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CUSTOMER VALUE OF CONNECTED REMOTE SERVICES AND THEIR IMPACT ON CAR SERVICING LOYALTY

Doctoral Thesis

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ANNOTATION

This doctoral thesis investigates the impact of connected remote services on customer value and its effect in terms of car servicing loyalty within the automotive after-sales business, based on fundamental literature, the analysis of previous studies and evidence from a research study which combined qualitative and quantitative methods. The purpose of this research is to derive suggestions for managers and identify future fields of research for scientists. The main hypothesis postulates that the greater is the contribution of certain key factors of connected remote services to customer value, the higher is the effect on car servicing loyalty.

To support this hypothesis, several structured steps were taken. At the conclusion of the well-founded literature review on service innovation, customer value and customer loyalty, it was possible to define and characterise connected remote services and also identify interrelations between customer value and car servicing loyalty. The in-depth analysis of previous studies on technology acceptance of mobile services in different industry sectors resulted in the first grouping of connected remote services' potential key factors. Based on this foundation, the exploration of connected remote services by using the means-end chain method as a qualitative research approach led to the identification of five key factors for the conceptualization of the phenomenon. A research model was developed by combining the results of the theoretical considerations and the qualitative study. It was evaluated empirically within the German automotive after-sales business. For the survey, the opinions of active customers of connected remote services were collected using an online-questionnaire.

The empirical results support the formulated main hypothesis that the higher is the contribution made by certain key factors of connected remote services to customer value, the higher is the effect on car servicing loyalty. The results also demonstrated that comfort, which was one of five key factors of connected remote services identified, was not significant for the model. The concept of connected remote services was adapted and now comprises four empirically validated key factors: convenience, interactivity, safety, and reliability. The thesis is limited to the German automotive after-sales business and the connected remote services provided by six brands of car.

The findings will help managers of car dealerships and vehicle manufacturers, to further improve their connected remote services offerings in terms of providing superior customer value and creating car servicing loyalty. The suggested research model would also constitute a good starting point for further research.

Keywords: Automotive; car servicing loyalty; connected remote services; customer value.

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ABBREVIATIONS

AVE	average variance extracted
B2B	business-to-business
B2C	business-to-consumer
CFT	comfort
CITC	corrected item to total correlation
COV	convenience
CR	composite reliability
CRM	customer relationship management
CRS	connected remote services
CSL	car servicing loyalty
DAS	driver assistance system
ICT	information and communication technology
INO	innovativeness
INT	interactivity
IR	indicator reliability
IT	information technology
ITSUM	interactive technology-mediated service usage model
JOY	enjoyment
HVAC	heating, ventilation, and air conditioning
MIMIC	multiple indicator multiple cause
n.s.	not significant
PERVAL	perceived value scale
PLS	partial least squares
REL	reliability
REU	connected remote services reuse intention
RM	relationship management
SEM	structural equation modelling
SI	service innovation
STY	safety
TAM	technology acceptance model
TRA	theory of reasoned action
TRU	trust
VAL	customer value
VDMA	German Machinery and Plant Manufacturers' Association (Verband Deutscher Maschinen- und Anlagenhersteller)
VIF	variance inflation factor

INTRODUCTION

Topicality

One current general trend in the automotive industry is that the isolated focus on car sales is being replaced by a wider perspective, which considers the initial car sale as more of an enabler for beginning customer relationships. Car sales are becoming the starting point for relationship management based on additional services to expand the traditional after-sales business, consisting of maintenance and repair services aimed at ensuring the existing market share and profits.[1] The intensification of competitive pressure not only affects large companies, such as vehicle manufacturers, but also small- and medium-size companies, such as car dealerships and car service providers. In the future, the after-sales business will be the most enduring and important business for car manufacturers, as well as a vital opportunity for brand building, as it represents continuous contact between manufacturers and customers through their authorized dealership networks.[2] Although after-sales business makes a significant contribution to financial success, car manufacturers have paid it scant attention in the past.

Today, many automotive companies, especially in the luxury car segment, are starting to expand their service portfolio to catch up. The traditionally product-centred business approach has moved from only selling physical products to combining products and services to solve customers' problems and create superior value, e.g., in the car servicing business maintenance and repair services are supplemented by innovative services, using the new potential of information and communication technology (ICT) at the customer interface. The rewards for successfully introducing service innovation can be observed in competitive advantages, leading to an increased management focus and investment in the development of such service innovation in the entire industry, with the aims of accelerating further economic growth and raising quality and productivity levels. One challenge is to combine technology, business, social, and customer needs into the systematic service innovation creation and management process.

The integration of information and communication technology has gained relevance in the automotive industry by focusing on car-to-car communication and smart phone integration. Systems, such as live traffic information and automated emergency-calls, arise from the context-based adaption of services and processes at the interfaces between customer, dealer, car servicing, brand, and vehicle. Connected remote services, the object of this thesis, are examples of

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1 Confente, I. and Russo, I. (2015), "After-sales service as a driver for word-of-mouth and customer satisfaction: insights from the automotive industry," *International Journal of Management Cases* 17, no. 4: p. 59.

2 Ahmad, S. and Mohsin Butt, M. (2012), "Can after sale service generate brand equity?," *Marketing Intelligence & Planning* 30, no. 3: p. 313.

such ICT-based service innovations and can be categorised as a customer retention management measure developed by the vehicle manufacturers and provided by car dealerships to their individual customer base. Innovative technology is used to provide superior customer value mainly addressed to the fields of car servicing. The potential pay-off aims to increase car servicing loyalty to a specific dealership.

Vehicle manufacturers and dealerships both strive to increase customer loyalty, but have different motives for doing so. While manufacturers are primarily focused on brand loyalty, dealerships focus on dealership loyalty, which can further be divided into sales loyalty and car servicing loyalty. The existing research has demonstrated the positive effect of brand loyalty on dealership loyalty,[3] which leads to vehicle manufacturers and dealerships having a co-interest in introducing connected remote services and rapidly increasing this new service's market penetration. Additionally, dealerships must be more involved in loyalty-building measures than the manufacturers. To increase car servicing loyalty, customer retention management strategies are implemented with measures, which focus on additional services for customers. The competitive advantage for vehicle manufacturers and their dealership networks from connected remote services is mainly based on the possibility of direct customer interaction with active customers via connected remote services, which allows the providers to exclusively market their individual car servicing offerings to their customer base.

This thesis investigates whether the customer value created by using connected remote services positively affects car servicing loyalty. This interrelation has not yet been investigated in terms of customer perceptions of both the acceptance of the service innovation itself, and the consequences of its use on car servicing loyalty. The existing literature does not describe the underlying characteristics of connected remote services, which leads to there being no clear understanding of benefits and disadvantages provided by connected remote services. In addition, there is no empirical data on customers' perceptions, or the drivers of reuse intention for connected remote services and their effects on car servicing loyalty. These points represent considerable gaps in research, which the present thesis aims to fill.

[3] Bloemer, J. M.M. and Pauwels, K. (1998), "Explaining brand loyalty, dealer sales loyalty and dealer after-sales loyalty: the influence of satisfaction with the car, satisfaction with the sales service and satisfaction with the after-sales service," *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior* 11: p. 88; Bauer, H. H., Huber, F., and Bräutigam, F., *Determinanten der Kundenloyalität im Automobilsektor: Eine empirische Studie im Neu- und Gebrauchtwagenmarkt* (Mannheim: Inst. für Marketing, 1997), p. 67.

Research object

Connected remote services in the automotive after-sales business.

Research subject

Customer value of connected remote services' key factors and their impact on car servicing loyalty.

Purpose

The purpose of the thesis at hand is to provide managers of car dealerships and vehicle manufacturers with suggestions for enhancing their customer retention management strategies by using connected remote services.

Research objective

The objective of the present thesis is to elucidate the impact of customer value, created by key factors of connected remote services, on car servicing loyalty. It aims to prove the interrelationship between the three phenomena by collecting empirical evidence from active connected remote services customers in Germany.

Tasks required to achieve the research objective are to

1. Define, classify and explore the concept of connected remote services and identify the relevant key factors by using qualitative methods;
1. Perform a literature review on customer value, its antecedents and consequences, to derive findings for the development of the research model;
2. Analyse the concept of car servicing loyalty, with an emphasis on intentional aspects and approaches for its measurement;
3. Investigate current models in related research fields, to derive implications for the development of the research model;
4. Combine the findings of the qualitative study and the theoretical findings from the literature review into a comprehensive research model, linking the key factors of connected remote services towards customer value and car servicing loyalty;
5. Empirically examine the research model based on data collected from active customers of connected remote services, and analyse the results using statistical methods with the aim of deriving predictions and explanations from it;

6. Suggest future research areas to scientists and universities, and identifying possible research directions to generalize these results for other sectors;
7. Derive managerial implications for further enhancement of connected remote services in the automotive industry.

Hypothesis and research questions

The basic hypothesis (HB) of this thesis is postulated as follows:

HB: The more certain key factors of connected remote services contribute to customer value, the higher is the effect on car servicing loyalty.

Based on the information given in the topicality section, the following research questions arise:

1. Which key factors form a general profile of connected remote services?
2. Are there certain key factors that contribute more to customer value than others?
3. To what extent do key factors of connected remote services explain and determine measurable consequences of customer value?

Theses presented for defence

Aligned with the main hypothesis and the research questions mentioned above, the following additional propositions have been developed as a basis for all research and analysis:

Proposition 1: For connected remote services, there is a limited number of key factors that have a positive impact on customer value and trust.

Proposition 2: The customers' intention to reuse connected remote services is determined by their perception of customer value and trust generated through certain key factors of CRS.

Proposition 3: Connected remote services to some extent determine car servicing loyalty and can therefore be used as an effective customer retention management tool.

Proposition 4: The trust building effects of connected remote services are of higher importance for customers of premium brands than for those of volume brands.

Novelties

1. Development of a research model for the interrelation between key factors of connected remote services towards customer value and car servicing loyalty.
2. Definition and exploration of connected remote services in uniquely fine grading and development of a measurement concept.
3. Identification of drivers for customer value creation by connected remote services, which constitute effective levers for the enhancement of customer retention management.
4. Discovering the impact of connected remote services reuse intention on car servicing loyalty in the automotive trade business, which can be applied to different types of connected remote services and after-sales loyalty in other industries.
5. Revealing interactivity as a particular key factor of connected remote services to have an impact on car servicing loyalty.

Methodology of the study

By using scientific databases, fundamental literature on service innovation, customer value and customer loyalty has been identified. The review of articles, publications and books, as well as the analysis of contemporary research in the field of technology acceptance of mobile services provided important findings and implications for the development of the research model.

A qualitative study among active users of connected remote services was performed to identify potential key factors of connected remote services and to supplement the theoretical findings from the literature review. For this purpose, the means-end chain method was used. The data obtained in the written questionnaires, were analysed using various qualitative methods (content analysis, implication matrix, hierarchical value map).

The empirical evidence is based on primary data from German automotive customers, which were required to be active users of connected remote services. The data was collected using a pre-tested online questionnaire. The data obtained was analysed using structural equation modelling and the software SPSS 24.0 and Smart PLS 3.2.7. The data was tested for skewness and kurtosis to test it for normality. The non-response bias was tested using the Mann–Whitney U-test. Analysis of the empirical results was extended by using various quantitative methods (frequency analysis, grouping, comparisons, rankings, factor analysis, cross-tabulation, correlation analysis, maximum likelihood analyses and multi-group causal analyses).

Structure of the thesis

The thesis is separated into three main chapters:

Chapter 1 covers the theoretical foundations of service innovation, customer value and customer loyalty. The necessary definitions of connected remote services and car servicing loyalty are developed and applied to current theories linking services to customer loyalty. The first chapter concludes with a summary, which reveals customer value to be a suitable link between connected remote services towards car servicing loyalty.

The second chapter links the theory to the context of the automotive industry in Germany and the competitive situation between the authorized dealership networks and the independent market. Moreover, the current state of connected remote services technology is analysed in a cross-brand comparison to develop a common understanding of existing functions. Current models from the field of technology acceptance research are investigated to derive implications for the model development.

The development of the research model and hypotheses are presented in the third chapter. First, connected remote services are conceptualized, so that the determining key factors can be identified using an explorative, qualitative approach. The research model is derived from the findings from the literature review and earlier research in related fields, combined with the results of the qualitative study. The third chapter also includes the results of the empirical study carried out with 331 users of connected remote services, as well as the analysis and validation of the postulated hypotheses. The chapter concludes with a discussion and interpretation of the results. The final part of the doctoral thesis presents the conclusions and suggestions to managers and scientists in accordance with the main hypothesis, research questions and propositions proposed initially.

Limitations of the study

There are limitations to the research design and findings, which need to be considered, when deriving conclusions and generalizing the results.

In this thesis, it is claimed that key factors of connected remote services, are the source of customer value outcomes, such as reuse intention for connected remote services and car servicing loyalty. However, this study only investigated the perceptions of active users; the extent, to which the non-usage of connected remote services affects value perceptions and outcomes, was not addressed by this study.

Further, the results of the qualitative study in respect of customer sacrifices, as second dimension of customer value, was neglected in the further process of research. This is because the main sacrifices described in the literature, such as monetary costs[4] and non-monetary costs,[5] are not applicable to connected remote services, because their use is free of charge for customers. The design of the qualitative study concentrated on active users of connected remote services, which has the consequence that all the participants had access to and could use, connected remote services. This is a plausible explanation for the non-occurrence of customer sacrifices.

Moreover, the subject of this research has been validated in the German automotive after-sales business. The results as well as the derived conclusions and implications, are based on six German car brands which offer connected remote services at different levels of maturity. The findings could differ for other brands or other countries. The setting for the research carried out is limited, due to its focus on private passenger car customers. Due to the restrictions of this B2C setting, transferability to complementary sectors of commercial customers and vehicles, requires evaluation of the findings under the specific circumstances of those sectors. It is also possible that the customer value received from connected remote services use, or its importance, may be very different when considered in other cultural contexts. It is important to recognize that the key factors and values identified in this study are based on an industrialized Western culture.

This research only refers to authorized dealerships and their specific connected remote services offerings. The offerings of independent dealerships are outside the scope of this thesis. This limitation mainly results from the fact that, to date, connected remote services are only available in combination with a service agreement with car dealerships from the manufacturers' own retail networks or authorized dealership networks. Thus, connected remote services can only be activated by an authorized dealership, leading to the fact that the customer can only be connected to this specific dealership via these services.

However, despite several limitations, this study provides a foundation for advanced investigation of user perceptions of connected remote services in the automotive context.

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[4] Lapierre, J. (2000), "Customer-perceived value in industrial contexts," *Journal of Business & Industrial Marketing* 15, 2/3: p. 123.

[5] Woodall, T. (2003), "Conceptualising 'Value for the Customer': An Attributional, Structural and Dispositional Analysis," *Academy of Marketing Science Review* 2003, no. 12: p. 12.

Approbation of the research results

The main parts of the thesis were developed in a dialogue with the scientific community. The results and the process of the research were presented in eight international scientific conferences, among others at the University of Latvia (Latvia), the University of Twente (Netherlands), and the University of Warsaw (Poland). The results have been reported in eight publications.

Author's presentations in scientific conferences

1. Manowicz, A.-A. (2016), *Contribution of customer communication platforms to customer retention*. Academy of Business Administration, International Conference. August 3rd – 7th 2016, Prague, Czech Republic.
2. Manowicz, A.-A. (2017), *Exploring the concept of Connected Service Innovation*. New challenges of economic and business development. International scientific conference of the University of Latvia, May 18th – 20th, 2017, Riga, Latvia.
3. Manowicz, A.-A. (2017), *Means-End Chain analysis within explorative research.* New challenges of economic and business development. International scientific conference of the University of Twente, August 20th – 21st, 2017, Twente, Netherlands.
4. Manowicz, A.-A. (2017), *Technology Induced Loyalty Model – a theoretical consideration*. Annual Berlin Business Research Conference, International scientific conference of the World Business Institute of Australia, September 15th – 16th, 2017, Berlin, Germany.
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6. Manowicz, A.-A. (2017), *Connected Remote Services – Connecting customers with products and dealers*. 8th International Scientific Conference for Ph.D. students of EU countries. International Conference of Comparative European Research, October 30th – 31st, 2017, London, United Kingdom.
7. Manowicz, A.-A. and Šavriņa, B. (2017), *Conceptualization and validation of Connected Remote Service as a second-order formative construct*. 26th International Scientific Conference on Economic and Social Development - Building Resilient Society, University North, December 8th – 9th, 2017, Zagreb, Croatia.

