers one can afford to interview. Other important factors are for example timeliness, demographic reach, statistical precision and tracking method for consistency. In other words the decision of what survey method to use is a tradeoff, where several variables affect the outcome. A list of methods used for customer satisfaction measurement is presented in Table 14. Some advantages and disadvantages are also listed in the same table.

Table 14. Methods used for customer satisfaction measurement

Survey method	Advantages	Disadvantages
Postal / mail	<ul style="list-style-type: none"> • cost effective • efficient to reach a large audience • possible to conduct longer surveys 	<ul style="list-style-type: none"> • no control over who is actually responding • slow method for data collection • usually lower response rates
Telephone interviews	<ul style="list-style-type: none"> • possible to clarify open-ended questions • easy to include respondents from wide or different geographical regions • higher response rates 	<ul style="list-style-type: none"> • more households are becoming cell-only • if cell phone used: <ul style="list-style-type: none"> - respondents might expect monetary compensation - little control over geographic representativeness - driving while talking is a safety risk
Face-to-face interviews	<ul style="list-style-type: none"> • easier to explain questions and correct misunderstandings • high cooperation and response rates • usually best quality of response 	<ul style="list-style-type: none"> • hard to get a wide enough geographic coverage • costly • hard to conduct with large sample sizes
Internet	<ul style="list-style-type: none"> • cost effective • fast and efficient to reach a large audience 	<ul style="list-style-type: none"> • aging population under represented • no control over who is actually responding
Focus Groups	<ul style="list-style-type: none"> • in depth discussions • easier to understand attitudes and expectations 	<ul style="list-style-type: none"> • too small of a sample to be representative

The type of survey used is a significant decision and all the methods have benefits, risks, and disadvantages. The method that works best depends on the purpose of the survey and the type of information or data that one is collecting and is more applicable on what one wants to achieve. Overall, there is a need for more widespread use of qualitative survey methods for more in-depth analyses if we really want to understand the customers and their views. When designing customer satisfaction surveys, one needs to remember that it is only a snapshot in time and that there are several factors that might influence the road users' attitudes.

As important as it is to choose the appropriate survey method to use, it is to choose the right timing for the survey. One needs to take into consideration other factors when developing the survey as to include different stakeholders, focus on regional difference and the structure of the questionnaire. The questions can be asked in an "open-ended" or "closed-ended" format.

Open-ended questions give the respondents the opportunity to answer in their own words while close-ended offer the respondents a list of possible responses for the questions. Most of the participating countries use “closed-ended” questions and some include both types of questions in their surveys. Close-ended questions are usually more efficient, especially in telephone or face-to-face interview, as they help to control the length of the interview. However, these types of questions enable a more simple way to assess the results. Open-ended questions are still good to add in some part in the survey as they give the respondents the control to express their opinions and comments, which can be very valuable.

In addition, it is important to consider how to target the questions as they need to relate to the actual services of the road administration as opposed to nice-to-know information. It could also be a good practice to target different stakeholders as different road user groups have different needs, expectations and experiences.

The participating countries are using various methods in order to present the questions or to obtain and differentiate results between regions, road classes or levels of service. For example Transport Scotland presents road network maps concerning the road region in question in the face-to-face interviews, while the Finnish Transport Agency sends the road area map included with the postal survey. MnDOT conducts bare pavement customer surveys with the focus on snow and ice removal by showing authentic conditions to the participants in form of videos or pictures.

The themes, sub-themes and issues that the participating countries mostly concentrate on in their customer satisfaction measurements undertaken as constant tracking research (*ad hoc* surveys not included) are presented in Table 15. The road administrations usually measure the level of satisfaction on a regional level, i.e. by comparing different regions, and for example by differentiating private and professional drivers. The participating countries also have sub-themes included in their CSM that are specifically designed to suit their operations. For example the Finnish Transport Agency is measuring the level of satisfaction concerning the condition of gravel roads and opinions regarding winter speed limits. The Danish Road Directorate have included a question in their surveys to find out if the respondent acknowledge if he is driving on roads maintained by the Road Directorate or by municipalities. Alberta Transportation has tried to explore in their omnibus surveys if the respondents would be willing to pay more in taxes in order to have the provincial highways in better winter driving conditions.

Table 15. Main themes addressed in undertaken CSM

Themes	Alberta	Denmark	Finland	Minnesota	Norway	Scotland	Slovenia	Sweden
Road condition and roadside								
Overall condition		X	X	X		X		X
Drainage of water from road surfaces		X				X		
Response time of road defects (potholes etc)						X		
Quality of repairs						X		X
Cleanliness of/amount of litter on road surface		X	X	X		X		
Cleanliness of roadside areas		X	X	X				X
Maintenance of vegetation along the road		X		X		X		
Winter maintenance								
Snow ploughing	X	X	X	X	X	X	X	X
Antiskid treatment	X	X	X	X	X	X	X	X
Evenness of the road surface			X					
Response time	X							
Signs, markings and road lighting								
Visibility of traffic signs and road markings		X	X	X	X	X		X
Cleanliness and condition of traffic signs		X	X		X			X
Provision of road lighting			X			X		
Traffic information								
Information on weather and traffic conditions		X	X		X	X	X	X
Provision of electronic message boards						X		
Traffic congestion and safety								
Amount of traffic congestion		X			X	X	X	
Aspects concerning traffic safety		X		X				
Road network								
Functioning road network		X		X				
Rest areas and lay-bys								
Cleanliness and maintenance of rest areas		X	X					X
Services provided at rest areas		X						
Number of rest areas and lay-bys			X					
Footways and bicycle lanes								
Condition of footways and cycle lanes			X			X		
Maintenance of footways and cycle lanes			X		X	X		
Provision of lighting on footways/cycle lanes						X		
Availability of footways and cycle lanes			X			X		
Bus stops								
Cleanliness and maintenance of bus shelters			X		X			

Road works								
Frequency of road works		X					X	
Information regarding road works		X	X				X	
Directions on roadwork site		X	X				X	
Image and information on the road administration								
Knowledge concerning the administration		X					X	
Usage of administration's website (or other service channels like road user line etc)		X	X	X	X		X	
Opportunities for public involvement				X				

Regarding the respondents' satisfaction with the road network and the operations of the road administrations, the following themes and factors are examples of what was highlighted and prioritized by the road users in most of the participating countries:

- the general condition of road surfaces
- importance of snow removal and antiskid treatment
- the speed with which road defects are repaired
- the management of vegetation on verges
- traffic information to warn of e.g. congestion and delays
- the quality of road markings

5.9.3 Perceived challenges related to CSM

The participating road administrations are facing similar challenges and an important challenge is the limited public awareness about actions and service improvements taken by the local road administrations or their service providers. In order to manage the road network better it is important to build up a genuine relationship with the road users.

The universal issue concerning customer satisfaction measurement within the road sector is how to actually use the customer satisfaction measurement data. In order to utilize customer feedback and information effectively, the road administrations need systematic methods to process and analyze the data. Another recognized challenge is how can all customer satisfaction measurement data and results be managed, communicated to road administration managers and road users, and used for process improvement and increased road user benefits? Just as important as to analyze the data is to improve the processes that affect customer satisfaction by interpreting and transforming the survey results into action.

Another common issue is how to evolve and change the survey practices as most countries fear that they may lose the trend data and even a more difficult and recognized challenge is how to link the customer satisfaction levels with the technical road data and standards and how to identify what actually causes satisfaction levels to increase or decrease. If correlation

could be found, then the results could possibly influence budgets as politicians are more likely to listen to the views and feedback from the customers

Other issues that were recognized by the participating road administrations are:

- how to communicate with the public – a need to develop a common language between the road authorities and the road users
- what are the critical aspects of the process and which factors should be measured in surveys, i.e. are the right issues being measured
- limiting size of survey – how to target the questions
- what kind of survey method works best
- how to get the respondents to differentiate between national and local roads
- low response rates in the surveys
- how to get the results from customer satisfaction measurement implemented straight into the decision making processes (is there a need for developing a direct feedback system)
- should the results be used only for validating current practices or also for generating new standards
- how to align performance measures with results from customer satisfaction measurements
- better road conditions lead to higher expectations – how to find the optimum or balance
- decreasing budgets in road sector - hard to get support for surveys
- how can we demonstrate value for money
- how to provide accurate costs for the different levels of service

In some countries low response rates is a common problem, especially in postal surveys. Measures for increasing the response rate in these kinds of surveys are for example to develop a shorter questionnaire, following up with no-returns and to offer incentives for filling out the survey. Furthermore it is important to promote the actual survey, and explain the direct benefits of participating in the survey to the customers.

An important step of customer satisfaction measurement is to link the measurement to organizational strategy. If the measurements don't reflect the aspirations and goals of the organization, they are of little value and do not support improvements work. By some of the participating countries it was found that occasionally there is a large gap between the road management objectives and the level of customer satisfaction and, therefore, it would be useful to try to link these two together. One possible reason for the gap could be that the road management objectives are not customer oriented or focused. Transport Scotland is currently planning to link the levels of satisfaction and expectations of the road users directly within their "Performance Management Framework".

A recognized challenge is how to link customer satisfaction with technical standards and how to identify what actually causes satisfaction levels to increase or decrease. If correlation

could be found, then the results could possibly influence budgets as politicians are more likely to listen to the views and feedback from the customers. Some countries have performed correlation studies with regard to finding the link between technical data and satisfaction levels or the performance of the contractors. For example the Finnish Transport Agency has conducted correlation studies concerning satisfaction levels and road condition data and one study focused on the relation between experienced level of service and the technical aspects of road maintenance.

With regard to how to link customer satisfaction with technical road data, Transport Scotland has tried to develop new methods. In other words, Transport Scotland has specifically developed a number of questions concerning road surface condition in which the customer satisfaction survey is linked to road user satisfaction levels with technical engineering measures. The results indicate correlation between technical road condition data and satisfaction levels, but these results should still be treated with caution as only two customer satisfaction surveys have yet been undertaken. Transport Scotland will continue to follow if trends concerning this issue can be seen in coming surveys as well.