8. Manowicz, A.-A. (2018), *Empirical evaluation of connected remote services – findings from the German automotive market*. 76th Annual International Conference of the University of Latvia, January 25th, 2018, Riga, Latvia.

Publications

1. Manowicz, A.-A. (2017), "Contribution of customer communication platforms to customer retention". In: *Global Business Trends, 2017 Edition*, pp. 59-66, ISBN 1-887676-06-6.
2. Manowicz, A.-A. (2017), "Exploring the concept of Connected Remote Services". In: *Proceeding of Reports: New Challenges of Economic and Business Development – 2017 Digital Economy*. University of Latvia, Riga. pp. 327-335, ISBN 978-9934-18-242-6.
3. Manowicz, A.-A. (2017), "Technology Induced Loyalty Model - a theoretical consideration". In: *Proceedings of Annual Berlin Business Research Conference*, World Business Institute, Melbourne, Australia, https://wbiworldconpro.com/pages/paper/berlin-germany-conference-september-2017/4233, accessed October 2018, ISBN 978-1-925488-45-6.
4. Manowicz, A.-A. (2017), "A model for Brand Loyalty creation by Connected Remote Services". In: Economic and Social Development - Proceedings of 24th International Scientific Conference on Economic and Social Development 2017, University of Warsaw, Poland, pp. 10-20, ISSN 1849-7535.
5. Manowicz, A.-A. (2017), "Connected Remote Services - Connecting customers with products and dealers". In: *Proceedings of Research Track of the 8th Biannual CER Comparative European Research Conference*, London, United Kingdom, Vol. 4, No. 2, pp. 8-11, ISBN 978-0-9935191-6-1.
6. Manowicz, A.-A. and Šavriņa, B. (2017), "Conceptualization and validation of Connected Remote Service as a second-order formative construct". In: *Building Resilient Society - Proceedings of 26th International Scientific Conference on Economic and Social Development*, University North, Zagreb, Croatia, pp. 286-296, ISSN 1849-7535.
7. Manowicz, A.-A. (2018), "Empirical Validation of Key Factors of Connected Remote Services". In: *Management Studies*, Vol. 6, No. 3, pp. 167-176, ISSN 2328-2185.
8. Manowicz, A.-A. (2018), "Impact of Connected Remote Services on Car Servicing Loyalty". In: *European Journal of Business and Management*, Vol. 10, No. 8, pp. 59-69, ISSN 2222-2839.

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1 THEORETICAL FOUNDATIONS ON CONNECTED REMOTE SERVICES, CUSTOMER VALUE AND CAR SERVICING LOYALTY

The development of a research model to investigate the creation of customer value by key factors of connected remote services (CRS) and their impact on car servicing loyalty, requires a detailed analysis of the existing literature in the fields of service innovation, customer value and customer loyalty, with regard to the framework of relationship management. For these phenomena, it is necessary to develop a comprehensive understanding regarding different definitions of and measurement approaches. To specify suitable links between CRS and car servicing loyalty for integration into the research model the identification of possible consequences of service innovation and antecedents of customer loyalty is emphasised, assuming that such concepts provide insights regarding interdependencies between the individual concepts. The following procedure was defined for the development of the theoretical foundation:

1. First, a comprehensive understanding of the concept of connected remote services is developed, and its potential consequences are identified;
2. Secondly, theoretical models are analysed to interlink connected remote services with car servicing loyalty;
3. Third, customer value is investigated as a central link between CRS and car servicing loyalty, with a focus on customer benefits;
4. Fourth, the concept of car servicing loyalty is derived from the research field of customer loyalty, with an emphasis on the antecedents and approaches of measurement;
5. Fifth, the findings obtained are summarized regarding the target of the current thesis.

1.1 Definition and characterization of connected remote services in the research field of service innovation

In many reference books about relationship management, the concept of service innovation (SI) is used in different or even contradictory ways. The purpose of this chapter is to identify the essential characteristics of services and to highlight implications for the description of connected remote services. The definition of CRS developed is based on existing literature within related research fields. It classifies and differentiates the phenomenon from other terms used in the service area, such as product innovation. The resultant findings are applied to the research model design.

1.1.1 Characteristics of services and innovation

Before discussing the details of service innovation, the terms *service* and *innovation* will be explained, because products and services cannot always be differentiated unequivocally. In numerous cases, the transition is more gradual in nature.[6] Kotler and Bloom state that: "a service is any act or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product."[7] According to Grönroos, services are "an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees, and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems."[8] Kotler and Bloom, as well as Grönroos, emphasize four basic characteristics when defining services:

1. *Intangibility.* The use of services does not result in ownership, in contrast to physical products. The customer purchases the right to receive a service. Services are non-physical, although they are provided in support of a tangible product;
2. *Inseparability.* Production and consumption are conducted at the same time. In contrast to physical products, services cannot be stored. Some or all parts of the service process depend on the interaction between provider and customer, and the information that the customer provides. Most of the time, customers are present while the service is given, or their presence is mediated by channels, such as the internet, e-mail, or mobile media;
3. *Heterogeneity.* Service outcomes and processes are not standardized. In comparison to the efforts made to ensure the quality of physical products, quality control is difficult to achieve. Because of this, services can vary in quality. The evaluation of the quality of a service, regarding outcome and process, depends on the customer's individual and subjective expectations and perceptions during the consumption of the service;

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6 de Jong, J.P.J. et al., "Innovation in service firms explored: what, how and why?: Literature review," in *Innovation in service firms explored: what, how and why?: Literature review*, ed. Jeroen de Jong (Zoetermeer: EIM, Business & Policy Research, 2003), p. 14.

7 Kotler, P. and Bloom, P. N., *Marketing professional services* (Englewood Cliffs NJ: Prentice-Hall, 1984), p. 200.

8 Grönroos, C., *Service management and marketing: Managing the moments of truth in service competition* (Lexington, Mass: Lexington Books, 1990), p. 27.

4. *Perishability.* The service cannot be transferred or resold, which means that the resources needed to deliver the service cannot be wasted but must be made operational to deliver the service again.[9]

An indispensable characteristic of service is the necessity of integrating an external factor (e.g., customer) into the process of service delivery.[10] This consists of the consumer introducing a service object into the service's creation and delivery process. Possible examples of the external factor might be human beings, as well as material objects, such as vehicles or immaterial objects, such as software.[11] The intangibility of services also implies that there are fewer possibilities for protecting innovations by patents and copyrights. Imitation of services by competitors is easier in comparison to products.[12] Vermeulen compares these four characteristics with the corresponding aspects of products,[13] as shown in Table 1-1.

Table 1-1: Comparison of products and services.[14]

Products tend to be	**Services tend to be**
Tangible	Intangible
Separation of production and consumption, customers do not normally participate in production	Simultaneous production and consumption, customers participate in production
Homogeneous	Heterogeneous
Can be kept in stock	Perishable, cannot be kept in stock

Having clarified the characteristics of services, the term *innovation* also needs to be analysed in detail. Research on innovation has not reached a consistent definition of the term.[15] Schumpeter defines it as the "carrying out of new combinations". Innovation is considered to be a

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9 Bruhn, M. and Georgi, D., *Services marketing: Managing the service value chain* (Harlow, England, London, New York: Financial Times/Prentice Hall an Imprint of Pearson Education, 2006), p. 162.

10 Hilke, W., Trippen, L., and Peiner, W., *Dienstleistungs-Marketing: Banken und Versicherungen. Freie Berufe. Handel und Transport* (Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler | GWV Fachverlage GmbH Wiesbaden, 1989), p. 12.

11 Corsten, H. and Gössinger, R., *Dienstleistungsmanagement,* 5th ed. (München, Wien: Oldenbourg, 2007), p. 59.

12 Oke, A. (2004), "Barriers to innovation management in service companies," *Journal of Change Management* 4, no. 1: p. 39.

13 Vermeulen, P., *Organizing product innovation in financial services: How banks and insurance companies organize their product innovation processes,* p. 5.

14 Author's table based on Vermeulen, P., *Organizing product innovation in financial services: How banks and insurance companies organize their product innovation processes,* p. 5.

15 Garcia, R. and Calantone, R. (2002), "A critical look at technological innovation typology and innovativeness terminology: A literature review," *Journal of Product Innovation Management* 19, no. 2: p. 110; Green, S. G., Gavin, M. B., and Aiman-Smith, L. (1995), "Assessing a multidimensional measure of radical technological innovation," *IEEE Transactions on Engineering Management* 42, no. 3: p. 203.

competitive advantage that companies must achieve to ensure remaining ahead of their competitors. Most managers believe that innovations not only create added-value for their customers, but also strengthen the company's profitability.[16] According to the definition of innovation set by Schumpeter, an essential distinction is to be made between *invention* and *innovation*. Invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out in practice. To turn an invention into an innovation, the innovator normally needs to combine several different types of knowledge, capabilities, skills and may require resources, such as production knowledge, skills, facilities, market knowledge, a distribution system, etc. and professional management.[17] By combining the findings on invention and innovation, innovation in this study is defined as: *a process of generating new ideas and incorporating them into new products, services, and administrative procedures, in order to deliver superior customer value relative to competitors*.

Innovation involves the introduction of new products or services, including modifications to existing core services or the introduction of so-called additional services, which augment the value of a specific core service.[18] Referring to product innovation as "novelty and meaningfulness of new products introduced to the market at a timely fashion", Wang and Ahmet criticize the pure focus on product innovation, because it undermines other factors, such as behavioural changes, process innovation, and strategic orientation towards innovation within companies. Regarding it as a component factor separate from product innovation, the authors define market innovation as, "the newness of approaches that companies adopt to enter and exploit the targeted market." In other words, companies can enter a market or identify a new market niche, and launch innovative services based on cutting-edge technology.[19]

The use of technology leads to the important criterion of innovation intensity, which is explained by Tidd et al. as a continuum of innovation from incremental to radical. The authors use the term *incremental innovation* to describe solutions that are new to a firm and considered to be the logical further development of an existing solution ('doing what we do better'). In distinction to this, a *radical innovation* in their terminology, depicts solutions that are not just

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16 Schumpeter, J. A., *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, 55th ed. (Cambridge, Mass.: Harvard University Press., 1934), p. 66.

17 Fagerberg, J., *Innovation: A Guide to the Literature* (Paper to be presented at the Workshop "The Many Guises of Innovation: What we have learnt and where we are heading", Ottawa, October 23rd-24th, 2003, University of Oslo, 2003), p. 3.

18 Nasution, H. N. and Mavondo, F. T. (2008), "Organisational capabilities: Antecedents and implications for customer value," *European Journal of Marketing* 42, 3/4: p. 484.

19 Wang, C. L. and Ahmed, P. K. (2004), "The development and validation of the organisational innovativeness construct using confirmatory factor analysis," *European Journal of Innovation Management* 7, no. 4: pp. 303–305.

new to a firm, but also new to markets and customers ('new to the world').[20] Service concepts or the way that client interaction is performed, which are new or significantly changed e.g., by using technology-meditated channels or service delivery systems, can also be considered as innovations. Such changes can also lead to extension of service functions that are new to the company and to customers.[21]

Perspective and *geographical context* are further aspects that help to classify innovations. Toivonen and Tuominen describe *newness* as a relative concept, confirming that a truly radical innovation usually means 'new to the world'. On the other hand, they criticize the aspect of 'new to the firm', which they exclude from the definition of innovation. They justify this by arguing that otherwise backward, companies which adopt well-known practices to catch up with their competitors are not making innovations. Further, the aspect of newness is supplemented by a geographical or sectorial context. Correspondingly, incremental innovations could be characterized as 'new to a region or a nation' or 'new to a sector'.[22] The *time* criterion describes the period during which the introduced product or service can be assumed to be new. Especially in the field of service innovation, this evaluation process may vary since the adoption of a new service differs from customer-to-customer.[23]

Capturing the identified perspectives, the definition of Garcia and Calantone concludes that, "Innovation is an iterative process initiated by the perception of a new market and/or new service opportunity for a technology-based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention."[24] The authors make two further important distinctions: (1) the innovation process comprises the technological development of an invention combined with the market introduction of that invention to customers; and (2) the innovation process is iterative in nature and thus includes first the introduction of an innovation and then proceeds to the reintroduction of improved innovations. Based on the developed understanding of services and innovation, the two phenomena are combined in the concept of service innovation in the next step.

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[20] Tidd, J., Bessant, J. R., and Pavitt, K., *Managing innovation: Integrating technological, market and organizational change*, 3rd ed. (Chichester: Wiley, 2005), p. 12.

[21] van Ark, B., Broersma, L., and den Hertog, P., *Services Innovation, Performance and Policy: A Review* (Report, University of Groningen and The Conference Board, 2003), p. 15.

[22] Toivonen, M. and Tuominen, T. (2009), "Emergence of innovations in services," *The Service Industries Journal* 29, no. 7: p. 893.

[23] Meffert, H., Bruhn, M., and Hadwich, K., *Dienstleistungsmarketing: Grundlagen - Konzepte - Methoden*, 8th ed. (Wiesbaden: Springer Fachmedien Wiesbaden, 2015), p. 284.

[24] Garcia, R. and Calantone, R. (2002), "A critical look at technological innovation typology and innovativeness terminology: A literature review," *Journal of Product Innovation Management* 19, no. 2: p. 112.

1.1.2 Definition of service innovation and consequences on customer behaviour

The literature review on service innovation has shown that several approaches to defining service innovation exist in the scientific community. Figure 1-1 shows these different perspectives, which either represent the company's perspective, the customer's perspective, or combine aspects of both perspectives within an integrated approach.

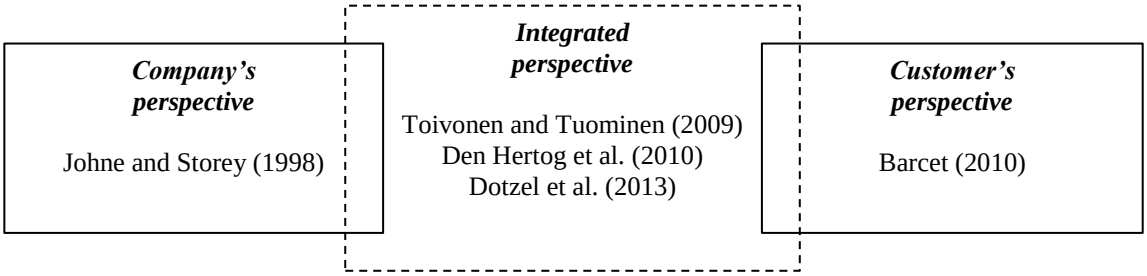

Figure 1-1: Perspectives on service innovation.[25]

From a company's perspective, *service innovation* (SI) can be defined as "the development of service products which are new to the supplier."[26] Customer-oriented definitions centre on the customer's perception when encountering a service innovation, which "introduces something new into the way of life, organization, timing and placement of what can generally be described as the individual and collective processes that relate to consumers."[27]

Integrating both perspectives, Dotzel et al. define SI "as a new or enhanced intangible offering that involves the firm's performance of a task/activity intended to benefit customers."[28] According to den Hertog et al., a service innovation's novelty can comprise a new service, a new service portfolio, and/or a new service process that individually or in combination, defines a new way of creating value for the customer. Moreover, the authors categorize possible dimensions specifically and describe service innovation as, "a new service experience or service solution that consists of one or several of the following dimensions: new service concept, new customer interaction, new value system/business partners, new revenue model, new organizational or technological service delivery system."[29] This definition comprises essential aspects

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[25] Author's illustration.

[26] Johne, A. and Storey, C. (1998), "New service development: A review of the literature and annotated bibliography," *European Journal of Marketing* 32, 3/4: p. 185.

[27] Barcet, A., "Innovation in services: a new paradigm and innovation model," in *The handbook of innovation and services: A multi-disciplinary perspective*, ed. Faïz Gallouj (Cheltenham u.a.: Elgar, 2010), p. 51.

[28] Dotzel, T., Shankar, V., and Berry, L. L. (2013), "Service Innovativeness and Firm Value," *Journal of Marketing Research* 50, no. 2: p. 259.