Possible reasons for why results from customer satisfaction measurements and measured technical data differ can for example be:

- road users experience the road as a whole segment while technical instruments measure for example road surface unevenness on a more detailed and averaging means
- road users are only asked for their overall opinion
- road users may be biased
- road users may not understand the actual costs associated with different levels of service
- negative media publicity or extreme cases

Many road administrations have experienced the problem with finding common language between the customers and the “experts”. Engineers tend to use language according to technical standards, while customers understand more outcome based criteria, such as, signs and road markings need to be visible at a certain safe distance. One measure to the problem is to simplify the survey by using pictures and videos in focus groups or more basic scales in written questionnaires (e.g. outcomes described in form of excellent, good, fair and poor).

By forming a common language between the road authorities and the road users, a direct feedback system with regard to satisfaction levels and technical data can be developed. A practical example of finding common language with the road users is the MnDOT’s bare pavement customer surveys, where bare pavement policy is shown with videos or pictures to simulate driving on snowy or icy road conditions. The bare lane customer survey is focused on snow and ice removal and is used for developing winter maintenance satisfaction measures and targets.

PART IV – Future Prospects and Conclusions

6 FUTURE PROSPECTS FOR CUSTOMER SATISFACTION MEASUREMENT WITHIN THE ROAD SECTOR

This chapter focuses on possible future prospects of customer satisfaction measurement within the road sector. The aim is to provide my recommendations for how road administrations could improve or develop current CSM programs. The chapter also discusses how a model in obtaining feedback and input from the different stakeholders of the road sector could be established.

6.1 CSM programs and processes within the road sector

An ever increasing emphasis on customer satisfaction issues has resulted in a growing need to learn how to communicate properly with the public and how public input should be obtained. Customer focus and creating understanding of the needs and expectations of the customer are essential for the improvement efforts to succeed. Using customer information for improvement efforts can include both exploring collected data and results from constant tracking research or from specific ad hoc surveys. In the long term it is good to formulate and develop existing measurement practices in order for these to improve and be more suitable to identify key areas for improvement work. Moreover, it is important to link and integrate CSM with decision-making processes.

The common objective of conducted CSM within the road sector is to explore the views about the road network and to determine the road users' perception of specific aspects such as the provided services and the physical condition of the road surface. The primary benefit with customer satisfaction surveys is that they can track trends and help an organization to focus on major improvement efforts. A problem with most customer surveys is that they tend to focus solely on the road users' experiences and their perceptions of services. The key point is to investigate the expected level of service on the road network and to identify areas for improvement and to get these improvements made.

The following basic CSM concept (Kessler 1996.) can also well be applied to the road sector:

- Use qualitative measures with a few customers to develop questions
- Use quantitative measures across your customer base to get answers

Qualitative measures focus on in-depth understanding of clients while quantitative measures provide data that need to be compared and trended. Working and dealing with both methods simultaneously allows for bi-picture decisions, Kessler (1996) states. On the other hand, most road administrations today focus merely on the use of quantitative measures.

Quantitative measurements are needed for comparisons and moreover, quantitative data is easier to summarize to be more decision-making friendly. But there is a need of more qualitative measures to achieve a more problem focused approach.

6.2 The basic steps of a CSM-model

Customer satisfaction measurement should not only be seen as a simple straightforward process. The actual measurement process consists of many different steps and my suggestion for a possible CSM system and its basic steps is presented in Figure 21. The CSM framework should include data and allow comparison of both qualitative and quantitative measurements in order to establish priorities of different alternatives used for the decision-making processes.

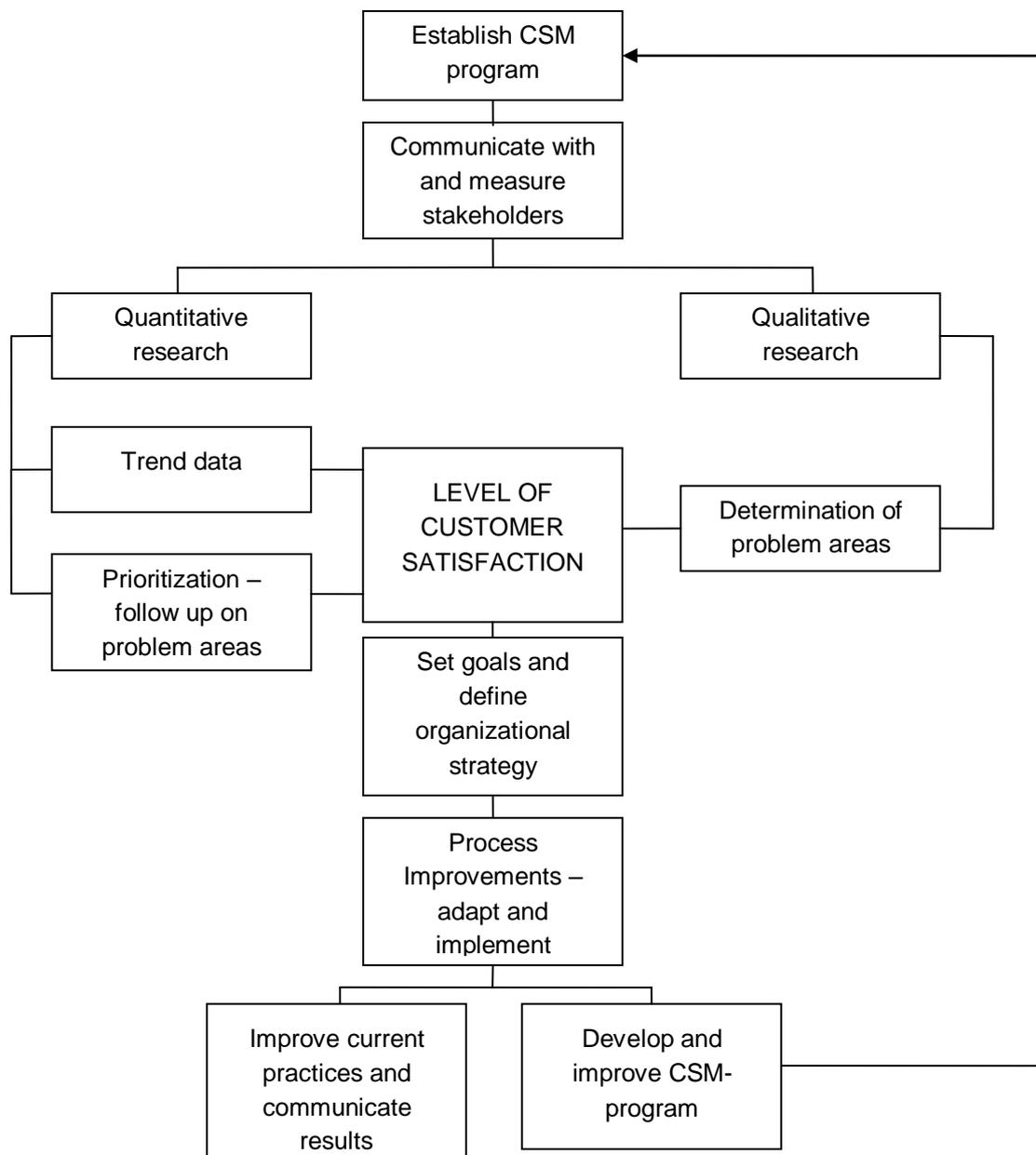


Figure 21. The basic steps of the CSM program

The CSM-program is formed by different steps and forms a complete on-going process:

1) *Establish CSM program*

Satisfaction with the services provided by and the performance of the road administration is obtained by customer input and satisfaction measurements. In the first step the services provided by the organization and the objectives of the CSM should be identified.

2) *Communicate with and measure stakeholders*

Collecting the views of the road users and assessing the needs of the customers. An important part of customer service within an organization is to capture the voice of the customer and to obtain information of the needs and values of the customers. This step is further on divided into two sub steps, namely qualitative and quantitative measures.

3) *Qualitative and quantitative research*

Separate qualitative studies should be undertaken in order to find out what forms expectations, map the priority areas and to establish the questions to be asked in the CSM. Quantitative research should mainly be used to produce trend data, i.e. for tracking yearly variations in the level of satisfaction among road users. Moreover, it can be used to explore how the road user prioritizes, i.e. where the public would allocate services and where investments should be spent. The undertaken surveys form the level of satisfaction.

4) *Set goals and define organizational strategy*

In this step the objective is to translate findings and results from conducted CSM into organizational objectives of future improvements and developments regarding the services provided by the road administration. In other words, it should be explored if the road administration is over performing or under performing in specific issues. In addition, the service areas in need of improvement efforts should be determined. If the level of satisfaction of a specific attribute is significantly down, more research effort and focus should be put into this issue in the following CSM program.

5) *Process Improvements*

The customer surveys are important feedback indicators for the road authorities to improve their practices and services, to budget and prioritize and to adjust service levels. The goals and organizational strategy is converted into action by adapting and implementing the set goals into measures.

6) *Improve current practices and develop CSM-program*

The process improvement can be divided into to the actual improvement work of current practices and the development and improvement of the current CSM-program. The aim is thus for the framework to be an on-going process that is developed and changed with regard to findings from CSM and the views of the road users. Moreover, it is important to

provide information and communicate results to the stakeholders within a context that they can relate to.

When forming and developing the CSM-program, various issues have to be taken into consideration. Table 16 presents some questions that are central in the process of improving the framework.