[29] den Hertog, P., van der Aa, W., and de Jong, M. W. (2010), "Capabilities for managing service innovation: Towards a conceptual framework," *Journal of Service Management* 21, no. 4: p. 494.

which must be transferred to the context of the present thesis. Connected remote services are a new service concept that introduces a new type of customer interaction, as well as new business partners, revenue models, and technology-based delivery systems. Therefore, the definition of den Hertog et al. forms the foundation for this research. Another important aspect of service innovation is explained by Toivonen and Tuominen, who combine the mutual dependency of benefit creation. The authors state that, "A service innovation […] provides benefit to the organization that has developed it; the benefit usually derives from the added-value that the renewal provides the customers."[30]

Inferentially, value creation for the customer is an essential target of the introduction of service innovation. The provision of added-value for the customers is often driven by the use of information and communication technology, which involves the introduction or adoption of new software or integrated systems ensuring that a company keeps ahead of the market.[31] Other drivers for the emergence of service innovation are the companies' urge for brand differentiation[32] and brand image. Brand image conveys the worth of the brand to consumers, describing the customers' perception of it, as reflected by the brand associations held in customer memory.[33] One way to positively influence brand image is by creating new service experiences and service solutions, which again could consist of a new service, a new service portfolio, and/or a new service process that individually or in combination defines a new way of creating value for the customer.[34] Overall, it can be asserted that service innovation often results in increased customer value and a higher perception of brand image. Typically, service innovation constitutes transferring (non-physical) attributes to deliver benefits to the customer and to fulfil customer needs. Consequently, this can have a positive effect on the firm's financial results through repeated purchases by the customer, and a higher recommendation-rate to potential customers.[35]

From the characteristics described above, it can be concluded that to understand customers' behaviour in terms of customer loyalty, it is crucial to consider service innovation from their

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30 Toivonen, M. and Tuominen, T. (2009), "Emergence of innovations in services," *The Service Industries Journal* 29, no. 7: p. 893.

31 den Hertog, P. et al., *Services in innovation: Knowledge intensive business services (KIBS) as co-producers of innovation* (Studies in technology, innovation and economic policy), p. 22.

32 Berry, L. L. et al. (2006), "Creating new markets through service innovation," *MIT Sloan Management Review* 47, no. 2: p. 62.

33 Prasad, K. and Dev, C. S. (2016), "Managing Hotel Brand Equity," *Cornell Hotel and Restaurant Administration Quarterly* 41, no. 3: p. 23.

34 den Hertog, P., van der Aa, W., and de Jong, M. W. (2010), "Capabilities for managing service innovation: Towards a conceptual framework," *Journal of Service Management* 21, no. 4: p. 494.

35 Narver, J. C. and Slater, S. F. (1990), "The effect of a market orientation on business profitability.," *Journal of Marketing*, October: p. 27.

perspective. Further, the creation of customer benefits or customer value in general, seems to be the central customer-oriented consequence of SI and the target of most companies' activities. In addition, it is necessary to align the definition of service innovation with the standards that customers would set for service innovation and its degree of intensity. Based on the investigations carried out, an appropriate classification of service innovation can be summarized as follows: *service innovation describes a new intangible offering that involves the firm's performance, intended to provide benefits to the customer*.

When considering the effects of service innovation on customer behaviour, evidence from the hospitality industry shows that service innovation influences customer choice processes.[36] Therefore, the measurement of its effects is critical for its effective management. The results of Hanaysha and Hilman in the context of the automotive industry, demonstrate that innovation has a significant positive effect on brand trust, brand commitment, and brand satisfaction, as dimensions of relationship quality.[37] By adapting the findings of Keyi and Linlin, who state that innovation is an important factor for strengthening the relationship between the customer and the vendor,[38] the conclusion can be drawn that automobile manufacturers and dealers, bearing high competition in mind, should concentrate on introducing innovative products and services that meet quality standards and improve customer relationships.

In addition, service innovation is found to have a positive influence on perceived customer value.[39] Through the introduction of SI companies can improve perceived customer value by enhancing customer benefits and reducing costs.[40] According to Boxer and Rekettye, SI also creates added-value for the customer from a long-term perspective, which leads to a durable competitive advantage over its competitors, expressed in long-term and fruitful relationships with customers and an improved loyalty level.[41] Further, trust is identified as an outcome of service innovation and describes the creation of a customer's emotional connection to the brand.

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[36] van Riel, A. C.R. et al. (2005), "Service innovation and customer choices in the hospitality industry," *Managing Service Quality: An International Journal* 15, no. 6: p. 563.

[37] Hanaysha, J. and Hilman, H. (2015), "The Impact of Product Innovation on Relationship Quality in Automotive Industry: Strategic Focus on Brand Satisfaction, Brand Trust, and Brand Commitment," *Asian Social Science* 11, no. 10: p. 99.

[38] Wang, K. and Liu, L. (2010), "An Empirical Study of Service Innovation's Effect on Customers' Re-purchase Intention in Telecommunication Industry," *Canadian Social Science* 6, no. 5: p. 191.

[39] Chen, J. K.C., Batchuluun, A., and Batnasan, J. (2015), "Services innovation impact to customer satisfaction and customer value enhancement in airport," *Technology in Society* 43: pp. 228–229.

[40] Dotzel, T., Shankar, V., and Berry, L. L. (2013), "Service Innovativeness and Firm Value," *Journal of Marketing Research* 50, no. 2: p. 273.

[41] Boxer, I. and Rekettye, G. (2011), "The relation between perceived service innovation, service value, emotional intelligence, customer commitment and loyalty in b2b," *International Journal of Services and Operations Management* 8, no. 2: p. 239.

A trusted brand is assumed to reduce perceived fears regarding the use of the core service.[42] SI creates customer benefits if it offers an improved solution for a relevant customer need in order to stimulate customer reuse intention towards the service innovation. Often, the benefit is created in terms of perceived convenience through saving the customers' time and effort. If a service innovation is able to provide such customer value, it may lead to positive word-of-mouth and customer recommendations regarding the SI and the brand behind it.[43]

Several studies within various industries confirm the positive effects of service innovation on perceived customer satisfaction,[44] continuance of usage,[45] and competitive advantage[46] for the companies that provide such services to their customers. In contrast, the findings of Dotzel et al. reveal that service innovation has a nonsignificant, or even negative, short-term effect on customer satisfaction, indicating the necessity of managers considering customer satisfaction as a relevant consequence of successful service innovation.[47] Kunz et al. confirmed the positive effect of service innovation on customer satisfaction and customer loyalty, recognizing the customers' innovativeness, which is generally considered to represent a characteristic which relates to an individual's basic tendency to adopt new innovations, as an influence.[48] The effects on satisfaction and loyalty are higher for more innovative, compared to less innovative customers,[49] which in turn leads to the assumption that the individual customer's innovativeness influences the perception and effects of CRS.

As seen in this chapter, there is a consensus among researchers regarding the use of ICT as a pillar of service innovation. Many new services introduced to the market obtain their innovative character from the application of ICT, creating new service concepts and service delivery systems. This also applies to CRS, although it is necessary to consider the technological issues. In

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42 Hanaysha, J. and Hilman, H. (2015), "The Impact of Product Innovation on Relationship Quality in Automotive Industry: Strategic Focus on Brand Satisfaction, Brand Trust, and Brand Commitment," *Asian Social Science* 11, no. 10: p. 95.

43 Berry, L. L. et al. (2006), "Creating new markets through service innovation," *MIT Sloan Management Review* 47, no. 2: p. 62.

44 Chen, J. K.C., Batchuluun, A., and Batnasan, J. (2015), "Services innovation impact to customer satisfaction and customer value enhancement in airport," *Technology in Society* 43: p. 227.

45 Bhattacherjee, A. (2001), "An empirical analysis of the antecedents of electronic commerce service continuance," *Decision Support Systems* 32, no. 2: p. 210.

46 Salunke, S., Weerawardena, J., and McColl-Kennedy, J. R. (2013), "Competing through service innovation: The role of bricolage and entrepreneurship in project-oriented firms," *Journal of Business Research* 66, no. 8: p. 1091.

47 Dotzel, T., Shankar, V., and Berry, L. L. (2013), "Service Innovativeness and Firm Value," *Journal of Marketing Research* 50, no. 2: p. 274.

48 Kunz, W., Schmitt, B., and Meyer, A. (2011), "How does perceived firm innovativeness affect the consumer?," *Journal of Business Research* 64, no. 8: pp. 820–821.

49 Hong, J.-C., Lin, P.-H., and Hsieh, P.-C. (2017), "The effect of consumer innovativeness on perceived value and continuance intention to use smartwatch," *Computers in Human Behavior* 67: p. 265.

this specific case, these issues are mainly defined by mobile communication technology and its subfield, remote services.

1.1.3 Characterization of connected remote services in the context of mobile services

Mobile services can supplement traditional, physical products by aiming to provide added-value to customers particularly based on the usage of mobile devices, such as smart phones, thus achieving a competitive advantage.[50] Mobile service innovations combine technologies and concepts from the areas of telecommunications, information technology and consumer electronics, and typically require suppliers, vendors, and customers to cooperate in complex value networks.[51] These require a combination of several components, such as mobile devices, applications, networks and user interfaces, as well as content and service providers, which are necessary to deliver a mobile service that adds value to the customer. A workable definition of a mobile service system is "a group of components that work together for delivering a coherent set of activities of intangible nature that provide added-value for a mobile user using a mobile network."[52] Karhu, based on the characterization of Järvelä, Lähteenmäki and Raijas,[53] emphasizes the mobility aspect and defines mobile services as follows: "Mobile services are independent of time and place. Mobile services can be consumed via a mobile device over a public network and they involve interaction between the customer and service provider's systems."[54]

In addition to mobile services, teleservices as another type of service used in professional surroundings applied to remote diagnostic issues also need to be considered. In line with the idea of service delivery independent of time and space, Borgmeier introduces the concept of teleservices by focusing on the machinery sector. This type of service is defined as, "industrial, technical after-sales service of production systems at the customers' factory, which are provided via a spatial distance by using synchronous, interactive communication."[55]

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50 Wirtz, B. W., *Electronic Business,* 3rd ed. (Wiesbaden: Gabler, 2010), pp. 70–71.

51 Bouwman, H. and Fielt, E., "Service Innovation and Business Models," in *Mobile Service Innovation and Business Models,* 1st ed., eds. Harry Bouwman, Henny Vos and Timber Haaker (Berlin Heidelberg: Springer-Verlag, 2008), p. 12.

52 van de Kar, E. and Verbraeck, A., *Designing mobile service systems,* 2nd ed. (Amsterdam: IOS Press, 2008), pp. 3–4.

53 Järvelä, P., Lähteenmäki, M., and Raijas, A., *Mobiilipalvelujen kaupallisen kehityksen haasteet ja mahdollisuudet* (Helsinki: Liikenne- ja viestintäministeriö; Edita [jakaja], 2001).

54 Karhu, P., *Emerging Mobile Service Innovation Markets: The Case of the Finnish Mobile TV Service Market* (St. Gallen, 2007), p. 26.

55 Borgmeier, A., *Teleservice im Maschinen- und Anlagenbau: Anwendung und Gestaltungsempfehlungen* (Zugl.: Darmstadt, Techn. Univ., Diss., 2002), pp. 29–30.

Based on the concept of teleservices, the concept of remote services was recently developed as an additional type of service, which describes a kind of service that can be delimited from traditional services by a technological interdependence which occurs within the delivery process of the service and considers the possibility of remotely controlling the service object. Holtbrügge et al. define remote services as, "services that are delivered through a technologically mediated process between a service provider and its customer regardless of the spatial distance. The spatially separated service object can be bidirectionally controlled and modified via a control unit."[56] Moreover, these services can be subdivided into remote monitoring, remote diagnostics, and remote control.[57]

However, neither of these approaches fully captures the characteristics of CRS because, firstly, they are focused on a business-to-business relationship, and secondly are concentrated only on the machinery sector. To the best of the author's knowledge, customers of remote services are professional users of special machinery, and therefore, commercial customers. In the current thesis, private customers are the centre of attention, and the focus is on business-to-customer communication within the automotive after-sales business. In addition, the integration of a mobile device as a characteristic of mobile services, as well as the aspect of remote control of the service object, is not covered by the existing definitions. In summary, the existing literature does not fully capture the specific attributes of CRS, so that an independent and more detailed characterization is needed to derive a suitable definition for the continuation of this thesis.

From the existing definition of remote services can be taken that they require a technology which mediates the service delivery process and that no physical connection between service provider and customer is needed: these characteristics can be applied to connected remote services. Thus, the concept of CRS extends beyond the ideas of remote and mobile services, due to the integration of the service object via ICT. Here, based on a permanent data connection, the service object's relevant status information is provided to both the customer and the service provider. The possibility for e.g. the customer, to remotely control the service object, requires a feedback process and a continuous data transfer of actual status and commands to change or adjust the service object's status. This interaction is characterized by an almost exclusive focus on the factual level. A limiting characteristic of connected remote services is the impossibility

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[56] Wünderlich, N. V. et al., "Ferngesteuerte Dienstleistungen. Betriebswirtschaftliche Spezifika, Terminologie und Herausforderungen für das Management," in *Remote Services: Neue Formen der Internationalisierung von Dienstleistungen*, eds. Dirk Holtbrügge, Hartmut H. Holzmüller and Florian Wangenheim (Wiesbaden: Deutscher Universitäts-Verlag / GWV Fachverlage GmbH Wiesbaden, 2007), p. 13.

[57] VDMA, *Teleservice - ein Werkzeug zur Sicherung der Produktion und Minimierung der Kosten für Hersteller, Anwender und Betreiber: Ein Leitfaden zu "Wirtschaftlichkeit durch Teleservice"* (Frankfurt am Main: VDMA-Verl., 2006), p. 7.

of face-to-face communication, which must be compensated via other channels. Connected remote services require several control elements. ICT enables the service provider to access both the service object and the customer's mobile device. The customer needs access to ICT which makes it possible to query data, and to control and modify the service object. The service object must also be able to feed its own status data into the system via ICT. This enables the customer and the service provider to access the service-object and monitor, perform diagnostics and control it.[58]

Based on the classification of service innovation in conjunction with the definition of connected services developed by Hiraoka,[59] the following definition for the term *connected remote services* is suggested: C*onnected remote services are innovative services that enable customers to interact with the service object, as well as the service provider, by using mobile infrastructure independently of spatial distance. This infrastructure enables the bidirectional exchange of information and the control of the service object via data channels.* Figure 1-2 describes the information and communication flows within the system architecture.

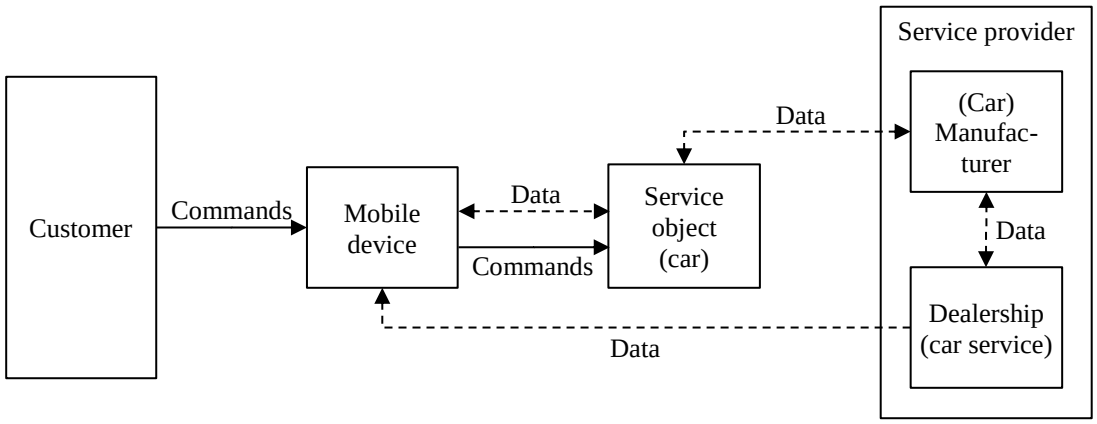

Figure 1-2: Architecture of the connected remote services delivery system.[60]

[58] Wünderlich, N. V. et al., "Ferngesteuerte Dienstleistungen. Betriebswirtschaftliche Spezifika, Terminologie und Herausforderungen für das Management," in *Remote Services: Neue Formen der Internationalisierung von Dienstleistungen*, eds. Dirk Holtbrügge, Hartmut H. Holzmüller and Florian Wangenheim (Wiesbaden: Deutscher Universitäts-Verlag / GWV Fachverlage GmbH Wiesbaden, 2007), p. 13.