Table 16. Summary of important questions in the various steps of the CSM framework

1. Establish CSM Program	<ul style="list-style-type: none"> • is CSM being conducted in line with organizational target? • how often should surveys and measurements be undertaken? • what are our survey objectives?
2. Communicate with and measure stakeholders	<ul style="list-style-type: none"> • what survey method or data-gathering technique is most suitable? • which stakeholder groups to include in the measurement?
3. Quantitative research	<ul style="list-style-type: none"> • how to identify and monitor changes and trends in the level of satisfaction? • what is valued and prioritized by the customers?
3. Qualitative research	<ul style="list-style-type: none"> • what are the problem areas of our provided services or products? • what do the road users expect from our services or the condition of the roads?
4. Set goals and define organizational strategy	<ul style="list-style-type: none"> • what are the differences between the customers and the road administration's perception and views?
5. Process improvements – adapt and implement	<ul style="list-style-type: none"> • are the right issues being measured? • are outcomes improving as a result of measurement? • how can the process and decisions be improved? • are the results communicated effectively to the customers and the stakeholders?
6. Improve current practices and develop CSM-program	<ul style="list-style-type: none"> • is action being taken as a result of measurement activity? • is the frequency of the conducted CSM right, i.e. is there under- or over-measurement?

The key of a CSM-program is a problem focused approach. By focusing on the needs of the road users and other stakeholders, the road authorities can set the right levels of services and develop their practices and services in the direction that is prioritized and valued by the public. In addition, most companies, especially governmental organizations, are working under budget constraints and usually do not have enough resources to make all of the improvements simultaneously. In other words, efficient and problem focused CSM results in improvement efforts that customers say is important to them and thus most likely in higher levels of customer satisfaction.

A key difficulty in CSM is to elicit “willingness to pay”-information from the customers. For example, road users are less satisfied with the condition of gravel roads, as exemplified by the Finnish results presented in Figure 14 (page 67). One survey approach could be to identify how much would people be willing to pay more than at present for their improved service level. This way, road authorities might get the customers to understand how much money is needed for maintaining a certain level of service on the roads.

Another cornerstone in the CSM-program for road administration is a local or regional focused approach. Most companies or organizations want to know what differences exist in different regions. This is a central aspect within the road sector due to differences in local policies and conditions, for example weather conditions, differences regarding road network and traffic conditions. The results from undertaken CSM can be used on a regional level to develop the services and operations in the road districts.

For the measurements to form a part of the monitoring system of customer satisfaction, they have to be performed regularly and so that they can be compared to earlier measurements. This does not, however, mean that the same issues have to be measured and asked from the customers. Measurements should not though be measured before improvement work has been carried out and before it can be assumed that these efforts would have started to affect the customers’ experiences. However, as many of the case studies suggest, most road authorities do measure their stakeholders on a regular basis in a time interval of one or two years.

New strategies and performance measures developed to reflect the issue prioritized and valued by the customer may require new data gathering techniques, analysis and management processes. As Schwartz (2006) proposes, the implementation of these new strategies will require input of and expertise in areas such as market research, public involvement, communications and asset management. For the CSM program and a more customer-driven and performance-based approach to succeed, the road administration have to effectively communicate the results from undertaken CSM and successful improvement work to the customers and stakeholders.

Customer satisfaction measurement might be considered as an art as it requires finding and selecting the proper means and methods, ability to utilize the results effectively and to integrate and convert findings into action. But the essential thing is to form an effective customer research function that can be integrated into the decision-making processes at all levels of management in the road administration. A well developed CSM framework includes the customers and their views and perceptions and allows the organization to develop their current practices based on these.

7 CONCLUSIONS

This chapter concludes the thesis and the findings. The key findings are discussed and an evaluation of the study is presented.

7.1 *Summary of the key findings*

People have always strived to develop and to achieve better results and improvements. Today, organizations and companies are facing new challenges and experiencing pressure to improve. Furthermore, the customers' expectations are changing and thus customer focus and level of satisfaction have become a driving force for many companies and organizations. By measuring the degree of satisfaction, an organization can determine if they have in fact improved and if their improvements have resulted in desired effects. Moreover, the very act of surveying sends a message that you care about your customers and their needs and views.

The purpose of the thesis and this study was to evaluate current practices used by road organizations within the field of public input and customer feedback systems. More and more companies and organizations are using the level of customer satisfaction as an indicator on their performance of delivered products and services. The intent of the study was also to establish a conceptual framework for customer satisfaction measurement within the road sector and to determine how consistent and applicable road user data from customer surveys is gathered internationally and how results from undertaken customer satisfaction measurements should be utilized.

Organized co-operation between the customer and the supplier of a product or service is becoming increasingly common. The use of customer research is increasingly entering the public sector. The concept or term "*customer*" is widely used in different industry sectors and nowadays many nonprofit organizations and governmental agencies have adopted the customer oriented approach from the private sector. A public organization as for example the road administration typically conducts research studies to support and introduce a change in current service levels. However, satisfaction and quality are concepts with a quite subjective character, i.e. soft data, and this may be frustrating for engineers or technicians to measure.

Nowadays, most road administrations are conducting market research surveys in one form or another. The problem with these surveys though are often that they only measure current levels of customer satisfaction and perception without capturing whether the customers' expectations and needs are actually being met. Moreover, these surveys tend to focus solely on current practices and services without exploring the customers' needs and opinions regarding how to prioritize and the importance of different services. The major benefit with

customer satisfaction measurements and surveys is that they can track trends and help an organization to focus on major improvement efforts.

The road administration has to develop performance measures that relate to the customers or stakeholders ideas about what is important. By co-operating with the customers, the road authorities can set measures and create shared understanding of the expectations. Customer satisfaction is greatly affected by the expectations of the customer. Basically, customer satisfaction occurs when a customer's experiences of a service match the expectations. In addition, the level of customer satisfaction is formed by the image of the company or organization. Customer perceptions, expectations and views regarding the road administration's current practices and services must be fed back to the organization and then further on used as a basis for improvement strategies and programs.

The key of a CSM-program is a problem focused approach. By focusing on the needs of the road users and other stakeholders, the road authorities can develop their practices and services in the direction that is prioritized and valued by the public. In addition, most companies, especially governmental organizations, are working under budget constraints and usually do not have enough resources to make all of the improvements simultaneously. By segmenting and identifying different groups within their customers, organizations can adjust their services to meet the different needs. Different customers and stakeholder groups have different expectations and needs on the road network. Hence, segmenting the customers allows the road administration to determine the specific needs for the different groups of customers.

7.2 Evaluation of the study

This study focused on the current practices used by road authorities to capture customer perception. The research was undertaken as a qualitative study including both literature review and empirical research. The empirical part of the study was conducted from an international benchmarking and case study approach. The case studies focused to map the "best practices" within undertaken CSM. Altogether eight road administrations were surveyed and interviewed. A wider sample would have probably made the results more reliable but the personal interviews and the workshop provided qualitative data and valuable insights into the CSM practices currently in use internationally. Most road authorities also presented future plans with regard to improving their customer feedback systems.

The participating road administrations were selected by the teams from the Swedish Transport Administration and Aalto University. Most of the participating countries were purposely selected based on for example similar weather conditions, i.e. countries with winter climate. In possible future studies it could be a good idea to include road administrations from other countries as well to broaden the picture. On the other hand, it

would be wise to also continue to monitor some of the current participating countries as well to determine if changes or improvement works have been carried out.

A workshop was organized with the purpose to gather participants and experts to present their results and highlights. During the workshop current practices, ideas and challenges were discussed. The workshop also included a brainstorming exercise to create discussion based on the challenges that the road authorities are experiencing.

Customer satisfaction measurement was explored and evaluated both from a broader perspective and also with regard to how it applies to the public or road sector. An overview of how customer satisfaction is formed and how customer perception can be measured is also provided for anyone who is not familiar with the field from before. The results from the study may provide insights to road administrations with regard to how other road authorities are capturing the attitudes and views of the road users and how a CSM program can be formed or improved.

During this study, some possible future research areas and topics were identified. As this thesis focused on identifying how consistent and applicable road user data is gathered internationally today on a more general level, it could be interesting to do more in-depth research in specific areas such as how public feedback could be utilized in a more efficient and perhaps even in a more creative way as opposed to only remain as nice-to-know information. The road users could for example be used to acquire information concerning disorders or disturbances on the road network.

Another interesting and useful research topic to focus on could be how to actually implement good practices found elsewhere. As a research method, benchmarking gives an organization the opportunity to develop and improve its practices and strategies. But often the problem is how to implement and adapt these “best practices” and to make them suitable for your own organization.

There is a growing need to learn how to communicate properly with the public and how feedback and results from undertaken customer satisfaction measurements should affect decision-making processes and improvement in road conditions and levels of service. Increased focus on the road users and their satisfaction and needs are issues that will remain as important topics in the future as well.

8 REFERENCES

- Ackley, H. (2007) *From Strategic Planning to Everyday Practice – Customer Orientation in Nordic Road Administrations*. Downloaded from the www-page of PIARC at: http://publications.piarc.org/ressources/publications_files/4/1856,RR334-026.pdf, accessed 23.6.2010. 8 p.
- Adams, K., Brace I. (2006) *An Introduction to Market & Social Research: Planning & Using Research Tools & Techniques*. London, UK: Kogan Page. 150 p. ISBN 0-7494-4377-4.
- Alford, J. (2002) *Defining the Client in the Public Sector: A Social-Exchange Perspective*. Public Administration Review. Vol. 62, No. 3. Downloaded from the www-page of Wiley InterScience at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/118944787/PDFSTART?CRETRY=1&SRETRY=0>, accessed 21.7.2010. 10 p.
- Bergman, B., Klefsjö, B. (1994) *Quality from Customer Needs to Customer Satisfaction*. Lund, Sweden: Studentlitteratur. 473 p. ISBN 91-44-46331-6.
- Burns, A., Bush, R. (2008) *Basic Marketing Research: Using Microsoft Excel Data Analysis*. Upper Saddle River, NJ: Pearson/Prentice Hall. 510 p. ISBN 978-0-13-135421-0.
- Buttle, F. (1996) *SERVQUAL: review, critique, research agenda*. European Journal of Marketing. Vol. 30. Iss: 1. pp 8-32. Downloaded at: <http://buttleassociates.com/doc/SERVQUALcritiqueEJM.pdf>, accessed 10.8.2010. 25 p.
- Czarnecki, M. (1998) *Managing by Measuring: How to Improve Your Organization's Performance Through Effective Benchmarking*. New York: Amacom. 271 p. ISBN 0-8144-0390-5.
- Craig, G. (1993) *Creating an effective Customer Satisfaction Program*. Journal of Services Marketing. Vol. 3. Iss: 1. Downloaded from the www-page of Emerald at: <http://www.emeraldinsight.com/journals.htm?articleid=855589&show=abstract>, accessed 21.7.2010. 9 p.
- Danish Road Directorate (2009) *The Trunk Road Network in Denmark: Survey of current conditions and development*. Downloaded from the www-page of the Danish Road Directorate at: <http://www.vejdirektoratet.dk/pdf/samlet.pdf>, accessed 14.4.2010. 46 p.
- Elmore-Yalch, R. (1998) *A Handbook: integrating market research into transit management*. Washington (DC): National Academy Press. 196 p. ISBN 0-309-06272-1.
- Fink, A. (1995) *How to sample in surveys*. Thousand Oaks, California: Sage Publications. 73 p. ISBN 0-8039-5754-8.

- Finnish Road Administration (2006a) *Info-sheet: Bonuses are Awarded for Outstanding Customer Service in Maintenance Area Contracts*, Helsinki. 1 p.
- Finnish Road Administration (2006b) *Info-sheet: Customer-oriented Winter Maintenance Policy*, Helsinki. 1 p.
- Finnish Road Administration (2006c) *Info-sheet: Customer Satisfaction is Measured on a Regular Basis*, Helsinki. 1 p.
- Finnish Road Administration (2008) *Winter Maintenance Policy*, Operations and plan documents, Helsinki. 34 p + app. 9 p.
- Forsblom, M., Horppila, H., Männistö V. (2006) *Experienced level of service of day-to-day traffic*, Finnish Road Administration. Finnra Reports 36/2006. 65 p. + app. 14 p.
- Garnham, M., Gullon, M., Gould, G., Lanyi, P., Maggiorotti, P., Malipaard, E., Monette, C., Rolla, M., Sillan, S., Valle, J., Zwitteri, A., Vuillemin, G. (1999) *The Quality of Road Service: Evaluation, Perception and Response Behaviour of Road Users*, Technical Committee 4 Transport and Regional Development, PIARC. Downloaded from the www-page of PIARC at: http://publications.piarc.org/ressources/publications_files/2/913,04-04-e.pdf, accessed 23.6.2010. 192 p.
- Hayes, B. (1998) *Measuring Customer Satisfaction: Survey Design, Use, and Statistical Analysis Model*. 2nd ed. Milwaukee, Wisconsin: ASQ Quality Press. 267 p. ISBN 0-87389-362-X.
- International Organization for Standardization (ISO). (2010) *ISO standards*. The www-page of ISO at: <http://www.iso.org/iso/home.htm>, accessed 30.7.2010.
- Ipsos MORI (2009) *Perceptions of the Trunk Road Network in Scotland: Research Study conducted for Transport Scotland*, Glasgow. 55 p.
- Kessler, S. (1996) *Measuring and Managing Customer Satisfaction: Going for the Gold*. Milwaukee, Wisconsin: ASQ Quality Press. 217 p. ISBN 0-87389-364-6.
- Krivobokova, O. (2009) *Evaluating Customer Satisfaction as an Aspect of Quality Management*. World Academy of Science, Engineering and Technology. Vol. 53. Downloaded at: <http://www.akademik.unsri.ac.id/download/journal/files/waset/v53-92-oaj-unsri.pdf>, accessed 30.7.2010. 4 p.
- Lotti, L. (1994) *Markkinointitutkimuksen käsikirja*. 1st ed. Porvoo, Finland: WSOY. 261 p. ISBN 951-35-5864-9.
- Lund, S. (2010) *Customer Satisfaction*, power point-presentation at "The Road to Excellence"-seminar in Stockholm 24.3.2010

- LVM (Ministry of Transport and Communications). (2007) *Liikenne 2030 – Suuret haasteet, uudet linjat*. Downloaded at the www-page of the Ministry of Transport and Communications at: <http://www.lvm.fi/fileserver/Liikenne2030.pdf>, accessed 4.8.2010. 42 p.
- Matzler, K., Hinterhuber, H. (1998) *How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment*. Technovation. Vol. 18. Iss: 1. Downloaded from the www-page of ScienceDirect at: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V8B-3SX81BY-3&_user=8758044&_coverDate=01%2F31%2F1998&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1418331302&_rerunOrigin=scholar.google&_acct=C000109213&_version=1&_urlVersion=0&_userid=8758044&md5=db847b81f94613083fa4c0986b0607af, accessed 2.8.2010. 14 p.
- McGivern, Y. (2009) *The Practice of Market Research: An Introduction*. Harlow, England: Prentice Hall/Financial Times. 537 p. ISBN 978-0-273-71707-2.
- MnDOT (Minnesota Department of Transportation) (2009) *Rest Area Amenities Study: Final Report*. 65 p.
- Naumann, E., Giel, K. (1995) *Customer Satisfaction Measurement and Management: Using the Voice of the Customer*. Cincinnati, Ohio: Thomson Executive Press. 449 p. ISBN 0-87389-427-8.
- Robinson, R., Danielson, U., Snaith, M. (1998) *Road Maintenance Management: Concepts and Systems*. London: Macmillan Press Ltd. 289 p. ISBN 0-333-72155-1.
- Rope, T., Pöllänen, J. (1994) *Asiakastytyväisyysohjoaminen*. 3rd ed. Juva, Finland: WSOY. 259 p. ISBN 951-35-5858-4.
- Sandholm, L. (2010) *Total Quality Management*. 2nd ed. Lund, Sweden: Studentlitteratur. 281 p. ISBN 91-44-01164-4.
- Schwartz, M. (2006) *Building Credibility with Customers and Stakeholders*, NCHRP 20-24(51). Downloaded from the www-page of AASHTO at: <http://www.transportation.org/meetings/ceoleadership/Briefing%20Paper%20-%20Customers%20and%20Stakeholders.pdf>, accessed 23.11.2010. 39 p.
- Stewart J., Ranson S. (1988) *Management in the Public Domain*.
http://books.google.fi/books?id=p3tXhtYN9XgC&pg=PA54&lpg=PA54&dq=stewart+and+ranson+1988&source=bl&ots=VwLA1ts8J7&sig=2ieAsKzgcB57EEuuKTnBg0S3i3Y&hl=fi&ei=oZBGTMxAxY6MB4DrvfUG&sa=X&oi=book_result&ct=result&resnum=2&ved=0CBoQ6AEwATgK#v=onepage&q=stewart%20and%20ranson%201988&f=false

- Stricker, J., Clayton, C., Garnham, M., Guerra, M., Nilsson, L., Poutchy-Tixier, J., Price, S., Southern, A., Walcher, A. (2003) *Decision-making Process in the Implementation of Sustainable Road Transport Policies*, Technical Committee on Sustainable Development and Road Transport, PIARC. Downloaded from the www-page of PIARC at: http://publications.piarc.org/ressources/publications_files/1/690-14-04-VCD.pdf, accessed 23.7.2010. 144 p.
- Szwarc, P. (2005) *Researching Customer Satisfaction and Loyalty: How to Find Out What People Really Think*. London: Kogan Page. 273 p. ISBN 9780749443368.
- Sörqvist, L. (2000) *Kundtillfredsställelse och kundmätningar*. Lund, Sweden: Studentlitteratur. 181 p. ISBN 91-44-01580-1.
- Thorsgaard, J. (2010) *User Surveys 2000-2010*, power point-presentation at "The Road to Excellence"-seminar in Stockholm 24.3.2010
- Tilastokeskus (2002) *Matkapuhelin lähes kaikilla talouksilla*. Downloaded from the www-page of Statistics Finland at: http://www.stat.fi/tup/tietoaika/tilaajat/ta_04_02_matkapuhelin.html, accessed 25.8.2010.
- Tuominen, K. (1993) *Benchmarking Prosessiopas: Opi ja Kehitä Kilpailijoita Nopeammin*. Tampere: Tammer-Paino Oy. 111 p. ISBN 951-817-575-6.
- OECD (Organisation for economic co-operation and development) (1996) *Performance Indicators for the Road Sector*. Paris, France. 163 p. ISBN 92-64-15586-4.
- OECD (Organisation for economic co-operation and development) (2001) *Performance Indicators for the Road Sector*. Downloaded from the www-page of OECD – International Transport Forum at: <http://www.internationaltransportforum.org/Pub/pdf/01PerformIndicE.pdf>, accessed 28.7.2010. 88 p.
- Otto, S. (2010) *Alberta Transportation*, power point-presentation at "The Road to Excellence"-seminar in Stockholm 24.3.2010
- Vavra, T. (1997) *Improving Your Measurement of Customer Satisfaction: A Guide to Creating, Conducting, Analyzing, and Reporting Customer Satisfaction Measurement Programs*. Milwaukee, Wisconsin, USA: ASQ Quality Press. 490 p. ISBN 0-87389-405-7.
- Viinikainen, T., Päiviö-Leppänen, T. (2010) *Customer Satisfaction and Winter Maintenance in Finland*, power point-presentation at "The Road to Excellence"-seminar in Stockholm 24.3.2010

- Wisniewski, M. (2001) *Using SERVQUAL to assess customer satisfaction with public sector services*. *Managing Service Quality*. Vol. 11. Iss: 6. Downloaded from the www-page of Emerald at: <http://www.emeraldinsight.com/journals.htm?articleid=842749&show=html>, accessed 10.8.2010. 9 p.
- Ylikoski, T. (1999) *Unohtuiko Asiakas?*. Keuruu: Otavan Kirjapaino Oy. 323 p. ISBN 951-98006-1-1.
- Zairi, M. (1996) *Benchmarking for Best Practice*. Oxford, Great Britain: Reed Educational and Professional Publishing Ltd. 489 p. ISBN 0-7506-3948-2.
- Öster, S. (2008) *Asiakastyytyväisyyskuuntelujärjestelmän kehittäminen: Case Mepco*. Thesis. Tampere University of Applied Sciences, Business Administration. Tampere. 66 p.