[59] Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), p. 16.

[60] Author's illustration extended from Wünderlich, N. V. et al., "Ferngesteuerte Dienstleistungen. Betriebswirtschaftliche Spezifika, Terminologie und Herausforderungen für das Management," in *Remote Services: Neue Formen der Internationalisierung von Dienstleistungen*, eds. Dirk Holtbrügge, Hartmut H. Holzmüller and Florian Wangenheim (Wiesbaden: Deutscher Universitäts-Verlag / GWV Fachverlage GmbH Wiesbaden, 2007), p. 13.

Connected remote services as an ICT-based service innovation, face the challenge that the roles of customers and the provider are redefined. The innovative aspect of CRS is not only the application itself, but the redefinition of roles and interactions between car customers, the car and the dealership. The manufacturer provides the technological infrastructure to customers, who can then decide for themselves whether or how often to use CRS, so that the essential innovation consists of the trilateral interactivity of the parties.

According to Froehle and Roth, CRS provide technology-mediated contact between customer and provider, which is described as, "face to screen customer contact". In this type of contact, the customer and provider are spatially separated and one of the technology's purposes is to overcome physical distances.[61] However, their concept does not fully capture the special characteristics of CRS because it makes service delivery without communication between a customer and a provider possible. For example, the tele-diagnosis of a car requires a technology-mediated communication between the car and the maintenance and repair shop, in which the customer does not necessarily need to be involved. The authors do not take into consideration the involvement of the service object itself. The existing literature review also does not consider the possibility of using ICT to control the service object remotely, although CRS are especially characterized by the possibility of controlling the service object in terms of changing one of its special conditions, which goes beyond the technology-mediated communication between customer and provider and between the provider and the service object.

Berry et al. classify service innovation by assessing two main characteristics that can be perceived by customers. First, SI delivers an important *core* benefit or a new *delivery* benefit, by revolutionizing customers' access to the core benefit. Second, the *degree of separability* is changed, meaning the interrelationship between production and consumption of the service. This can be achieved through the use of technology which helps to transform formerly inseparable services into services that can be consumed at any time or place. The combination of the two dimensions, i.e. type of benefit and degree of separability, creates a two-by-two matrix that helps to categorize specific service innovations, as presented in Figure 1-3. The first cell is named *flexible solutions* and describes SI that offers a new core benefit, and which can be consumed independently from where it is produced. These innovations allow users to break free from the constraints of time and place. The second cell includes innovations based on new delivery benefits which therefore offer *controllable convenience*. Customers can enjoy the service e.g., through the use of ICT, enabling them to reach and use a service more easily. The cell

[61] Froehle, C. M. and Roth, A. V. (2004), "New measurement scales for evaluating perceptions of the technology-mediated customer service experience," *Journal of Operations Management* 22, no. 1: p. 3.

comfortable gains, contains service innovations that offer a new core benefit consumed at the time and place of production. These innovations mainly provide comfort gains, leading to direct benefits to customers' emotional or physical comfort. The fourth cell is called *respectful access*. Here, a new delivery benefit is provided with the restriction that the production and consumption of the service are inseparable. Companies providing this kind of SI, exhibit respect for their customers' time and physical presence in using the service, which can be perceived by customers, e.g., by lowering their stress level.[62]

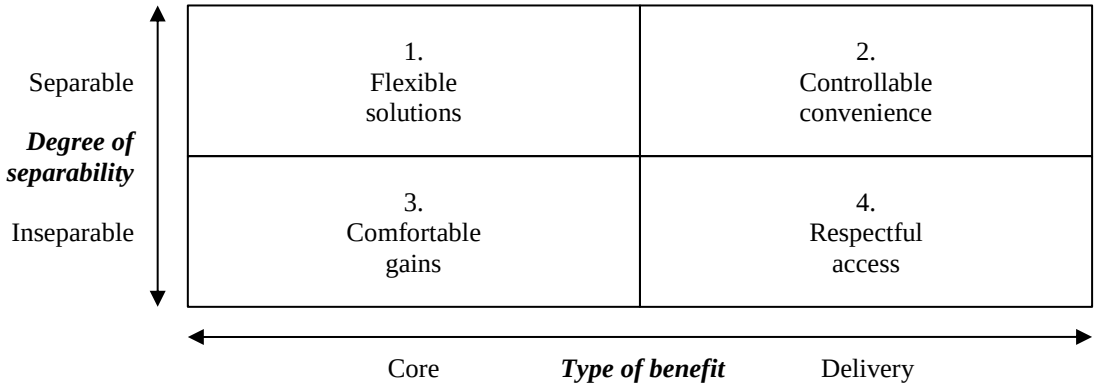

Figure 1-3: Four types of service innovation.[63]

According to den Hertog and Bilderbeek, combinations of one or more categories characterize each particular service innovation. The weight of the individual categories and the importance of the various linkages between them varies across individual service innovations and the companies which provide them.[64] When these categorizations are applied to connected remote services, as object of the present thesis, it can be allocated to more than one cell. Connected remote services mainly provide core benefits that cannot be provided independent of time and local presence, such as remote control of vehicle functions or remote diagnosis functions, which can therefore be placed in the category *comfortable gains*. On the other hand, different functions, such as remote monitoring, are better suited to the category *controllable convenience* because it denotes a new kind of delivery benefit contingent on independence regarding time and locality. It can therefore be concluded, that connected remote services are a complex, multi-dimensional type of service innovation, leading to various types of benefits, which in addition can be individually perceived by customers.

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62 Berry, L. L. et al. (2006), "Creating new markets through service innovation," *MIT Sloan Management Review* 47, no. 2: pp. 57–60.

63 Author's illustration based on Berry, L. L. et al. (2006), "Creating new markets through service innovation," *MIT Sloan Management Review* 47, no. 2: p. 59.

64 den Hertog, P. and Bilderbeek, R., *Conceptualising Service Innovation and Service Innovation Patterns* (1999), p. 9.

1.2 Theories about linking connected remote services to customer value and car servicing loyalty

After developing the definition of connected remote services and classifying the phenomenon as a service innovation in the context of mobile services, the interlinkage of CRS to customer value and car servicing loyalty, as the central concern of this thesis, is underpinned in the next step by the theories existing within the fields of service research and customer loyalty research in the automotive industry. In the literature, there are several theoretical approaches to explain the interrelation between a company's service activities and desired outputs, such as customer loyalty and if thinking about the companies' economic interests, increased growth and profits.

The service profit chain proposed by Heskett et al. links a specific company's service delivery system, which is part of its operational strategy, to measurable outputs. As a first perceptible output for customers, it identifies *external service value*, which is described as the perceptible output of a specific service for the customer. It can be compared to the concept of customer value, as it specifically describes customer benefits arising from using a service. If in addition such a service delivery system meets the customers' expectations and fulfils important customer needs, the next stage achieved is *customer satisfaction*, which leads to the statement that customer value is a major driver for satisfaction. In the next stage, the positive result of customer value and customer satisfaction is customer loyalty, which benefits the company through increased profits, caused by higher sales, lower acquisition costs, and enforceable price-premium strategies.[65]

Based on the considerations above, Johnson et al. define a similar chain of processes which distinguishes four phases in the customer loyalty process. The authors state that any discussion of customer satisfaction eventually leads to a discussion about which product or service processes must be changed to create higher perceived value for the customers. Likewise, any discussion about customer loyalty and defection eventually leads to those attributes and benefits of a service that satisfy or dissatisfy customers.[66]

These considerations can be adapted to the context of this thesis. Connected remote services are such service delivery systems. In phase one customers use CRS, leading to phase two in

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[65] Heskett, J. L. et al. (1994), "Putting the Service-Profit Chain to Work," *Harvard Business Review* 72, no. 2: pp. 164–166.

[66] Johnson, M. D. et al., "An Introduction to Quality, Satisfaction and Retention - Implications for the Automotive Industry," in *Customer Retention in the Automotive Industry: Quality, Satisfaction and Loyalty*, eds. M. D. Johnson et al. (Wiesbaden, 1997), pp. 5–9.

which they form subjective perceptions of customer value, based on their individual expectations regarding the performance and benefits of the functions provided. In phase three these customer value perceptions generate a certain degree of car servicing loyalty, possibly mediated by another concept, such as, but not limited to, satisfaction. In phase four, this car servicing loyalty intends to affect the customer's psychological predisposition towards repurchasing after-sales services such as maintenance and repair services, from the same dealership. Figure 1-4 shows the underlying service profit chain described by Heskett et al. and its adaption to the context of this thesis in comparison. Viewed from the management perspective, connected remote services can be seen as a specific customer retention management measure for a car dealership to provide additional customer value to its customer base, intended to directly and indirectly increase loyalty towards this specific dealership's car service.

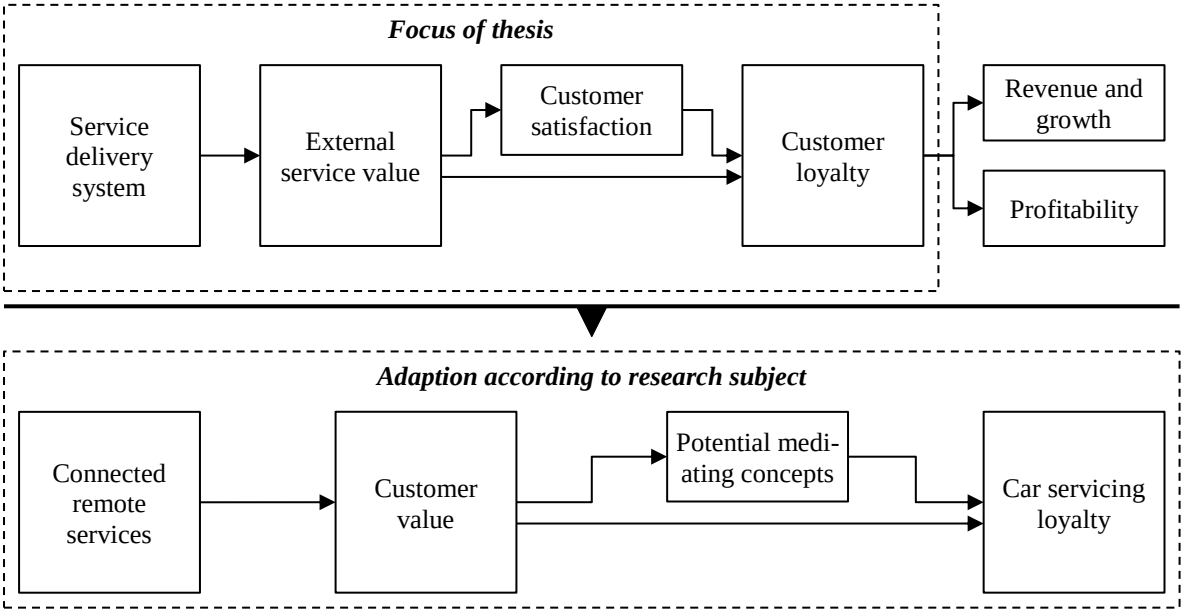

Figure 1-4: Adaption of the service profit chain to the context of research, linking CRS to customer value and car servicing loyalty.[67]

However, Reichheld critically notes that while customer value and satisfaction may constitute good predictors of actual customer loyalty, there is no guarantee that satisfied and loyal customers will turn loyalty intentions into the actual repurchase of a specific service. He argues that even customers with high levels of customer satisfaction often defect and that it is critical to examine the reasons behind this.[68] For example, a customer can be loyal, but may be unable

[67] Author's illustration based on Heskett, J. L. et al. (1994), "Putting the Service-Profit Chain to Work," *Harvard Business Review* 72, no. 2: p. 166; Johnson, M. D. et al., "An Introduction to Quality, Satisfaction and Retention - Implications for the Automotive Industry," in *Customer Retention in the Automotive Industry: Quality, Satisfaction and Loyalty*, eds. M. D. Johnson et al. (Wiesbaden, 1997), p. 6.

[68] Reichheld, F. F., *The loyalty effect: The hidden force behind growth, profits, and lasting value* (Boston, Mass.: Harvard Business School Press, 1996).

to repurchase a certain service due to cost considerations. In this case, the chain of effects postulated does not lead to the intended loyalty related outcomes in terms of growth and profit.

Summarizing, it can be said that the theoretical considerations of Heskett et al. and Johnson et al. provide good starting points for the further analysis of customer value and customer loyalty, leading to the fundamental understanding of the present thesis, that the creation of customer value is crucial to achieving car servicing loyalty triggered through using connected remote services. There are various opinions in the literature on the necessity of customer satisfaction for the creation of customer loyalty, which calls for further analysis within the literature review on customer loyalty. Moreover, since no empirical research on the consequences of connected remote services exists, it is necessary to explore, whether customer satisfaction or other potential mediating concepts need to be considered as outcomes of CRS for use in the research model to be developed in the current thesis.

1.3 Current models of customer value with focus on customer benefits and measurement approaches

In the previous chapter, customer value was identified as a central consequence of service usage. Therefore, the concept of customer value will be investigated in detail in this chapter.

The creation of value for customers (in the following termed *customer value*) is a widely-discussed field in the literature. Many researchers and practitioners assume the creation of customer value is the one key to long-term customer relationships and company success. Albrecht states that, "the only thing that matters in the new world of quality is delivering customer value."[69] Slater states that, "... marketers […] should be committed to the proposition that the creation of customer value must be the reason for the firm's existence and certainly for its success."[70] In the following, the overall concept of customer value is presented first, and then the concepts of perceived customer benefits and sacrifices are investigated in detail.

1.3.1 Analysis of different perspectives and models for the definition of customer value

In the literature, the term *customer value* is used in various ways. Ulaga looks at value from three different perspectives, by adding the perspective of *joint buyer–seller value creation* to the existing approaches of *value creation for the customer* and *value creation for the supplier*.

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69 Albrecht, K., *The only thing that matters: Bringing the power of the customer into the center of your business* (New York: Harper Collins, 1992), p. 7.

70 Slater, S. F. (1997), "Developing a customer value-based theory of the firm," *Journal of the Academy of Marketing Science* 25, no. 2: p. 166.

The traditional view of value is from the customer's perspective. It assesses how suppliers create value for their customers and how customers perceive it, in comparison to the competition. Attracting and developing customers to achieve customer loyalty can therefore be seen to be the supplier's perspective of customer value. As a third perspective, the customer-supplier perspective refers to joint value creation between supplier and customer, i.e. networks that create value through relationships, collaboration, and alliances (the buyer–seller perspective).[71]

Of the three perspectives identified, the current thesis concentrates on that of the buyer: *value creation through products and services*. The main target is to derive an understanding and a definition of terms for the customer perspective. Therefore, a detailed discussion of the dimensions and outputs will be presented. The two other perspectives on customer value will not be discussed in detail.

When presenting the customer perspective, Zeithaml states that value is connected to the performance or costs of a certain product or service. Based on customer expressions, she refers to four different definitions for the term: (1) value is low price; (2) value is whatever I want in a product; (3) value is the quality I get for the price I pay; and (4) value is what I get for what I give. As a conclusion, Zeithaml captures one overall definition: "perceived value is the consumers' overall assessment of the utility of a product based on perceptions of what is received and what is given."[72] Payne divides the value creation process into three key elements: (1) determining what value the company can provide its customers; (2) determining the value that the organization receives from its customers; and (3) by successfully managing this value exchange, maximizing the lifetime value of desirable customer segments. This is suitable in the context of connected remote services because Payne further states that value, which customers receive from the supplier organization, is "the total package of benefits, or added-values that enhance the core product."[73] Core products, such as cars can be enhanced by services, such as connected remote services. In turn, he describes the value that the supplier organization receives from its customers as "the outcome of providing and delivering superior value for the customer, deploying improved acquisition and retention strategies and utilizing effective channel management."[74]

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71 Ulaga, W. (2001), "Customer Value in Business Markets," *Industrial Marketing Management* 30, no. 4: pp. 315–316.

72 Zeithaml, V. A. (1988), "Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence.," *Journal of Marketing* 52, no. 3: pp. 13–14.

73 Payne, A., *Handbook of CRM: Achieving Excellence through Customer Management,* 1st ed. (s.l.: Elsevier professional, 2005), p. 103.

74 Ibid., p. 135.

As a conclusion, the concept of customer value is further examined with a focus on customer benefits which arise from a company's relationship management activities regarding service innovations delivered to the customer. In the first step, a definition of terms will be presented based on the analysis of different models. In the next step, relevant dimensions of customer value will be identified and evaluated in relation to the research target.

Various approaches to the concept of customer value are considered to determine a definition that is suitable in the context of the current thesis. According to Khalifa, existing definitions of customer value can be grouped into three main categories: (1) benefits/costs ratio models (utilitarian); (2) value components models; and (3) means-ends models.[75]

Within *benefits/costs ratio models*, the approach that has received a lot of attention from researchers is to link Zeithaml's dimension "what is received" to the term *customer benefits* and the dimension "what is given" to the term *customer's perceived costs* or *customer sacrifices*.[76] Her definition, as stated in the previous chapter, can be applied to benefits/costs ratio models. In support of this, Huber Herrmann and Morgan state that, "[…] customer value is a consequence of subjective evaluation, which in turn results from the summing of the various elements contributing to the perceived fulfilment of the value, benefit, and attribute level and perceived costs, taking into account subjective weighting factors."[77] Treacy and Wiersema define customer value as the sum of benefits received minus the costs incurred by the customer, for acquiring a product or service. Because of this, benefits build value to the extent that the product or service improves the customer's performance or experience, whereas costs reduce value. These costs could be tangible, which includes money spent on purchases and maintenance or intangible, which include time spent on errors, delays, and effort.[78] These models consider customer value over a longer time perspective, including all interactions within the customer lifecycle. However, they seem to be more static than dynamic, and do not link benefits and sacrifices to customer ends, values, and purposes. They also do not offer much regarding the importance of different benefits to prospective customers or the significance of sacrifices.[79]

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[75] Khalifa, A. S. (2004), "Customer value: A review of recent literature and an integrative configuration," *Management Decision* 42, no. 5: p. 647.

[76] Ibid., p. 649.

[77] Huber, F., Herrmann, A., and Morgan, R. E. (2001), "Gaining competitive advantage through customer value oriented management," *Journal of Consumer Marketing* 18, no. 1: p. 45.

[78] Treacy, M. and Wiersema, F., *The discipline of market leaders: Choose your customers, narrow your focus, dominate your market*, 8th ed. (Cambridge Mass.: Perseus Books, 2000).

[79] Khalifa, A. S. (2004), "Customer value: A review of recent literature and an integrative configuration," *Management Decision* 42, no. 5: pp. 652–653.

Value component models are classified as *esteem value* (or "want"), *exchange value* (or "worth"), and *utility value* (or "need"). Each decision to acquire products or services includes one or a combination of the above value elements, in which the sum of the elements results in a purchase decision. As stated by Kaufman, "Esteem value or 'want' invokes the buyer's desire to own for the sake of ownership. […] Exchange value or 'worth' describes the buyer's perception. […] Utility value or "need is the primary value element the design engineers must address. Utility describes the performance and physical characteristics of the product […]".[80] These models are used especially within the development process of new products or services. However, they only pay limited attention to the relationship between customers and suppliers in service delivery, concentrate on customer benefits and limit the dimension of customer sacrifices within the value equation.[81]

Means-ends models assume that customers acquire and use products or services to accomplish desired ends.[82] Means-end theory posits that linkages between product attributes and consequences produced through consumption, and consumers' personal values underlie their decision-making processes.[83] Means are products or services, and ends are personal values considered essential to consumers. Means-end theory seeks to explain how an individual's choice of a product or service enables him or her to achieve his or her desired end states.[84] According to Woodruff, customer value is a customer's perceived preference for, and evaluation of, the advantages of product attributes and the results of usage, which enable the customer to achieve the desired goals.[85] Therefore, the usage of a product or service with its attributes, will lead to consequences which are either target-conductive or in opposition to the target. The positive consequences of the usage of a product or service are defined as customer benefits; whereas, negative consequences are perceived as customer sacrifices.[86] Services provided by suppliers, are intended to deliver benefits to the customers. Not all of the intended benefits may be perceived as a benefit by every customer. The benefit is limited by the extent to which that customers can perceive, appreciate, and use the product or service as an anticipated consumption

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80 Kaufman, J. J., *Value management* (Etobicoke, Ontario: Sakura House Publications, 2008), p. 5.

81 Khalifa, A. S. (2004), "Customer value: A review of recent literature and an integrative configuration," *Management Decision* 42, no. 5: p. 649.

82 Ibid., p. 653.

83 Gutman, J. (1991), "Exploring the nature of linkages between consequences and values," *Journal of Business Research* 22, no. 2: p. 143.

84 Morgan, R. M. and Hunt, S. D. (1994), "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing* 58, no. 3: p. 44.

85 Woodruff, R. B. (1997), "Customer value: The next source for competitive advantage," *Journal of the Academy of Marketing Science* 25, no. 2: p. 142.

86 Peter, J. P., Olson, J. C., and Grunert, K. G., *Consumer behaviour and marketing strategy* (London u.a.: McGraw-Hill, 1999), p. 67.

activity, in order to achieve their individual personal values.[87] Table 1-2 summarizes existing definitions, which can be applied to means-end models.

Table 1-2: Definitions of customer value within the means-end approach.[88]

Source	Definition
Lai (1995, p. 384)	A product has a benefit to customers to the degree that they can perceive, appreciate, and then use that product as an anticipated consumption activity to achieve personal values.
Woodruff and Gardial (1996, p. 160)	Customer value is a customer-perceived perception of what they want to happen in a specific use situation, with the help of a product and service, to accomplish their desired purpose and goal.
Butz and Goodstein (1996, p. 63)	By customer value, we mean the emotional bond established between a customer and a producer after the customer has used a salient product or service produced by that supplier and found the product to provide an added-value.
Woodruff (1997, p. 142)	Customer value is a customer's perceived preference for, and evaluation of, those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations.

In this thesis, of the various approaches towards customer value, the focus is set on means-end models taking into account the dimensional aspects of benefits/cost ratio models. Applying this approach to the aim of measuring the customer value generated using connected remote services, one can state that a specific service, such as CRS, is utilized by a customer to achieve a desired purpose or state in a specific use situation. The idea that customers use CRS for benefits, describes the use situation in the context of reality. The aspect described by Butz and Goodstein regarding the establishment of an emotional bond[89] between customer and provider of CRS corresponds to the attitudinal consequences of service innovation explained in Chapter 1.1.2 and also to the antecedents of customer loyalty, such as trust and commitment described later in Chapter 1.4.2.

Next, current models of customer value included in the above-mentioned categories are investigated in detail to elucidate applicable aspects for the measurement of customer value of connected remote services. Inferentially, the success of CRS regarding customer value creation, requires the benefits–sacrifices ratio to be positive, regardless of whether it is calculated as a ratio or by subtracting sacrifices from benefits. The focus of this analysis is on the underlying

[87] Lai, A. W. (1995), "Consumer Values, Product Benefits and Customer Value: A Consumption Behavior Approach," *Advances in Consumer Research* 22, no. 1: p. 384.

[88] Author's table based on Khalifa, A. S. (2004), "Customer value: A review of recent literature and an integrative configuration," *Management Decision* 42, no. 5: pp. 653–655.

[89] Butz, H. E. and Goodstein, L. D. (1996), "Measuring customer value: Gaining the strategic advantage," *Organizational Dynamics* 24, no. 3: p. 63.

value concept, identified consequences, and their approach for measuring customer benefits/sacrifices. Regarding measurement, especially models which measure the effects on behavioural intentions are of special interest for the current thesis, as they provide important insights to be adopted in the measuring approach of the research model to be developed.

1.3.2 Current approaches of customer benefits and customer sacrifices as dimensions of customer value

The combination of the means-end approach and the benefits/costs ratio models, leads to the assumption that customers achieve their intended goals by perceiving customer benefits during the use of connected remote services, while avoiding the dysfunctional effects arising from potential customer sacrifices. Next, these dimensions are discussed in detail, using Zeithaml's widely accepted approach,[90] which defines *received dimension* and *given-dimension* as *customer benefits* and *customer sacrifices*, respectively. The connection between these two dimensions can either be described as a ratio or by a subtractive model. Monroe utilizes a ratio model to define customer-perceived value as the ratio between perceived benefits and perceived sacrifices.

$$Customer\ perceived\ value = \frac{Perceived\ benefits}{Perceived\ sacrifices}$$

Perceived benefits are a combination of physical or service attributes, such as the availability of technical support for the use of the particular product or service, as well as the purchase price and other indicators of perceived quality. Perceived sacrifices focus on monetary and other cost aspects faced by the customer when making a purchase for example, purchase price, acquisition costs, transportation, installation, order handling, repairs and maintenance, risk of failure, or poor performance.[91] Other authors consider the connection between these two dimensions to be better represented by subtracting customer sacrifices from customer benefits.

$$Customer\ perceived\ value = Perceived\ benefits - Perceived\ sacrifices$$[92]

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[90] Eggert, A. and Ulaga, W. (2002), "Customer perceived value: A substitute for satisfaction in business markets?," *Journal of Business & Industrial Marketing* 17, 2/3; Anderson, J. C., Jain, D., and Chintagunta, P. (1993), "Customer Value Assessment in Business Markets: A State-Of-Practice Study," *Journal of Business-to-business Marketing* 1, no. 1; Woodruff, R. B. (1997), "Customer value: The next source for competitive advantage," *Journal of the Academy of Marketing Science* 25, no. 2; Khalifa, A. S. (2004), "Customer value: A review of recent literature and an integrative configuration," *Management Decision* 42, no. 5.

[91] Monroe, K. B., *Pricing: Making profitable decisions,* 3rd ed. (Boston, Mass.: McGraw-Hill/Irwin, 2003).

[92] Woodall, T. (2003), "Conceptualising 'Value for the Customer': An Attributional, Structural and Dispositional Analysis," *Academy of Marketing Science Review* 2003, no. 12: p. 7.

Lai suggests that customer value results from the sum of the various perceived benefits and perceived costs, and therefore customer perceived value can be understood and explained as the surplus (or the difference) between perceived benefits and perceived costs.[93] Applying the concept of relationship management to the distinction between short-term oriented transactional marketing approaches focusing on single transactions and the long-term oriented approach of relationship marketing (see Chapter 2.2), Ravald and Grönroos divide customer benefits into the two dimensions of episode benefits and relationship benefits, as well as dividing customer sacrifices into episode sacrifices and relationship sacrifices. This concept distinguishes the short-term benefits/sacrifices of single episodes within the customer lifecycle from long-term relationship benefits/sacrifices.[94] Next, customer benefits and sacrifices and their differentiated measurement, will be considered.

Customer benefits

The five dimensions used in the model postulated by Sheth, Newman and Gross, are based on the assumption that a customer's choice is a function of multiple, independent consumption values, and that these values contribute in different ratios, depending on the given choice situation. Through examining the description of the dimensions, it can be seen that the definitions are based on the idea that each value dimension consists of various types of benefits (utility) that a customer receives from a product or service. The specific definitions of perceived customer benefits are described as follows:

1. Functional value: The perceived benefit[95] acquired from functional, utilitarian, or physical performance;
2. Social value: The perceived benefit acquired from the association with one or more specific social groups;
3. Emotional value: The perceived benefit acquired from the capacity to arouse feelings or affective states;
4. Epistemic value: The perceived benefit acquired from the capacity to arouse curiosity, provide novelty, and/or satisfy a desire for knowledge;

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93 Lai, A. W. (1995), "Consumer Values, Product Benefits and Customer Value: A Consumption Behavior Approach," *Advances in Consumer Research* 22, no. 1: p. 386.

94 Ravald, A. and Grönroos, C. (1996), "The value concept and relationship marketing," *European Journal of Marketing* 30, no. 2: p. 23.

95 The original source uses the term "utility", which is regarded as synonym for "benefit".

5. Conditional value: The perceived benefit acquired as the result of the specific situation or set of circumstances facing the choice-maker.[96]

The model has been tested in more than 200 situations, and it has been shown that emotional value and conditional value have the highest relevance within customer choice situations. Thus, the results "may be used to *predict* consumption behaviour, as well as to *describe* and *explain* it."[97] Transferring the term *predict* to this research, it can be interpreted as corresponding to behavioural intention, which qualifies these findings to be considered more closely.

Utilizing the results of Sheth et al., Sweeney and Soutar developed the perceived value scale (PERVAL), which consists of 19 items and focuses on durable goods. It is based on a mixed method approach consisting of a quantitative and qualitative part; however, none of the items in it reflect epistemic value. This was because the authors assumed that it was possibly less important for customers buying durable goods. In their study, conditional value was considered to be less critical than in that of Sheth et al. Consequently, these two aspects were not included in their perceived value scale, which consists of four value dimensions, i.e., quality, price, emotional value, and social value.[98] They describe the four types of value as:

2. Emotional value: the benefit[99] derived from the feelings or affective states that a product generates;
3. Social value: the benefit derived from the product's ability to enhance social self-concept;
4. Functional value (price/value for money): the benefit derived from the product due to the reduction of its perceived short-term and long-term costs;
5. Functional value (performance/ quality): the benefit derived from the perceived quality and expected performance of the product.[100]

Their findings show that emotional value and the performance/quality functional value are the biggest contributors to repurchase intention and recommendation intention. These two indicators exhibit parallels to the measurement of behavioural intentions within customer loyalty research, and are thus relevant to this research process.

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96 Sheth, J. N., Newman, B. I., and Gross, B. L. (1991), "Why we buy what we buy: A theory of consumption values," *Journal of Business Research* 22, no. 2: pp. 159–162.

97 Ibid., p. 168.

98 Sweeney, J. C. and Soutar, G. N. (2001), "Consumer perceived value: The development of a multiple item scale," *Journal of Retailing* 77, no. 2: pp. 207–208.

99 The original source uses the term "utility", which is regarded as synonym for "benefit".

100 Sweeney, J. C. and Soutar, G. N. (2001), "Consumer perceived value: The development of a multiple item scale," *Journal of Retailing* 77, no. 2: p. 211.

The study by Gwinner et al. focuses on relational benefits regarding customers' perceptions. In their two studies, the authors defined relational benefits: "as those benefits customers receive from long-term relationships above and beyond the core service performance."[101] Three dimensions of relationship benefits were identified from the results of the empirical analysis:

1. Confidence benefits that arise from faith in the trustworthiness of the provider, reduced anxiety and risk, and knowing what to expect from the supplier;
2. Social benefits created by personal recognition by employees, customer familiarity with employees, and the development of friendship;
3. Special treatment benefits describe the possibility of obtaining an occasional price reduction or special service.

Confidence benefits were shown to be the most important to customers, which can be interpreted to mean that perceived trust generated by a product or service, leads to positive behavioural intentions and reduction of perceived risks. Gwinner et al. concluded that besides a satisfactory or even good, core service, industries can build retention strategies by introducing extra new services to offer additional benefits to their customers. Customers may even remain in a relationship in which the core service is perceived to be less satisfying if, at the same time, they are receiving essential relational benefits from extra services. Thus, the authors assert that loyalty strategies can be built around relational benefits. Extra services which create confidence benefits, social benefits, and special treatment benefits, exist in all service industries to varying degrees.[102]

The detailed analysis of the models of Sheth et al., Sweeney et al., and Gwinner et al., leads to the finding that several aspects of customer benefits can influence customer's perception of connected remote services in varying ratios,[103] and the conclusions that:

1. The measurement of the outcomes of different dimensions of customer benefits corresponds to central aspects of the measurement of intentional behaviour within customer loyalty research;

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[101] Gwinner, K. P., Gremler, D. D., and Bitner, M. J. (1998), "Relational Benefits in Services Industries: The Customer's Perspective," *Journal of the Academy of Marketing Science* 26, no. 2: p. 102.

[102] Ibid., pp. 109–110.

[103] Wachter, N., *Kundenwert aus Kundensicht: Eine empirische Analyse des Kundennutzens aus Sicht der Privat- und Geschäftskunden in der Automobilindustrie*. Zugl.: Basel, Univ., Diss., 2005, 1st ed. (Wiesbaden: Dt. Univ.-Verl., 2006), p. 47.

2. If connected remote services can create emotional value and functional value, in terms of performance, it can be assumed that there will be a positive impact on repurchase intention and recommendation intention;
3. If connected remote services can provide confidence benefits, regarding trust and/or reduction of perceived risks, a positive effect in car servicing loyalty is also to be expected.