9 ATTACHMENTS

- Annex 1. Road authorities participating in the study
- Annex 2. Questionnaire Cover Letter
- Annex 3. Questionnaire
- Annex 4. Example 1 of a customer satisfaction measurement questionnaire (Transport Scotland: Perceptions of the Trunk Road Network in Scotland, 2009)
- Annex 5. Example 2 of a customer satisfaction measurement questionnaire (Finnish Road Administration: Road User Satisfaction Survey, winter 2008)

Annex 1: Road authorities participating in the study

Country	Organization and contact person
Alberta, Canada	Alberta Transportation <i>Steve Otto</i>
Denmark	Vejdirektoratet – Danish Road Directorate <i>Vibeke Overgaard Madsen</i>
Finland	Liikennevirasto – Finnish Transport Agency <i>Tuomas Toivonen</i>
Minnesota, USA	Minnesota Department of Transportation (Mn/DOT) <i>Steve Lund</i>
Norway	Statens vegvesen – Norwegian Public Roads Administration <i>Odd Barstad</i>
Scotland	Transport Scotland <i>David Arran</i>
Slovenia	Direkcija Republike Slovenije Za Ceste – Slovene Roads Agency <i>Ljiljana Herga</i>
Sweden	Trafikverket – The Swedish Transport Administration <i>Jan Ölander</i>

Annex 2: Questionnaire Cover Letter

The cover letter for the questionnaires that were sent out to the countries that participated in the study:



Helsinki, 3.11.2009

Dear Respondent,

Thank you for participating in the Swedish Road Administration's (SRA) international study that is being done cooperatively with the Helsinki University of Technology (TKK). The topics of the study are divided into four tasks:

- Task 1 - Customer satisfaction in winter services, maintenance of pavements and rest areas in cold climates
- Task 2 - Energy and environmental efficiency
- Task 3 - Efficiency of rendered services
- Task 4 - Competence development and identifying best practice for R&D

Attached are the four questionnaires, which we kindly ask you to answer diligently and directly into the word-files. IT IS IMPORTANT THAT YOU ANSWER THE QUESTIONNAIRES THOUGHTFULLY AND COMPREHENSIVELY, BECAUSE THE ANSWERS WILL BE USED TO DETERMINE A WORLD-CLASS WINNER IN EACH OF THE FOUR TASKS. The winners will be announced at a workshop, which will be held in Sweden in March of 2010.

Questionnaire guidelines:

- All questions shall be answered in English
- Answer all questions directly in the Word documents
- Answer questions with as much detail as possible
- If some data is not available for the tables, please leave blank or mark as N/A
- Mark check boxes with an "X"
- Assistance can be requested by email or mobile telephone, when you have any questions
- Please send each completed Task to TKK (both Pekka and Eva) as they are completed and you do not have to send all of them at the same time once.

Due date: November 27th 2009.

If you have any questions or concerns about the survey or about completing the questionnaires, please contact: Eva Lodenius at e-mail: eva.lodenius@tkk.fi, tel: +358 50 369 7470) or Pekka Pakkala at e-mail: pekka.pakkala@tkk.fi, tel: +358 50 569 9383).

We thank you in advance for your collaboration!

Sincerely,
Pekka Pakkala and Eva Lodenius
Helsinki University of Technology (TKK)

Annex 3: Questionnaire of the study



QUESTIONNAIRE FOR SRA INTERNATIONAL BENCHMARKING TASK 1 - CUSTOMER SATISFACTION

Your name and country:

1. Do you have road user and/or road sector stakeholder satisfaction surveys for winter services, rest areas, and pavements? (Note: all questions apply to these 3 areas).

Winter Services

Rest Areas

Pavements

Yes

Yes

Yes

No

No

No

If yes, may we please have copies of these?

2. How do you perform the surveys?

Telephone

Sample size

Response rate

Internet

Mail/Postal Surveys

Other (please specify)

What is the effectiveness of each method?



3. What target groups or stakeholders did you include?

	Number of respondents	Response rate
<input type="checkbox"/> Private drivers		
<input type="checkbox"/> Pedestrians/bikers		
<input type="checkbox"/> Trucking industry		
<input type="checkbox"/> Public transport (bus)		
<input type="checkbox"/> Taxi-drivers		
<input type="checkbox"/> Material/Manufacturing suppliers		
<input type="checkbox"/> Others (please specify)		

4. How often do you conduct satisfaction surveys for each category?

Every _____ Year/s → Winter services

Every _____ Year/s → Rest Areas

Every _____ Year /s → Pavements

If not done every year, what are the reasons for not doing every year?

5. How are your questions structured?

- Multiple choice
- Open-ended (written response)
- Comments
- Other (please specify)
- Combinations

List all combinations used and include scaling factors levels used (e.g. 1 to 5).



6. How are your surveys randomized? What is the sample size? What is the response rate?

(See above Q2 and Q3)

7. What are the results from the last five surveys performed from each category? (Give tabulated results, specify the year surveyed and your rating scale)

CUSTOMER SATISFACTION	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Overall satisfaction										
winter period										
summer period										
Winter services										
antiskid treatment										
snow ploughing										
evenness of the road										
Rest-areas										
winter period										
summer period										
Condition of pavements (winter period)										
main roads										
other roads										
Condition of pavements (summer period)										
main roads										
other roads										

Your rating scale: _____

If you include other road categories, please specify.



8. How are the results from the surveys utilized? (Give examples)
9. How do you use these results to influence the political actors? What are the means and methods used? Are you able to use the results for budgetary purposes? (Give examples)
10. Are the survey results used for decision making? Do the results affect the service levels? (Give examples)
11. Do you use any other methods to determine road user satisfaction for winter services, pavements and rest-areas?
12. What are your road traffic injury/accident and fatality statistics for the public roads (managed by your road authority - NRA)? What are your normal summer and winter periods? Do you lower the speed limits during the winter periods? (Provide the results for the last 5 years in tabulated format, including statistics for all roads, summer periods and winter periods). What is the public road length in kilometers and road length for all roads? (make note if you are including private roads into the entire country length and provide the length of private roads in km)

	2004	2005	2006	2007	2008
Road Traffic Fatality figures (winter period)					
Entire country					
NRA-roads					
Road Traffic Fatality figures (summer period)					
Entire country					
NRA-roads					
Road Traffic Accident figures (winter period)					
Entire country					
NRA-roads					
Road Traffic Accident figures (summer period)					
Entire country					
NRA-roads					



Winter period (e.g. 16 November – 31 March): _____

Summer period (e.g. 1 April - 15 November): _____

Do you lower the speed limits for winter periods?

Yes

No

If yes, provide additional details and explanations.

Public road (NRA) length in km: _____

Road length for entire country
in km:

Private road length in km _____

13. How do you keep rest areas clean, functional, and in nice condition? Is the task outsourced? What types of information is provided at the rest areas? (For example: travel information, traffic congestion, and other services)

14. What additional services should be included at rest areas? Are the services free?

a. Are there private/commercial equivalent rest areas?

b. Are there any gated services?

c. What assurance is there for security and safety?

15. How is traffic information relayed to the public/customers? List all methods used. What are your charter clauses or public service commitments for rest areas, pavements and winter services?



16. How is the key stakeholder relationships managed? For example: cooperation and communication with trucking industry, police and public transport. (provide examples)

17. How do you identify differences in the satisfaction levels and service levels between regions, and between client groups? (provide examples)

18. Are you able to identify what causes the satisfactions levels to increase/decrease? (provide examples)

19. Have you ever done correlation studies between the satisfaction levels and road condition data? What road type classifications are compared? (provide details)

20. Do you ask behavioral and attitude questions? (provide examples)

21. Do you develop an index or indices from the results? (provide examples)

22. Do you ask if there are additional respondent comments or recommendations in customer surveys? (provide examples)



23. What new developments or changes are you planning to the customer satisfaction surveys? When will the changes be implemented? (provide examples)
24. What are some of the challenges in customer surveys and do you have any comments and recommendations?
25. Do you have any additional comments that were not asked – open ended?

Thank You for Your valuable responses!

Annex 4: CSM Questionnaire / Example 1

An example of a customer satisfaction measurement questionnaire used by Transport Scotland (Ipsos MORI 2009.):

Survey of Scottish Issues Wave 2 Final questionnaire 28/05/09

TIME STAMP

INTRODUCTION

Good morning/afternoon/evening. My name is from Ipsos MORI, the research organisation, and we are carrying out a survey on some important issues affecting Scotland today. The interview will take about 18 minutes.

I would like to assure you that all the information we collect will be kept in the strictest confidence, and used for research purposes only. It will not be possible to identify any particular individual or address in the results.

PRESENT RESPONDENT WITH MAP OF TRUNK ROAD NETWORK

This is a map of Scotland's trunk road network. Trunk roads include motorways and A roads.

ASK ALL

QTS1. How often have you travelled on a trunk road in Scotland in the last 12 months, either as a passenger or a driver?

SINGLE CODE

5 or more days a week	1
2-4 days a week	2
Once a week	3
Less than once a week but more than once a month	4
Once a month	5
Less than once a month	6
Never	7
Don't know	8

ASK ALL WHO USE TRUNK ROADS AT SOME POINT (CODES 1-6) AT QTS1
OTHERS GO TO SCREEN SHOWING:

That's all the questions about trunk roads I'd like to ask you.

THEN GO TO DEMOGRAPHICS SECTION

QTS2. SHOWCARD D In which of these ways do you travel on the trunk roads? Please read out the letters that apply.
MULTICODE OK

A	As a driver of a car/van	1
B	As a passenger in a car/van	2
C	As a driver of a goods vehicle, bus or coach	3
D	As a passenger in a bus or coach	4
E	As a motorcyclist	5
F	As a cyclist	6
G	Walking on footways alongside trunk roads	7
	Other (PLEASE WRITE IN AND CODE '8')	8
	Don't know	9

QTS3. SHOW MAP AGAIN Within which of these regions do you use trunk roads most often?
SINGLE CODE

North West	1
North East	2
South West	3
South East	4
Don't know	5

ASK ALL WHO MENTION A REGION (CODES 1-4) IN QTS3

OTHERS GO TO QTS5

QTS4. SHOW MAP AGAIN And on which of the specific trunk roads within this region do you most frequently travel? PROBE FULLY AND WRITE IN.

ANY ANSWER (WRITE IN AND CODE '1)	1
None/no answer	2
Don't know	3

ASK ALL

FOR THOSE WHO CODE DON'T KNOW (CODE 5) AT QTS3, OR WHO CODE DON'T KNOW (CODE 3) AT QTS4 READ OUT: For the remaining questions, I'd like you to focus on the trunk roads in Scotland you use most often.

FOR ALL OTHERS READ OUT: For the remaining questions, I'd like you to focus on these trunk roads in Scotland you use most often.

QTS5. Do you mainly travel on these roads..
 READ OUT a) – c)
 SINGLE CODE

- | | | |
|----|--|---|
| a) | During rush hours (7am-9am and/or 4pm to 7pm) | 1 |
| b) | During off peak hours (9am to 4pm and/or 7pm to 7am) | 2 |
| c) | During both periods | 3 |
| | Other | 4 |
| | Don't know | 5 |

QTS6. SHOWCARD E I'm now going to read out a number of aspects of the general state and condition of trunk roads and I'd like you to tell me how satisfied or dissatisfied you are with each.

READ OUT a) – g)
 SINGLE CODE EACH ROW
 RANDOMISE ORDER

	Very Satisfied	Fairly Satisfied	Neither satisfied nor dissatisfied	Fairly dissatisfied	Very dissatisfied	Don't know	N/A
a) The general condition of road surfaces	1	2	3	4	5	6	7
b) The management of vegetation on verges and central reserve	1	2	3	4	5	6	7
c) The amount of litter and debris on the road surface	1	2	3	4	5	6	7
d) The speed with which road defects such as potholes are repaired	1	2	3	4	5	6	7
e) The quality of repairs	1	2	3	4	5	6	7
f) The drainage of water from road surfaces	1	2	3	4	5	6	7
g) The amount of traffic congestion	1	2	3	4	5	6	7

QTS7. SHOWCARD F Here is a list of the things we just talked about. From this list, which 2 or 3 would you most like to see improved?
 MULTICODE UP TO 3 ONLY

- | | |
|---|----|
| The general condition of road surfaces | 1 |
| The management of vegetation on verges and central reserve | 2 |
| The amount of litter and debris on the road surface | 3 |
| The speed with which road defects such as potholes are repaired | 4 |
| The quality of repairs | 5 |
| The drainage of water from road surfaces | 6 |
| The amount of traffic congestion | 7 |
| Other write in | 8 |
| None of these | 9 |
| Don't know | 10 |

QTS8. SHOWCARD G For the next few questions I'd like you to think about road works and the maintenance of trunk roads. Still thinking about the trunk roads that you use most often, how satisfied or dissatisfied are you with the....

READ OUT a) – e)

SINGLE CODE EACH ROW

RANDOMISE ORDER

	Very Satisfied	Fairly Satisfied	Neither satisfied nor dissatisfied	Fairly dissatisfied	Very dissatisfied	Don't know	N/A
a) frequency with which you encounter road works	1	2	3	4	5	6	7
b) planning and coordination of diversions when road works take place	1	2	3	4	5	6	7
c) planning and coordination of lane closures and restrictions when road works take place	1	2	3	4	5	6	7
d) Promptness with which roads are cleared in the winter	1	2	3	4	5	6	7
e) Promptness with which roads are gritted in winter	1	2	3	4	5	6	7

QTS9. SHOWCARD H Here is a list of the things we just talked about. From this list, which 2 or 3 would you most like to see improved?

MULTICODE UP TO 3 ONLY

The frequency with which you encounter road works	1
The planning and coordination of diversions when road works take place	2
The planning and coordination of lane closures and restrictions when road works take place	3
The promptness with which roads are cleared in the winter	4
The promptness with which roads are gritted in winter	5
Other write in	6
None of these	7
Don't know	8

ASK ALL WHO SAY THEY CYCLE OR USE FOOTWAYS OR BOTH (CODES 6 OR 7 OR 6+7)
AT QTS2
OTHERS GO TO QTS14

FOR THOSE WHO CYCLE AND USE FOOTWAYS (CODE 6+7) AT QTS2 INSERT <cycle lanes and footways> INTO QUESTION WORDING, THEY SHOULD BE ASKED OPTIONS A-J

FOR THOSE WHO ONLY CYCLE (CODE 6) AT QTS2 INSERT <cycle lanes> INTO QUESTION WORDING, THEY SHOULD BE ASKED OPTIONS A-E

FOR THOSE WHO ONLY USE FOOTWAYS (CODE 7) AT QTS2 INSERT <footways> INTO QUESTION WORDING, THEY SHOULD BE ASKED OPTIONS F-J

QTS12. SHOWCARD L For the next few questions, I'd like you to think about the <INSERT APPROPRIATE TEXT FROM ABOVE> on trunk roads you use most often. Overall how satisfied or dissatisfied would you say you are with the...
READ OUT a) – j)
SINGLE CODE EACH ROW
RANDOMISE ORDER

		Very Satisfied	Fairly Satisfied	Neither satisfied nor dissatisfied	Fairly dissatisfied	Very dissatisfied	Don't know	N/A
a)	general condition of cycle lane surfaces	1	2	3	4	5	6	7
b)	provision of lighting on cycle lanes	1	2	3	4	5	6	7
c)	speed with which cycle lane defects such as potholes are repaired	1	2	3	4	5	6	7
d)	quality of cycle lane repairs	1	2	3	4	5	6	7
e)	availability of cycle lanes where they are needed	1	2	3	4	5	6	7
f)	general condition of footway surfaces	1	2	3	4	5	6	7
g)	provision of lighting on footways	1	2	3	4	5	6	7
h)	speed with which footway defects are repaired	1	2	3	4	5	6	7
i)	quality of footway repairs	1	2	3	4	5	6	7
j)	availability of footways where they are needed	1	2	3	4	5	6	7

ASK ALL WHO SAY THEY CYCLE OR USE FOOTWAYS OR BOTH (CODES 6 OR 7, 6+7) AT QTS2
OTHERS GO TO QTS14

FOR THOSE WHO CYCLE **AND** USE FOOTWAYS (CODE 6+7) AT QTS2, CAPI SCREEN SHOULD SHOW OPTIONS A-J AND INTERVIEWER INSTRUCTIONS SHOULD SAY: SHOWCARD MA FOR THOSE WHO USE CYCLE AND USE FOOTWAYS

FOR THOSE WHO **ONLY** CYCLE (CODE 6) AT QTS2, CAPI SCREEN SHOULD SHOW OPTIONS A-E AND INTERVIEWER INSTRUCTIONS SHOULD SAY: SHOWCARD MB FOR THOSE WHO ONLY CYCLE

FOR THOSE WHO **ONLY** USE FOOTWAYS (CODE 7) AT QTS2, CAPI SCREEN SHOULD SHOW OPTIONS F-J AND INTERVIEWER INSTRUCTIONS SHOULD SAY: SHOWCARD MC FOR THOSE WHO ONLY USE FOOTWAYS

QTS13. Here is a list of the things we just talked about. From this list, which 2 or 3 would you most like to see improved?
MULTICODE UP TO 3 ONLY

The general condition of cycle lane surfaces	1
The provision of lighting on cycle lanes	2
The speed with which cycle lane defects such as potholes are repaired	3
The quality of cycle lane repairs	4
The availability of cycle lanes where they are needed	5
The general condition of footway surfaces	6
The provision of lighting on footways	7
The speed with which footway defects are repaired	8
The quality of footway repairs	9
The availability of footways where they are needed	10
Other write in	12
None of these	13
Don't know	14

ASK ALL
QTS14. Here is a list of all the improvements you said you would like to see made over the last few questions. From this list, which are the 2 or 3 most important ones?
TURN CAPI MACHINE TO RESPONDENT
SHOW LIST OF ALL IMPROVEMENTS MENTIONED FROM QTS7, QTS9, QTS11 and QTS13
MULTICODE UP TO 3 ONLY

QTS15. SHOWCARD N Do you think that each of the following aspects of trunk roads has got better, worse or stayed the same over the past two years?

READ OUT a) – f)

SINGLE CODE EACH ROW

RANDOMISE ORDER

	Got better	Got worse	Stayed about the same	Don't know
a) General condition of road surfaces	1	2	3	4
b) Drainage of water from road surfaces	1	2	3	4
c) Visibility of road markings	1	2	3	4
d) Frequency with which you encounter road works	1	2	3	4
e) Promptness with which roads are cleared in the winter	1	2	3	4
f) Promptness with which roads are gritted in winter	1	2	3	4

ASK ALL WHO SAY THAT THEY ARE FAIRLY/VERY DISSATISFIED WITH THE GENERAL CONDITION OF ROAD SURFACES (CODES 4 OR 5) AT QTS6A
OTHERS GO TO QTS18

QTS16 SHOWCARD O You mentioned that you were dissatisfied with the general condition of road surfaces. When using trunk roads how often, if at all, do you encounter road defects which you feel are unsafe?