Customer sacrifices

Lapierre defines customer sacrifices as, "the overall monetary and non-monetary costs the customer invests or gives to the supplier in order to complete a transaction or to maintain a relationship with a supplier."[104] Within this definition, non-monetary costs are described as the time, effort, or energy invested by the customer in obtaining the products or services, or in establishing and remaining in a relationship with a supplier. In confirmation of this, Woodall states that sacrifices can be practical/cognitive (e.g., cost), entirely of the senses/affective (e.g., disappointment), or a combination of both. He lists a range of possible sacrifices which he categorizes either as monetary or non-monetary costs. While monetary costs can be measured in currency, non-monetary costs reflect the customer's time, effort, or potential anxieties (psychological costs) in connection with a particular product or service.[105] Kotler describes psychological costs as fears, such as the fear of not being able to use the product or service as intended.[106] When applied to connected remote services, the findings above show that especially the aspect of fear needs to be considered. Existing research on other mobile services reveals that customers perceive risks and fear because innovative mobile services often require access to personal data, such as location, which typically triggers a user reaction of rejection rather than acceptance. Possible customer sacrifices caused by costs can be ignored in this study, because no monetary investment is required from customers to use CRS. The service provided is also free-of-charge, which ultimately accelerates market penetration.

To sum up, in keeping with the targets of this thesis: If customers perceive value using connected remote services, it can be assumed that they are willing to use the service in the future, to recommend it to friends and acquaintances and to be loyal to the provider of the service. An overview of the analysed concepts of customer value is listed in Appendix A.

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[104] Lapierre, J. (2000), "Customer-perceived value in industrial contexts," *Journal of Business & Industrial Marketing* 15, 2/3: p. 123.

[105] Woodall, T. (2003), "Conceptualising 'Value for the Customer': An Attributional, Structural and Dispositional Analysis," *Academy of Marketing Science Review* 2003, no. 12: pp. 7–12.

[106] Kotler, P. and Bliemel, F., *Marketing-Management: Analyse, Planung und Verwirklichung,* 10th ed. (Stuttgart: Schäffer-Poeschel, 2001), p. 58.

1.4 Definitions and measurement approaches for car servicing loyalty as part of customer retention management

In this chapter the concept of customer loyalty is first classified and assigned within the research field of relationship management. In the next step customer loyalty is analysed regarding its different reference objects. This differentiation is applied to the context of connected remote services, identifying car servicing loyalty as the target construct which CRS are aiming to achieve. Further, the antecedents of customer loyalty are identified, with the aim of identifying potential concepts linking connected remote services and car servicing loyalty. The literature review also provides an overview on approaches for measuring car servicing loyalty.

1.4.1 Theorizing customer loyalty and customer retention management as part of relationship management

Initial investigations on customer loyalty can be traced back to the 1920s when Copeland examined, for the first time, the repurchase behaviour of brands. He describes factual repurchase behaviour and preference as the underlying psychological condition. By differentiating between *consumer insistence* and *consumer preference*, he describes two bond types, which were referenced in the following research.[107]

In the 1950s, the discussion on brand loyalty in Anglo-American research became increasingly influential. Cunningham examined repeated purchase behaviour with an emphasis on factual behaviour.[108] Later, he investigated the phenomenon of store loyalty and the interrelationship with brand loyalty, explaining how it is possible to be loyal to a brand while switching dealers or distributors of the product or service.[109] Farley examined another point of view and focused on stochastic measures, such as the probability of purchase.[110]

In the 1970s, behaviourist models, which investigated static and dynamic repurchase behaviour, were at the forefront.[111] The explicit behavioural orientation was then increasingly questioned, since it did not allow conclusions to be drawn about the underlying causes of behaviour. Jacoby

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[107] Copeland, M. (1923), "Relation of Consumer's Buying Habit to Marketing Methods," *Harvard Business Review* 34, no. 1: p. 287.

[108] Cunningham, R. M. (1956), "Brand Loyalty: What, where, how much," *Harvard Business Review, no.* 34: p. 116.

[109] Cunningham, R. M. (1961), "Customer Loyalty to Store and Brand," *Harvard Business Review* 39, no. 6: p. 127.

[110] Farley, J. U. (1964), "Why does brand loyalty vary over products?," *Journal of Marketing* 1, no. 4: p. 9.

[111] Nolte, H., *Die Markentreue im Konsumgüterbereich* (Bochum: Brockmeyer, 1976), p. 6.

and Chestnut claimed that in order to manage brand loyalty instead of only measuring it, the phenomenon had to be researched with a more detailed description of cognitive activities.[112]

In the 1990s, models were developed which combined behavioural and attitudinal settings. However, neither a definition of the term *loyalty* nor a measurement of a universally accepted consensus exists among researchers. In addition, loyalty appears to be a multi-dimensional, complex construct,[113] and the complexity of the analytical methods used to investigate the phenomenon has increased.[114]

To date, research on customer loyalty has been dominated by the study of service quality, service value, and satisfaction issues, and has focused on the interrelationships among and between these constructs.[115] The results indicate that building loyalty can be traced back to the successful creation of value, satisfaction or quality, i.e. created through successful management of service innovations that lead to positive customer perceptions in one or all of the mentioned concepts. However, there is no research that incorporates the concept of connected remote services into explaining customer loyalty, thereby indicating a research gap to be analysed. No theory completely explains how customer loyalty is achieved although research efforts have been made in the fields of customer behaviour, decision-making processes, service marketing and relationship management. Oliver and other researchers call for more research to explain the concept of loyalty better.[116]

A large body of research exists about loyalty in relation to tangible goods, but only limited theoretical or empirical studies have been performed on intangible goods. Therefore, Gremler and Brown call for more empirical research on service loyalty.[117] Reichheld and Sasser first reported that customer loyalty positively affects company profits. Using the example of a car service chain, they demonstrated that profits from a customer increased, when the customer relationship is of a longer duration, due to reduced cost over time, increased sales, a realizable

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[112] Jacoby, J. and Chestnut, R. W., *Brand loyalty measurement and management* (New York, NY: Wiley, 1978), p. 31.

[113] Dick, A. S. and Basu, K. (1994), "Customer Loyalty: Toward an Integrated Conceptual Framework.," *Journal of the Academy of Marketing Science* 22, no. 2: p. 111.

[114] Mellens, M., Dekimoe, M. G., and Steenkamp, J.-B. E.M. (1996), "A Review of Brand-Loyalty Measures in Marketing," *Tijdschrift voor Econoniie en Management* XLI, no. 4: p. 527.

[115] Cronin, J. J., Brady, M. K., and Hult, G. T. M. (2000), "Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments," *Journal of Retailing* 76, no. 2: p. 193; Heskett, J. L. et al. (1994), "Putting the Service-Profit Chain to Work," *Harvard Business Review* 72, no. 2.

[116] Oliver, R. L. (1999), "Whence Consumer Loyalty?," *Journal of Marketing* 63: p. 43.

[117] Gremler, D. D. and Brown, S. W. (1996), "Service loyalty: its nature, importance, and implications," *Advancing service quality: A global perspective* 5: p. 171.

price mark-up, and ultimately revenue effects from referrals. The results outlined were confirmed in numerous studies.[118] This example shows that customer retention management and customer loyalty are strongly intertwined. Therefore, a definition of terms and a demarcation of both phenomena are necessary.

In the literature, terms, such as *relationship management*, *relationship marketing*, *customer retention management*, or *customer relationship management* are increasingly being used. In practice, however, these are often not clearly defined or may even be used as synonyms. For this reason, these concepts and their relationships to each other are clarified below. In literature, the phenomenon of customer loyalty is often discussed within the framework of relationship management, as a concept for analysing, designing, and controlling business relationships. Therefore, relationship management provides a conceptual framework of this research.

A suitable definition of the term *relationship management* and a differentiation from the term *relationship marketing* can be found in Diller. He defines relationship management as, "... the active and systematic analysis, selection, planning, design and control of business relationships in terms of a holistic concept of targets, mission statements, individual activities and systems."[119] This definition considers distinguishing between individual transactions and long-term business perspectives, although both are respected in relationship management. In this case, relationship management is not limited to customer relationships, but is understood as a comprehensive approach. It includes horizontal (e.g. sales communities), vertical (e.g. supplier relations), lateral (e.g. relations with authorities), or even corporate relations (e.g. staff).[120]

In the early 1980s, Berry coined the term *relationship marketing* in the Anglo-American scientific community, and defined it as follows, "relationship marketing is attracting, maintaining and (...) enhancing customer relationships."[121] Berry exclusively considered vendors and customers as actors in business relationships.[122] Wehrli expanded this definition by considering procurement markets in addition to the sales markets. However, numerous authors have criticized the pure, transactional orientation. Therefore, relationship marketing not only deals with

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[118] Reichheld, F. F. and Sasser Jr, W. E. (1990), "Zero Defections: Quality comes to services," *Harvard Business Review* 68, no. 5: pp. 106–107.

[119] Diller, H. (1995), "Beziehungs-Marketing," *Wirtschaftswissenschaftliches Studium: Wist; Zeitschrift für Ausbildung und Hochschulkontakt, no.* 9: p. 442.

[120] Diller, H. and Kusterer, M. (1988), "Beziehungsmanagement," *Marketing: Zeitschrift für Forschung und Praxis, no.* 3: p. 212.

[121] Wehrli, H. P. (1994), "Beziehungsmarketing - Ein Konzept," *der markt* 33, no. 4: p. 193.

[122] Berry, L. L. (1983), "Relationship Marketing," *AMA - Emerging perspectives on Services Marketing, Chicago:* p. 25.

the initiation of relationships, but also with their stabilization, strengthening and if a customer terminates the relationship, resumption.[123]

Customer relationship management (CRM) has evolved directly from relationship marketing, and accordingly exhibits a great similarity in basic principles. In contrast to relationship marketing, customer relationship management is solely limited to managing relationships with customers, so that it must be understood as an integral part of relationship marketing. It not only includes potential and existing customers, but also former customers. In terms of relationship management and its long-term perspective, the central purposes of customer relationship management are to concentrate on loyal customers so that they purchase more, purchase more expensive offerings, and generate customer referrals. Loyalty can also be generated by making the process of purchasing goods or services more convenient for the customer.[124] This is consistent with the targets of maintaining and intensifying business relationships with active customers.

Here, customer retention management separates from the customer relationship management approach. It is understood as a sub-aspect of the approaches mentioned above, since it explicitly focusses on existing customers.[125] Various definitions of customer retention management can be found in the literature. One of the reasons for the different definitions is that customer retention management can be analysed from differing perspectives, i.e. from the perspective of the company, from a consumer's perspective, and from a relationship-oriented perspective. In general, customer retention is viewed as a phenomenon that regulates the relationship between a supplier and a customer.[126] From a company's perspective, Meyer and Oevermann state that, "customer retention includes all measures of a company aimed to positively influence the behavioural intention and the factual behaviour of a customer to a vendor or its services to stabilize or expand the relationship with this customer for the future."[127]

Assuming the customers' perspective, Diller defines customer retention as, "setting of a customer towards a business relationship with a supplier which is reflected in its willingness to

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[123] Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen,* 4th ed. (München: Franz Vahlen, 2015), pp. 11–15.

[124] Peppers, D. and Rogers, M., *Managing customer relationships: A strategic framework,* 2nd ed. (Hoboken NJ u.a.: Wiley, 2011), p. 16.

[125] Hippner, H., Hubrich, B., and Wilde, K. D., *Grundlagen des CRM: Strategie, Geschäftsprozesse und IT-Unterstützung,* 3rd ed. (Wiesbaden: Gabler Verlag / Springer Fachmedien Wiesbaden GmbH Wiesbaden, 2011), p. 19.

[126] Diller, H. (1996), "Kundenbindung als Marketingziel," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 2: p. 81.

[127] Meyer, A. and Oevermann, D., "Kundenbindung," in *Handwörterbuch des Marketing,* 2nd ed., eds. Bruno Tietz, Richard Köhler and Joachim Zentes (Stuttgart: Schäffer-Poeschel, 1995), pp. 1341–1342.

repeat transactions."[128] In the context of business relationships, customer retention is understood as a multidimensional construct which can be described by the customer's factual and future intentional behaviour.[129] This understanding of the customer's perspective, indicates further dimensions, i.e. an attitudinal dimension and a behavioural dimension, and also describes a bridge to the concept of customer loyalty. While retaining the idea of these two dimensions, Diller also considers the time criterion for an additional classification, stating, "customer retention is present when repeated information, goods or financial transactions between two business partners have taken place within a suitably defined period (ex post consideration) or are planned (ex ante consideration)."[130] The *ex-post* consideration includes all past transactions between business partners, and thus refers to factual behaviour. Here, in addition to the actual re-purchases, the customer's actual recommendations are also considered. In the *ex-ante* consideration, the customer's future behaviour is integrated as a second construct in the concept of customer retention. The term used, *suitably defined period,* is not further specified in this definition. The period in which the repeated purchase occurs depends on the product or service. For instance, several years may pass between two vehicle purchases, whereas the interval would be several months for a car service.[131] Summarizing the above, in contrast to customer retention, which can exist from both the vendor and the customer side, the concept of customer loyalty solely describes the customer perspective of a relationship.

Integrating the concept of customer retention management into the concept of customer loyalty, Stauss and Seidel designate a company's measures for the systematic increase of customer loyalty, as customer retention management.[132] The differentiation of possible measures within customer retention management can be made according to the classic 4P marketing instruments, i.e., product, price, place, and promotion. Innovative products or services which provide added-value, in combination with new delivery processes and customer communication interfaces, constitute effective measures for increasing customer retention, by utilizing various tools and different communication and distribution channels.[133] Consequently, the causal link between

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[128] Diller, H. (1996), "Kundenbindung als Marketingziel," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 2: p. 83.

[129] Meyer, A. and Oevermann, D., "Kundenbindung," in *Handwörterbuch des Marketing,* 2nd ed., eds. Bruno Tietz, Richard Köhler and Joachim Zentes (Stuttgart: Schäffer-Poeschel, 1995).

[130] Diller, H. (1996), "Kundenbindung als Marketingziel," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 2: p. 84.

[131] Herrmann, A. and Johnson, M. D. (1999), "Die Kundenzufriedenheit als Bestimmungsfaktor der Kundenbindung," *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* 51, no. 6: p. 583.

[132] Stauss, B. and Seidel, W., *Beschwerdemanagement: Unzufriedene Kunden als profitable Zielgruppe,* 4th ed. (München: Hanser, 2007), p. 27.

[133] Wirtz, B. W., *Multi-Channel-Marketing: Grundlagen — Instrumente — Prozesse* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2008), p. 15.

the concepts of customer loyalty and customer retention management can be summarized by stating that the result of successful customer retention management is customer loyalty.[134]

Figure 1-5 integrates the perspectives described above and applies them to the context of this thesis. Here it can be seen that the different types of customer retention management measures driven by a company aim at different categories of customer loyalty. If applied to the context of the automotive after-sales business, brand loyalty and dealership loyalty can be differentiated, among others. Dealership loyalty can be further divided into dealership sales and after-sales loyalty, which in the case of the automotive business is further specified as car servicing loyalty. Thus, within the company's portfolio of customer retention management measures, connected remote services can be classified as a specific measure aimed at the creation of car servicing loyalty by providing certain customer value.