SINGLE CODE

Always	1
Usually	2
Sometimes	3
Rarely	4
Never	5
Don't know	6

ASK ALL WHO SAY ON AT LEAST RARELY (CODES 1-4) AT QTS16, OTHERS GO TO QTS18

QTS17 SHOWCARD P And what is the specific defect in most of these cases? Just read out the letter that applies.

SINGLE CODE

A	Uneven/bumpy surface	1
B	Potholes	2
C	Poor repairs	3
D	Cracking	4
E	Ironwork in need of repair (i.e. manholes, drain covers etc.)	5
F	Deterioration of road edge	6
G	Slippery roads caused by ice/snow	7
H	Poor skid resistance	8
I	Water on roads	9
J	Poor road makings	10
	Other – write in	11
	Don't know	12

ASK ALL WHO SAY THAT THEY ARE FAIRLY/VERY DISSATISFIED WITH THE GENERAL CONDITION OF CYCLE LANES (CODES 4 OR 5) AT QTS12A
OTHERS GO TO QTS20

QTS18 SHOWCARD Q You mentioned that you were dissatisfied with the general condition of cycle lane surfaces. When using the cycle lanes how often, if at all, do you encounter defects which you feel are unsafe?
SINGLE CODE

Always	1
Usually	2
Sometimes	3
Rarely	4
Never	5
Don't know	6

ASK ALL WHO SAY ON AT LEAST RARELY (CODES 1-4) AT QTS18
OTHERS GO TO QTS19

QTS19 SHOWCARD R And what is the specific defect in most of these cases? Just read out the letter that applies.
SINGLE CODE

A	Uneven/bumpy surface	1
B	Potholes	2
C	Poor repairs	3
D	Cracking	4
E	Ironwork in need of repair (i.e. manholes, drain covers etc.)	5
F	Deterioration of cycle lane edge	6
G	Slippery cycle lanes caused by ice/snow	7
H	Water on cycle lanes	9
I	Poor cycle lane makings	10
J	Loose/damaged/missing kerbs	11
	Other –write in	12
	Don't know	13

ASK ALL WHO SAY THAT THEY ARE FAIRLY/VERY DISSATISFIED WITH THE GENERAL CONDITION OF FOOTWAYS (CODES 4 OR 5) AT QTS12F
OTHERS GO TO QTS22

QTS20 SHOWCARD S You mentioned that you were dissatisfied with the general condition of footway surfaces. When using the footways how often, if at all, do you encounter defects which you feel are unsafe?
SINGLE CODE

Always	1
Usually	2
Sometimes	3
Rarely	4
Never	5
Don't know	6

ASK ALL WHO SAY ON AT LEAST RARELY (CODES 1-4) AT QTS20
OTHERS GO TO QTS22

QTS21 SHOWCARD T And what is the specific defect in most of these cases? Please just read out the letters that apply.
SINGLE CODE

A	Uneven/bumpy surface	1
B	Potholes	2
C	Poor repairs	3
D	Cracking	4
E	Ironwork in need of repair (i.e. manholes, drain covers etc.)	5
F	Slippery footways caused by ice/snow	7
G	Water on footways	9
H	Wobbly paving slabs	11
I	Loose/damaged/missing kerbs	12
	Other –other write in	13
	Don't know	14

The next few questions are about electronic message boards.

READ OUT STATEMENT ON SHOWCARD J OR SHOW RESPONDENT SHOWCARD FOR THEM TO READ THEMSELVES

QTS22 SHOWCARD U To what extent, if at all, do you find electronic message boards useful in...
READ OUT a) – h)
SINGLE CODE EACH ROW
RANDOMISE ORDER

	Very useful	Fairly useful	Not very useful	Not at all useful	Don't know
a) providing accurate information about traffic conditions	1	2	3	4	5
b) providing up to date information about traffic conditions	1	2	3	4	5
c) providing messages about driving safely	1	2	3	4	5
d) providing information that is easy to read	1	2	3	4	5
e) providing information about alternative routes	1	2	3	4	5
f) providing information about the length of traffic delays	1	2	3	4	5
g) providing reasons for traffic delays	1	2	3	4	5
h) enabling you to save time on your journey	1	2	3	4	5

QTS23 SHOWCARD U AGAIN And, overall, how useful, if at all, do you find electronic message boards?
SINGLE CODE

Very useful	1
Fairly useful	2
Not very useful	3
Not at all useful	4
Don't know	5

We are also interested in finding out how useful people would find some new types of information that could be displayed on electronic message boards.

QTS24 SHOWCARD U AGAIN How useful, if at all, would you find information on...
READ OUT a) – d)
SINGLE CODE EACH ROW
RANDOMISE ORDER

	Very useful	Fairly useful	Not very useful	Not at all useful	Don't know
a) the temperature outside	1	2	3	4	5
b) the amount of time that it will take to travel to destinations	1	2	3	4	5
c) the current date and time	1	2	3	4	5
d) public transport such as train or bus times	1	2	3	4	5

QTS25 Moving on, do you have access to the internet at all?
SINGLE CODE ONLY.

Yes	1
No	2
Don't know	3

ASK ALL WHO HAVE INTERNET ACCESS (CODE 1) AT QTS25
OTHERS GO TO QTS29

QTS26 Have you ever used the Traffic Scotland web site?
SINGLE CODE ONLY.

Yes	1
No	2
Don't know	3

ASK THOSE WHO HAVE USED THE TRAFFIC SCOTLAND WEBSITE (CODE 1) AT QTS26
OTHERS GO TO QTS28

QTS27 SHOWCARD V Thinking about your experiences of using the Traffic Scotland web site, how would you rate it?
SINGLE CODE

Very good	1
Fairly good	2
Neither good nor poor	3
Fairly poor	4
Very poor	5
Don't know	6

ASK ALL WHO HAVE ACCESS TO THE INTERNET (CODE 1) AT QTS 25
OTHERS GO TO QTS29

FOR THOSE WHO HAVE NOT USED THE TRAFFIC SCOTLAND WEBSITE (CODE 2) AT QTS26 READ: The Traffic Scotland website provides up to date information on traffic conditions on the motorways and main roads of Scotland. We are interested in views on some additional services that could be provided through the Traffic Scotland website.

FOR THOSE WHO HAVE USED THE TRAFFIC SCOTLAND WEBSITE (CODE 1) AT QTS26 READ:

We are interested in views on some additional services that could be provided through the Traffic Scotland web site.

QTS28 SHOWCARD W How useful, if at all, would you find...

READ OUT a) – e)

SINGLE CODE EACH ROW

RANDOMISE ORDER

		Very useful	Fairly useful	Not very useful	Not at all useful	Don't know
		1	2	3	4	5
a)	Emails alerting you of incidents that affect the journeys you make on a regular basis					
b)	Text messages alerting you of incidents that affect the journeys you make on a regular basis	1	2	3	4	5
c)	Information on journey times based on different departure times	1	2	3	4	5
d)	Information on journey times for different forms of public transport	1	2	3	4	5
e)	A facility to customise the Traffic Scotland website to only show information that is relevant to you	1	2	3	4	5

ASK ALL

Moving on, we are also interested in what you think of the idea of a new digital traffic radio station for road users. This station would provide real-time regional traffic information and would be updated every 10 or 15 minutes. With this new service, people would be able to tune in whenever they want traffic information rather than waiting on traffic announcements to come on the radio.

QTS29 SHOWCARD W AGAIN To what extent, if at all, would you find this digital radio station useful?

SINGLE CODE

Very useful	1
Fairly useful	2
Not very useful	3
Not at all useful	4
I don't have a digital radio	5
Don't know	6

ASK ALL

Finally, the trunk road network is the responsibility of Transport Scotland, a public body that reports to the Scottish Government.

QTS30 Had you heard of Transport Scotland before this interview?
SINGLE CODE ONLY.

Yes	1
No	2
Don't know	3

ASK ALL THOSE WHO HAVE HEARD OF TRANSPORT SCOTLAND (CODE 1) AT QTS30

QTS31 Where have you seen or heard anything about Transport Scotland?
DO NOT PROMPT
SINGLE CODE

Road Sign	1
Magazine or Newspaper	2
Radio	3
TV	4
Internet	5
Friend/relative/word of mouth	6
At work	7
On transport/bus/train/tram stations	8
School/college	9
Community council	10
Other – write in	11
None of these	12
Don't know	13

TIME STAMP

DEMOGRAPHICS SECTION

ASK ALL

QA CODE RESPONDENTS GENDER
SINGLE CODE

Male	1
Female	2

QB WRITE IN & CODE EXACT AGE
SINGLE CODE

Exact age	
18-24	1
25-34	2
35-44	3
45-54	4
55-59	5
60-64	6
65-74	7
75+	8

QC Working Status of Respondent:

Working - Full time (30+ hrs)	1
- Part-time (9-29 hrs)	2
Unemployed	3
Not working - retired	4
- looking after house/children	5
- invalid/disabled	6
Student	7
Other (PLEASE SPECIFY)	8

QD Occupation of Chief Income Earner

Position/rank/grade

Industry/type of company

Quals/degree/apprenticeship

Number of staff responsible for

QE Class:
SINGLE CODE

A	1
B	2
C1	3
C2	4
D	5
E	6

QF How many cars or light vans are there in your household?
SINGLE CODE

1 car or light van	1
2 cars/light vans	2
3+ cars/light vans	3
None	4
Refused/don't know	5

QG Do you have any long-term illness, health problem or disability which limits your daily activities or the work you can do?
SINGLE CODE ONLY

Yes	1
No	2
Refused/don't know	5

QH SHOWCARD X
What is your household's total income from all sources over the last 12 months? Just read out the letter from the card.
SINGLE CODE.

	Per Week	Per Year	
A	Less than £100	Less than £5,200	1
B	£100 to £199	£5,200 to £10,399	2
C	£200 to £299	£10,400 to £15,599	3
D	£300 to £499	£15,600 to £25,999	4
E	£500 to £699	£26,000 to £36,399	5
F	£700 to £949	£36,400 to £49,399	6
G	£950 to £1,199	£49,400 to £62,399	7
H	£1,200 to £1,499	£62,400 to £77,999	8
I	£1,500 or more	£78,000 or more	9

QIA WRITE IN NUMBER OF ADULTS IN THE HOUSEHOLD

QIB WRITE IN NUMBER OF CHILDREN IN THE HOUSEHOLD (UP TO 15 YEARS OLD)

ASK IF CHILDREN IN THE HOUSEHOLD AT QIB

QIC What ages are the children in the household?
MULTICODE OK

0-4	1
5-7	2
8-10	3
11-15	4
Don't know	5

ASK ALL

QJ SHOWCARD Y Which of these best describes the ownership of your home? Please read out the letter that applies.

SINGLE CODE ONLY.

A	Owned outright (including leasehold)	1
B	Buying on mortgage	2
C	Rented from Council	3
D	Rented from housing association	4
E	Rented from private landlord	5
	Other	6

Annex 5: CSM Questionnaire / Example 2

An example of a customer satisfaction measurement questionnaire for private drivers used by the former Finnish Road Administration (Finnish Road Administration 2008.):

FINNISH ROAD ADMINISTRATION'S ROAD USER SATISFACTION SURVEY WINTER 2008

The intention of this survey is to find out your opinion about the maintenance and condition of the roads indicated on the map on the reverse side of the cover letter. All of the region's roads are marked on the map, and you can use it to check which ones are main roads and which ones are other roads.

The Finnish Road Administration is responsible for improving the traffic conditions of roads maintained by the State, the daily traffic worthiness of roads and the maintenance of their condition. In addition, the Finnish Road Administration controls traffic using traffic signs, traffic markings and directional signs, by providing information on road conditions and by maintaining resting areas. The Finnish Road Administration is not responsible for streets in municipalities or towns, planned roads or private roads.

Please reply by placing an "X" in the box under the choice that corresponds to your opinion. In this survey, we are interested in your experiences during the current winter season.

1. How often do you travel on the roads indicated on the map?

	Daily or almost daily	Weekly	Less often	(Almost) never
On main roads	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
On other paved roads.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
On gravel roads.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
On pedestrian and bicycle roads.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

2. How satisfied are you with the overall condition of the roads indicated on the map during the 2007–2008 winter season?

Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	I cannot say
<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

3. Evaluate how satisfied you are with the condition of the road network and with the following areas of winter maintenance for the roads indicated on the map.

	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	I cannot say
1. Antiskid treatment on main roads....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
2. Snow ploughing on main roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
3. Evenness of the road surface on main roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
4. Antiskid treatment on other roads....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
5. Snow ploughing on other roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
6. Evenness of the road surface on other roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
7. Winter maintenance of resting areas and lay-bys.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
8. Visibility of traffic signs and signposts.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
9. Winter maintenance of bus stops....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
10. Winter maintenance of pedestrian and bicycle roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
11. Adequacy of road lighting.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
12. Provision of information on weather and traffic conditions on main roads.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

4. If you wish, you can state reasons for the grades you give. Please indicate which section your reasons concern by marking its number (1–12) at the start of the line. We would be especially interested in your comments if you gave a grade of "dissatisfied" or "very dissatisfied". Please describe the main matters that you have been dissatisfied with.

Next, we will ask your opinion separately on main roads and other roads.

- 5a. To what extent have road conditions in the winter on main roads made your travel more difficult in terms of...?

	Not at all	A few times during the winter	Weekly	Daily	I cannot say
comfort	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
safety	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
smoothness	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
predictability of the travel time.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

- 5b. If road conditions in winter have made your travel more difficult on main roads, when has it mainly occurred?

Day of the week	Time	Type of trip
weekdays <input type="checkbox"/> 1	6–9 a.m. <input type="checkbox"/> 1	work, study or business.. <input type="checkbox"/> 1
Saturday..... <input type="checkbox"/> 2	9 a.m.–3 p.m. <input type="checkbox"/> 2	shopping or personal business <input type="checkbox"/> 2
Sunday..... <input type="checkbox"/> 3	3 p.m.–6 p.m. <input type="checkbox"/> 3	free time or holiday..... <input type="checkbox"/> 3
I cannot say..... <input type="checkbox"/> 4	6 p.m.–10 p.m..... <input type="checkbox"/> 4	I cannot say..... <input type="checkbox"/> 4
	10 p.m.–6 a.m..... <input type="checkbox"/> 5	
	I cannot say..... <input type="checkbox"/> 6	

- 6a. To what extent have road conditions in the winter on other roads made your travel more difficult in terms of...?

	Not at all	A few times during the winter	Weekly	Daily	I cannot say
comfort	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
safety	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
smoothness.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
predictability of the travel time.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

- 6b. If road conditions in winter have made your travel more difficult on other roads, when has it mainly occurred?

Day of the week	Time	Type of trip
weekdays <input type="checkbox"/> 1	6–9 a.m. <input type="checkbox"/> 1	work, study or business.. <input type="checkbox"/> 1
Saturday..... <input type="checkbox"/> 2	9 a.m.–3 p.m. <input type="checkbox"/> 2	shopping or personal business <input type="checkbox"/> 2
Sunday..... <input type="checkbox"/> 3	3 p.m.–6 p.m. <input type="checkbox"/> 3	free time or holiday..... <input type="checkbox"/> 3
I cannot say..... <input type="checkbox"/> 4	6 p.m.–10 p.m..... <input type="checkbox"/> 4	I cannot say..... <input type="checkbox"/> 4
	10 p.m.–6 a.m..... <input type="checkbox"/> 5	
	I cannot say..... <input type="checkbox"/> 6	

USE OF SALT

7. Do you think that at the present time the right amount of salt is used in antiskid treatment?

- No, not enough is used 1
 Yes 2
 No, too much is used 3

WINTER AND DARKNESS SPEED LIMITS

The highest speed limits are reduced during the late autumn and winter on most of the main road network because of the more difficult driving conditions due to darkness or skidding.

8. Speed limits are reduced during the winter. Do you accept this arrangement?

- Yes 1
 No 2

9. In general, how would you describe the speed limits on roads in the winter?

- too high 1
 just right 2
 too low 3

10. Does following the speed limits in the winter bother you?

- Yes, a lot 1
 Yes, a little bit 2
 No 3

POLICE SPEED CAMERAS

11. How do you feel about the extent of the use of police speed cameras? How do you feel about the number of roads that have police speed cameras?

- there are too few, there should be more roads with police speed cameras 1
 there are the right amount of police speed cameras 2
 there are too many, there should be fewer roads with police speed cameras 3

THE FINNISH ROAD ADMINISTRATION'S CUSTOMER SERVICES

The Finnish Road Administration is developing its customer services. The objective is to make it easier to deal with the Finnish Road Administration.

- Information is available on our website (www.tiehallinto.fi) where you can also leave feedback.
- By calling our customer service on 020 690 300 (Finnish) or 020 690 301 (Swedish) you can ensure that the processing of your matter is started, receive an immediate reply to your question or advice and you can leave feedback (weekdays 9 a.m.– 4 p.m.).
- To notify about road conditions or traffic problems that require immediate action, please call The Road User Line on 0200 2100 (24 hours a day)

12a. Are you familiar with the Finnish Road Administration's service channels and have you used them?

	Yes, and I have used them during the last year	I am familiar with them but have not used them	No
Finnish Road Administration's website	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Customer service telephone line	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
The Road User Line	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

12b. If you replied above that you have used the Finnish Road Administration's service channels, how satisfied are you with them?

	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	I cannot say
Finnish Road Administration's website	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
Customer service telephone line.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
The Road User Line	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

Finally, we would like to ask you for some background information for the statistical processing of the material

1. Your gender

Female 1

Male 2

2. Your age

--	--

years

3. Does your household have regular access to a car?

Yes 1

No 2

4. What kind of tyres do/does the car(s) used in your household this winter have?

studded tyres 1

friction tyres 2

my household has two or more cars, some of which have studded tyres and some of which have friction tyres 3

5. Which of the following choices best describe your use of a motor vehicle? (tick all that apply)

I drive a car regularly 1

I drive a car occasionally 2

I do not drive a car, but I am a passenger 3 => Please go to question 7

I very rarely use a car / never use a car 4 => Please go to question 7

I drive a motorcycle 5

I drive a moped 6

6. Approximately how many kilometres a year do you drive?

	0 km/year	Under 5,000 km/year	5,000– 10,000 km/year	10,001– 20,000 km/year	20,001– 30,000 km/year	Over 30,000 km/year
By car	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
By motorcycle	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
By moped.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

7. Do you use a bus?

Daily / almost daily 1

Weekly 2

Less often 3

(Almost) never..... 4

8. Do you bicycle during the winter?

Daily / almost daily 1

Weekly 2

Less often 3

(Almost) never..... 4

9. How many kilometres per day on average do you walk on roads, pavements or bicycle paths?

Less than 1 km..... 1

1–5 km 2

More than 5 km 3

10. Do you have some permanent physical or other handicap that hinders your mobility?

Yes..... 1

No..... 2

11. How would you describe the population of your place of residence?

Densely populated area..... 1

Sparsely populated area..... 2

12. Does your household include children who are of comprehensive-school age (7–15 years old)?

Yes 1

No..... 2

13. Which of following choices best describes your work?

I have a regular full-time job 1

I have a part-time job or work irregularly..... 2

I am unemployed or have been laid off... 3

I am a student..... 4

I am retired 5

Other (e.g., maternity leave, paternity leave, parental leave, alternation leave)..... 6