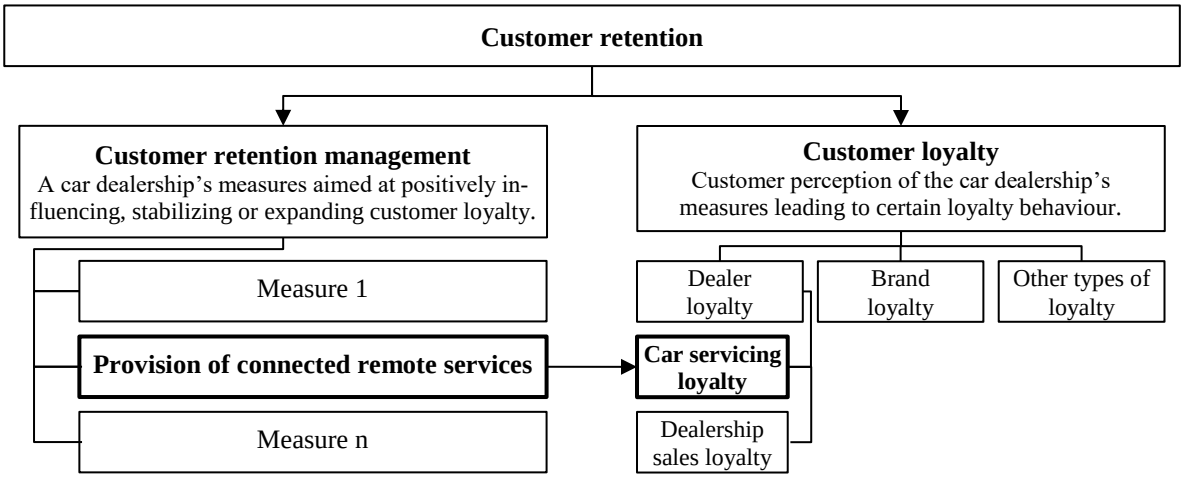

Figure 1-5: Linking connected remote services as customer retention management measure towards car servicing loyalty.[135]

This link is based on the idea that successful customer retention management creates customer value, which then leads to one or more specific types of customer loyalty. In turn, this loyalty contributes to the company's success through the economic effects on important key performance indicators of growth and profitability, such as repeated and additional sales, reduction of acquisition costs, and referrals. As spring of this chain of effects the creation of superior customer value is emphasized.

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[134] Krüger, S. M., *Profitabilitätsorientierte Kundenbindung durch Zufriedenheitsmanagement: Kundenzufriedenheit und Kundenwert als Steuerungsgröße für die Kundenbindung in marktorientierten Dienstleistungsunternehmen*. Zugl.: München, Univ., Diss., 1997 (München: FGM-Verl., 1997), p. 21.

[135] Author's illustration based on Meyer, A. and Oevermann, D., "Kundenbindung," in *Handwörterbuch des Marketing*, 2nd ed., eds. Bruno Tietz, Richard Köhler and Joachim Zentes (Stuttgart: Schäffer-Poeschel, 1995), pp. 1341–1342; Diller, H. (1996), "Kundenbindung als Marketingziel," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 2: p. 83.

1.4.2 Identification and analysis of antecedents of customer loyalty

Numerous researchers in the field of customer loyalty report that the factors leading to behavioural intentions and factual behaviour towards a brand or dealership are complex,[136] as well as dynamic and evolve over time.[137]

Examining the antecedents of customer loyalty in the existing literature, it is conspicuous that it is dominated by models revealing the concept of customer satisfaction as the strongest driver of customer loyalty. However, models also exist which show other relevant drivers. Here, it is particularly necessary to examine other industries in addition to the automotive industry, because CRS require different perspectives, such as mobile services and telecommunication, to be integrated. Figure 1-6 presents a classification of existing research models regarding drivers of customer loyalty. On one axis, it differentiates between models with a predominance of customer satisfaction and those which show other drivers to be essential. The other axis is differentiated according to the industry on which the empirical data are based.

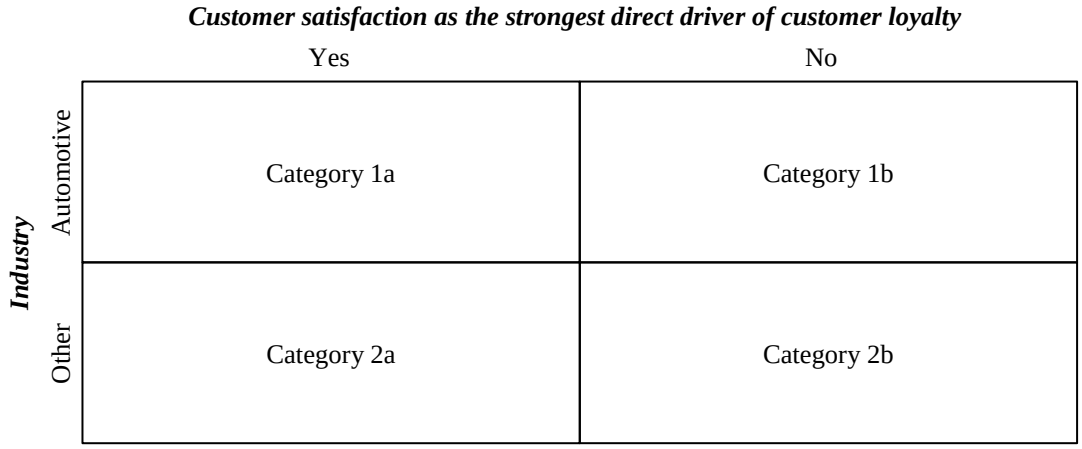

Figure 1-6: Classification scheme for existing research models on customer loyalty.[138]

Table 1-3 classifies the varied approaches researched into the categories described in Figure 1-6. Drivers of customer loyalty are listed in order of relevance for the individual models.

[136] Fournier, S. (1998), "Consumers and Their Brands: Developing Relationship Theory in Consumer Research," *Journal of Consumer Research* 24, no. 4: p. 343; Majumdar, A. (2005), "A model for customer loyalty for retail stores inside shopping malls - An Indian perspective," *Journal of Services Research, Special Issue,* December: p. 62.

[137] Johnson, M. D., Herrmann, A., and Huber, F. (2006), "The Evolution of Loyalty Intentions," *Journal of Marketing* 70, no. 2: p. 122.

[138] Author's illustration.

Table 1-3: Classification of empirical research findings according to Figure 1-6.[139]

Source	Industry (Country)	Drivers of loyalty	Findings
Category 1a			
Bauer, Huber and Bräutigam (1997)	Customers of new and used vehicles (Germany)	- Product satisfaction; - Dealer satisfaction; - Complaint management.	Product satisfaction has highest influence on brand loyalty, dealer satisfaction on dealer loyalty. Brand loyalty positively influences dealer loyalty.
Bloemer and Pauwels (1998)	Customers of car dealerships (The Netherlands)	- Satisfaction with automobile; - Sales service satisfaction; - After-sales service satisfaction.	Types of satisfaction (car, sales, after-sales) influence brand loyalty, which positively influences sales and after-sales loyalty.
Homburg and Giering (2001)	Customers of one car dealership and service (Germany)	- Product satisfaction; - Sales satisfaction; - Car servicing satisfaction.	Product satisfaction has highest influence on brand loyalty. Satisfaction with sales process and after-sales service has the strongest impact on dealer loyalty.
Wachter (2006)	Private and corporate customers of one brand (Germany)	- Customer satisfaction; - Customer benefit.	In all customer segments, customer satisfaction has a stronger effect on customer loyalty than perceived customer benefit.
Category 1b			
Eggert and Helm (2000)	Customers of premium car brand (Germany)	- Commitment; - Customer satisfaction.	Complete influence of satisfaction is mediated by commitment. Commitment has highly significant influence on customer loyalty.
Bansal, Irving and Taylor (2004)	Customers of car repair service (Canada)	- Commitment; - Trust; - Switching costs; - Alternative attractiveness; - Satisfaction; - Norms.	Commitment influences switching intentions. Trust, switching costs and norms positively influence switching intentions. Influence of satisfaction not significant.
Meyer (2010)	Corporate customers of car brands (Germany)	- Customer benefit; - Competitor attractiveness; - Brand strength; - Dealer relationship.	Brand strength dominates the influence on brand loyalty. Satisfaction is of importance, but not the strongest driver.
Scholly (2013)	Private customers of new vehicles (Germany)	- Employee trust; - Environment; - Pricing; - Contact frequency.	Customers' trust in employee competence, empathy and honesty influence loyalty. Brand loyalty positively affects sales and car servicing loyalty.
Nyadzayo and Khajehzadeh (2016)	Customers of car repair service (South-Africa)	- CRM quality; - Service quality; - Customer value; - Customer satisfaction.	Service-quality and customer value show higher direct and indirect influence on CRM quality and loyalty than satisfaction.

Table continued next page

[139] Author's table based on sources mentioned in the table.

Category 2a			
Shankar, Smith and Rangaswamy (2003)	Lodging industry (U.S.A)	- Service encounter satisfaction; - Overall satisfaction; - Online medium.	Overall satisfaction is the strongest driver in online and offline settings.
Spiteri and Dion (2004)	Veterinary pharmaceuticals (U.S.A.)	- Customer satisfaction; - Perceived value; - Relationship benefits.	Satisfaction has highest contribution to loyalty followed by relationship benefits (product-, personal- and strategic) and customer value.
Duman and Mattila (2005)	Travel services (U.S.A.)	- Perceived satisfaction; - Perceived value; - Hedonics; - Novelty; - Control.	Overall satisfaction is the strongest driver for behavioural intentions concerning repurchase. Hedonics has higher impact than customer value.
Chen and Chen (2010)	Tourism industry (Taiwan)	- Customer value; - Experience quality; - Satisfaction.	Satisfaction has the highest impact on behavioural intentions, customer value also significant.
Category 2b			
Andreassen and Lindestad (1998)	Package tour industry (Norway)	- Value; - Perceived quality; - Corporate image; - Customer satisfaction.	Corporate image has a stronger effect on loyalty than customer satisfaction, describing the primary path to customer loyalty.
Aydin and Özer (2005)	Telecommunication (Turkey)	- Image; - Trust; - Switching cost; - Service quality.	Trust is the most important determinant of customer loyalty, followed by service quality and switching cost. Contribution of image n.s.
Conze (2007)	Travel services (Germany)	- Confidence benefits; - Special treatment benefits; - Alternation.	Confidence benefits show a higher impact towards intentional loyalty than special treatment benefits. Social benefits shown to be n.s.
Ozturk et al. (2016)	Mobile hotel booking (U.S.A.)	- Perceived ease-of-use; - Convenience; - Compatibility; - Self-efficacy.	Convenience mediates impacts of compatibility and ease-of-use. Compatibility shows higher impact towards loyalty than convenience.

The analysis of the studies in Table 1-3 shows a large variety of loyalty drivers that also differ regarding their level of aggregation. Customer satisfaction, customer value, and commitment are identified as major antecedents affecting customer loyalty. Corporate image, customer relationship management strategies, communication, complaint handling, and service quality were also argued to be very influential.

However, it can be seen that many studies are based on sales and service personnel's loyalty-creating behaviour, such as service encounter satisfaction,[140] contact interactivity and care,[141]

[140] Shankar, V., Smith, A. K., and Rangaswamy, A. (2003), "Customer satisfaction and loyalty in online and offline environments," *International Journal of Research in Marketing* 20, no. 2: p. 156.

[141] Srinivasan, S. S., Anderson, R., and Ponnavolu, K. (2002), "Customer loyalty in e-commerce: An exploration of its antecedents and consequences," *Journal of Retailing* 78, no. 1: p. 47.

and cost-related aspects, such as switching costs[142] or price perception.[143] Since loyalty-drivers based on price advantages or personal face-to-face contact have no relevance in the context of the present thesis, these factors will not be further investigated. The focus is on possible loyalty drivers that are conceptualized independent of personal contacts and interpersonal relationships. The analysis of the studies shows that the main drivers of customer loyalty are creation of customer value, customer satisfaction, service quality, trust, commitment, and image. It is assumed that these antecedents can be viewed as possible mediators between connected remote services and car servicing loyalty. Next, the underlying concepts of these antecedents are discussed in detail.

Customer value: Analysis of the automotive trade business shows that, especially with private customers of passenger vehicles, the relationship-oriented dimensions of customer value influence customer satisfaction, as well as factual behaviour, such as repurchase from the same brand or dealership. In their cross-industry study, Cronin et al. demonstrated that the direct influence of customer value on attitudinal behaviour was significant in six out of six industries examined, whereas customer satisfaction only had an effect in five out of six industries.[144] In addition, service quality only showed an influence in four out of six industries. Therefore, customer value may be a better predictor of attitudinal behaviour than either satisfaction or quality. The findings regarding customer value as a driver for customer loyalty correspond with the findings of customer loyalty being a consequence of customer value creation (see Chapter 1.2).

Customer satisfaction: Based on empirical results, customer satisfaction is a central driver of customer loyalty. Several studies confirm that higher levels of customer satisfaction lead to greater customer loyalty.[145] It is common to operationalize customer satisfaction by using the confirmation/disconfirmation-paradigm. It is understood as the positive outcome of a psycho-

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[142] Lam, S. Y. et al. (2004), "Customer Value, Satisfaction, Loyalty, and Switching Costs: An Illustration From a Business-to-Business Service Context," *Journal of the Academy of Marketing Science* 32, no. 3: p. 308; Aydin, S. and Özer, G. (2005), "The analysis of antecedents of customer loyalty in the Turkish mobile telecommunication market," *European Journal of Marketing* 39, 7/8.

[143] Wachter, N., *Kundenwert aus Kundensicht: Eine empirische Analyse des Kundennutzens aus Sicht der Privat- und Geschäftskunden in der Automobilindustrie*. Zugl.: Basel, Univ., Diss., 2005, 1st ed. (Wiesbaden: Dt. Univ.-Verl., 2006).

[144] Cronin, J. J., Brady, M. K., and Hult, G. T. M. (2000), "Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments," *Journal of Retailing* 76, no. 2: p. 207.

[145] Bolton, R. N. and Drew, J. H. (1991), "A Multistage Model of Customers' Assessments of Service Quality and Value," *Journal of Consumer Research* 17, no. 4; Fornell, C. Johnson, M. D., Anderson, E. W., Cha, J., and Everitt Bryant, B. (1996), "Fornell_American Customer Satisfaction Index _BIB," *Journal of Marketing, no.* 60; Rust, R. T. and Oliver, R. L. (2000), "Should We Delight the Customer?," *Journal of the Academy of Marketing Science* 28, no. 1; Conze, O., *Kundenloyalität durch Kundenvorteile: Segmentspezifische Analyse und Implikationen für das Kundenbeziehungsmanagement*. Zugl.: St. Gallen, Univ., Diss., 2007 (Wiesbaden: Deutscher Universitäts-Verlag, 2007).

logical comparative process between the expectations of a customer and factual perceived performance level. Customer satisfaction is often responsible for their loyal behaviour and is a significant factor in future purchase intentions, leading to customer loyalty, which implies a long-term perspective for the evaluation of customer satisfaction.[146] In their cross-brand analysis based on the U.S.-American Customer Satisfaction Index of German and Japanese vehicle brands, Herrmann and Johnson report differences in the strength of the relationship between satisfaction and loyalty. If customer satisfaction is already high, a further increase in satisfaction leads to a marked increase in loyalty, whereas if the satisfaction level is only moderate, an increase only results in a slight increase in loyalty.[147] The results show that, for companies the focus should not solely be set on efforts to increase loyalty of unsatisfied customers, but also on customers with high levels of satisfaction.

Service quality: For services, a possible way to retain customers is by improving customer service quality.[148] Parasuraman, Zeithaml and Berry define service quality as, "[…] the consumer's judgement about an entity's overall excellence or superiority."[149] Grönroos describes service quality as containing two dimensions: technical quality ("what" the customer gets) and functional quality ("how" the customer gets it).[150] For example, Nyadzayo and Khajehzadeh's analysis of the automotive industry, reveals that the effect of service quality on loyalty is significant, which suggests that CRM quality partially mediates the effect of service quality on loyalty.[151] Bloemer, Ruyter and Wetzels, as well as Venetis and Ghauri, among others, have pointed out that there is a positive relationship between service quality and repurchase intention,

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[146] Anderson, E. W., Fornell, C., and Lehmann, D. R. (1994), "Customer Satisfaction, Market Share, and Profitability: Findings from Sweden," *Journal of Marketing* 58, no. 3; Dick, A. S. and Basu, K. (1994), "Customer Loyalty: Toward an Integrated Conceptual Framework.," *Journal of the Academy of Marketing Science* 22, no. 2.

[147] Herrmann, A. and Johnson, M. D. (1999), "Die Kundenzufriedenheit als Bestimmungsfaktor der Kundenbindung," *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* 51, no. 6: p. 595.

[148] Zeithaml, V. A., Parasuraman, A., and Berry, L. L., *Delivering quality service: Balancing customer perceptions and expectations* (New York, NY: Free Press, 1990); Zeithaml, V. A., Bitner, M. J., and Gremler, D. D., *Services marketing: Integrating customer focus across the firm,* 6th ed. (New York NY: McGraw-Hill Irwin, 2013), p. 176.

[149] Parasuraman, A., Zeithaml, V. A., and Berry, L. L. (1988), "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing* 64, no. 1: p. 15.

[150] Grönroos, C. (1984), "A Service Quality Model and its Marketing Implications," *European Journal of Marketing* 18, no. 4: p. 39.

[151] Nyadzayo, M. W. and Khajehzadeh, S. (2016), "The antecedents of customer loyalty: A moderated mediation model of customer relationship management quality and brand image," *Journal of Retailing and Consumer Services* 30: p. 266.

additional purchases, positive word-of-mouth, and resistance to other alternatives, which is expressed differently depending on the industry examined.[152] These behavioural intentions constitute customer loyalty. Therefore, it is proposed that service quality has a positive effect on customer loyalty.

Image: A range of authors confirm the positive effect of brand image on customer loyalty[153] and the acceptance of higher prices by loyal customers.[154] By definition, brand image is "… how a brand is perceived by consumers."[155] Keller connects these perceptions with the associations held in a consumer's memory.[156] Andreassen and Lindestad confirmed the role of brand image in the creation of customer loyalty within the service sector, and found that it had both a direct and an indirect influence on loyalty.[157] In addition to its impact on loyalty, Wachter's results from the commercial vehicle sector confirm that brand perception also influences the emotional and economical aspects of customer value.[158] Johnson et al. show that the influence of corporate image on loyalty is significant in five different industries, with the consequence that the brands or companies with a high customer perception of their corporate images are those that customers ultimately consider for repurchase.[159] Lai et al. report that image has no direct effect on loyalty, but that it plays an important role in enhancing customer value and satisfaction.[160] Thus, it can be assumed that image has the potential to either directly or indirectly affect customer loyalty.

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[152] Bloemer, J., Ruyter, K. de, and Wetzels, M. (1999), "Linking perceived service quality and service loyalty: A multi-dimensional perspective," *European Journal of Marketing* 33, 11/12; Venetis, K. A. and Ghauri, P. N. (2004), "Service quality and customer retention: Building long-term relationships," *European Journal of Marketing* 38, 11/12.

[153] Aydin, S. and Özer, G. (2005), "The analysis of antecedents of customer loyalty in the Turkish mobile telecommunication market," *European Journal of Marketing* 39, 7/8; Wachter, N., *Kundenwert aus Kundensicht: Eine empirische Analyse des Kundennutzens aus Sicht der Privat- und Geschäftskunden in der Automobilindustrie*. Zugl.: Basel, Univ., Diss., 2005, 1st ed. (Wiesbaden: Dt. Univ.-Verl., 2006).

[154] Chaudhuri, A. and Holbrook, M. B. (2001), "The Chain of Effects from Brand Trust and Brand Affect to Brand Performance: The Role of Brand Loyalty," *Journal of Marketing* 65, no. 2: pp. 85–87.

[155] Aaker, D. A. (1996), "Measuring Brand Equity Across Products and Markets," *California Management Review* 38, no. 3.

[156] Keller, K. L. (1993), "Conceptualizing, Measuring, and Managing Customer-Based Brand Equity," *Journal of Marketing* 57, no. 1.

[157] Andreassen, T. W. and Lindestad, B. (1998), "Customer loyalty and complex services," *International Journal of Service Industry Management* 9, no. 1: p. 19.

[158] Wachter, N., *Kundenwert aus Kundensicht: Eine empirische Analyse des Kundennutzens aus Sicht der Privat- und Geschäftskunden in der Automobilindustrie*. Zugl.: Basel, Univ., Diss., 2005, 1st ed. (Wiesbaden: Dt. Univ.-Verl., 2006).

[159] Johnson, M. D. et al. (2001), "The evolution and future of national customer satisfaction index models," *Journal of Economic Psychology* 22, no. 2: p. 240.

[160] Lai, F., Griffin, M., and Babin, B. J. (2009), "How quality, value, image, and satisfaction create loyalty at a Chinese telecom," *Journal of Business Research* 62, no. 10: p. 985.

Trust: Trust can be defined as, "a willingness to rely on an exchange partner in whom one has confidence."[161] Anderson and Narus assert that this can also be associated with two interacting firms. This suggests that trust can be seen from two perspectives, i.e. trust in a company or brand, and trust in its service personnel interacting with customers.[162] Morgan and Hunt define trust as, "confidence in the exchange partner's reliability and integrity."[163] Trust was found to have a significant influence on loyalty, in the context of relationships between a customer and the service-provider employee.[164] Aydin and Özer reveal that trust is an essential driver of customer loyalty,[165] confirming the results of Garbarino and Johnson, who previously demonstrated that trust, in addition to satisfaction and commitment is an important driver of behavioural intentions regarding loyalty.[166]

Commitment: Moorman, Zaltman and Deshpandé describe commitment as an "enduring desire to maintain a valued relationship"[167] and being unwilling to consider other alternatives. Customers are unlikely to be committed to relationships that they do not value; therefore, it indicates a positive evaluation of the relationship. Morgan and Hunt propose that commitment, similar to the concept of loyalty in terms of attitude towards a brand, is an essential determinant of the strength of a business relationship.[168] In Eggert and Helm's study the concept of commitment as a mediator between customer satisfaction and recommendations as an indicator of loyalty explained almost the entire variance. They demonstrate that customer satisfaction has a strong influence on commitment which, in turn, significantly influences recommendations.[169]

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[161] Moorman, C., Zaltman, G., and Deshpandé, R. (1992), "Relationships between Providers and Users of Market Research: The Dynamics of Trust within and between Organizations," *Journal of Marketing Research* 29, no. 3: p. 316.

[162] Anderson, J. C. and Narus, J. A. (1990), "A Model of Distributor Firm and Manufacturer Firm Working Partnerships," *Journal of Marketing* 54, no. 1: p. 45.

[163] Morgan, R. M. and Hunt, S. D. (1994), "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing* 58, no. 3: p. 23.

[164] Gremler, D. D. and Brown, S. W. (1996), "Service loyalty: its nature, importance, and implications," *Advancing service quality: A global perspective* 5: p. 176.

[165] Aydin, S. and Özer, G. (2005), "The analysis of antecedents of customer loyalty in the Turkish mobile telecommunication market," *European Journal of Marketing* 39, 7/8: p. 920.

[166] Garbarino, E. and Johnson, M. S. (1999), "The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships," *Journal of Marketing* 63, no. 2.

[167] Moorman, C., Zaltman, G., and Deshpandé, R. (1992), "Relationships between Providers and Users of Market Research: The Dynamics of Trust within and between Organizations," *Journal of Marketing Research* 29, no. 3: p. 316.

[168] Morgan, R. M. and Hunt, S. D. (1994), "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing* 58, no. 3: p. 31.

[169] Eggert, A. and Helm, S. (2000), "Determinanten der Weiterempfehlung: Kundenzufriedenheit oder Kundenbindung?," *der markt* 39, no. 2: p. 68.

Moreover, Johnson, Herrmann and Huber show that commitment mediates the effects of perceived value on behavioural intentions over time.[170]

The above concepts are related and include partially overlapping issues. For example, customer satisfaction includes, but is not limited to, evaluations of service quality. A satisfied customer is not necessarily a loyal customer, although it has been shown that customer loyalty is influenced by customer satisfaction.[171]

The antecedents of customer loyalty, which have been discussed, form the theoretical foundation for the development of the research model. They give important indications of possible paths to mediate the interrelationship between connected remote services and car servicing loyalty. From the description above, it is concluded that connected remote services create car servicing loyalty if its usage leads to increased customer satisfaction, customer value, service quality, brand image, trust, or commitment. These antecedents can be considered to work in an isolated manner or in combination. However, no literature exists regarding the effects of connected remote services on the above-mentioned concepts.

At the same time, the literature review on the effects of service innovation as a framework for CRS, reveals that service innovation has a strong influence on perceived customer value,[172] mainly caused by customer benefit enhancement,[173] which describes a major overlap between these fields of research, although this overlap might be not limited to customer benefits (see Chapter 1.3.2).

Therefore, two conclusions are derived from the discussion of customer loyalty antecedents. First, the concept of customer value is regarded as the most important interlinkage between connected remote services and car servicing loyalty. Second, to ensure that other possible links are not ignored, it has become necessary to identify further possible mediators within a suitable exploratory research approach (see Chapter 3.1).

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[170] Johnson, M. D., Herrmann, A., and Huber, F. (2006), "The Evolution of Loyalty Intentions," *Journal of Marketing* 70, no. 2: p. 130.

[171] Kendall, S., "Customer Service from the Customer's Perspective," in *Customer service delivery: Research and best practices,* 1st ed., ed. Lawrence Fogli (San Francisco: Jossey-Bass, 2006), p. 4.

[172] Chen, J. K.C., Batchuluun, A., and Batnasan, J. (2015), "Services innovation impact to customer satisfaction and customer value enhancement in airport," *Technology in Society* 43: pp. 228–229.

[173] Dotzel, T., Shankar, V., and Berry, L. L. (2013), "Service Innovativeness and Firm Value," *Journal of Marketing Research* 50, no. 2: p. 273.

1.4.3 Definition of car servicing loyalty with focus on intentional aspects

The analysis of existing literature regarding definitions of customer loyalty shows that different attempts are made to differentiate customer loyalty. These attempts comprise certain aspects, such as reference objects, varied stages of customer attitudes, and voluntariness.

Regarding the reference object, Dick and Basu consider customer loyalty to be a sustainable competitive advantage, which is not only important for brands (brand loyalty), but also for retail stores and dealers (dealer loyalty) and services (service loyalty). This loyalty can be regarded as a continuum from totally loyal to completely disloyal.[174] Integrating the aspect of customer attitudes, Herrmann et al. describe customer loyalty as a customer's attitude towards brands, dealers, and technologies,[175] such as connected remote services. The necessity arises of differentiating brand loyalty, dealer loyalty and service loyalty.

Brand Loyalty: When referring to a specific brand, Jacoby and Kyner define brand loyalty as, "(1) the biased (i.e., nonrandom), (2) behavioral response (i.e., purchase), (3) expressed over time, (4) by some decision-making unit, (5) with respect to one or more alternative brands out of a set of such brands, and (6) is a function of psychological (decision making, evaluative) processes".[176] In this thesis, the decision-making unit is defined as a customer. A customer is the recipient of a product or service,[177] also referred as the consumer or user, of a product or service.[178] Bloemer and Pauwels definition of brand loyalty refers to the automotive industry, stating that it can be measured as the product of the customers' intention to repeat purchase of the same brand and his commitment to the brand.[179]

Dealer loyalty: According to Bloemer and Pauwels, in the automotive context dealer loyalty should be divided into dealership sales loyalty and car servicing loyalty. Dealership sales loyalty is measured as the customer's willingness to repeat dealership purchases and the level of a customer's dealership sales commitment, whereas car servicing loyalty can be measured as a customer's intention to repeat after-sales purchases and the degree of a customer's after-sales

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174 Dick, A. S. and Basu, K. (1994), "Customer Loyalty: Toward an Integrated Conceptual Framework.," *Journal of the Academy of Marketing Science* 22, no. 2: pp. 99–101.

175 Herrmann, A. and Johnson, M. D. (1999), "Die Kundenzufriedenheit als Bestimmungsfaktor der Kundenbindung," *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* 51, no. 6: p. 584.

176 Jacoby, J. and Kyner, D. B. (1973), "Brand Loyalty vs. Repeat Purchasing Behavior," *Journal of Marketing Research* 10, no. 1: p. 2.

177 Kendall, S., "Customer Service from the Customer's Perspective," in *Customer service delivery: Research and best practices,* 1st ed., ed. Lawrence Fogli (San Francisco: Jossey-Bass, 2006), p. 3.

178 Frain, J., *Introduction to marketing,* 4th ed. (London: Internat. Thomson Business, 1999), p. 161.

179 Bloemer, J. M.M. and Pauwels, K. (1998), "Explaining brand loyalty, dealer sales loyalty and dealer after-sales loyalty: the influence of satisfaction with the car, satisfaction with the sales service and satisfaction with the after-sales service," *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior* 11: p. 80.

commitment.[180] Building on this, Scholly defines car servicing loyalty in the automotive trade business as a subcategory of dealership loyalty as: "a customer's positive attitude towards a dealer's car service department, where he has performed maintenance and repair services at least once in the past".[181]

Service Loyalty: With special regard to car servicing, Gremler and Brown's definition of service loyalty also provides insights for deriving a suitable definition of car servicing loyalty. According to the authors, "service loyalty is the degree to which a customer exhibits repeat purchasing behavior from a service provider, possesses a positive attitudinal disposition toward the provider, and considers using only this provider when a need for this service arises."[182] The underlying definition must be viewed critically due to the fact that Gremler and Brown's study and therefore, this definition, mainly refers to services based on personal interaction. However, connected remote services explicitly focus on impersonal interactions between the customer and car dealership using CRS instead. This needs to be considered in the conceptualization of car servicing loyalty.

Stages of loyalty: Oliver defines customer loyalty as, "a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior."[183] He also links the attitudinal dimension of loyalty to the behavioural dimension, by describing four temporally successive phases of loyalty. In the first phase, cognitive loyalty, customers make a conscious decision based on an evaluation of alternatives and available information, such as price and quality features of the product or service. Affective loyalty, describes the second phase of loyalty development. Here, the customer develops a positive attitude towards a supplier or its product or service that can be based on positive experience in the past with a high level of satisfaction. In contrast to cognition, affective loyalty cannot easily be dislodged by counter argumentation. The third phase of loyalty development is the conative loyalty (behavioural intention) stage, in which, based on an inner urge, a strong repurchase motivation occurs. In the final step, the author describes action loyalty, in which the behavioural intention is transformed into a readiness to act, e.g. in terms

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[180] Bloemer, J. M.M. and Pauwels, K. (1998), "Explaining brand loyalty, dealer sales loyalty and dealer after-sales loyalty: the influence of satisfaction with the car, satisfaction with the sales service and satisfaction with the after-sales service," *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior* 11: pp. 80–81.

[181] Scholly, V., *Kundenloyalität im Automobilhandel: Determinanten in Verkauf und Kundendienst* (Wiesbaden: Springer Gabler, 2013), p. 170.

[182] Gremler, D. D. and Brown, S. W. (1996), "Service loyalty: its nature, importance, and implications," *Advancing service quality: A global perspective* 5: p. 173.

[183] Oliver, R. L. (1999), "Whence Consumer Loyalty?," *Journal of Marketing* 63: p. 34.

of repurchase. This final step represents the link to factual behaviour and thus to customer retention.[184]

Voluntary versus involuntary loyalty: Diller adopts Oliver's idea regarding commitment, by defining it as an inner obligation towards an object and the customer's desire for a stable relationship. Commitment therefore stands for a customer's voluntary decision to retain the relationship.[185] Achieving this commitment might be a desirable state, but it is not the only path to achieve retention. Bliemel and Eggert differentiate two further aspects, i.e. voluntary and involuntary loyalty. Involuntary retention is present when a customer cannot switch providers, and therefore his or her set of providers is restricted to a limited set of choices. Building these barriers to change can be an effective measure for companies to retain their customers. Instead of being committed, the authors speak of a customer being bound.[186] Voluntary loyalty is characterized by a customer's attitude, described as, "not willing to switch". The customer stays loyal, even though he or she has the freedom and opportunity to switch. This type of loyalty has its roots in the customer's concerns and is primarily based on psychological factors.[187]

The different attempts described above, lead to various possibilities for defining and measuring customer loyalty. In Figure 1-7, the approaches are categorized using three axes, which represent the continuums regarding the reference object, loyalty stage, and level of commitment. This leads to several ways of combining these attempts. Further considerations of customer loyalty are focused on the sub-segment of car servicing loyalty. In addition, the focus is on measuring the intentional aspect and only considers the voluntary customer commitment level. Thus, the definitions by Gremler and Brown[188] and Scholly,[189] will be the foundations for the development of a definition of car servicing loyalty in this thesis.

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[184] Oliver, R. L. (1999), "Whence Consumer Loyalty?," *Journal of Marketing* 63: pp. 35–36.

[185] Diller, H. (1996), "Kundenbindung als Marketingziel," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 2: p. 88.

[186] Bliemel, F. and Eggert, A. (1998), "Kundenbindung-die neue Sollstrategie?," *Marketing ZFP* 29, no. 1: p. 41.

[187] Kotler, P., Keller, K. L., and Bliemel, F., *Marketing-Management: Strategien für wertschaffendes Handeln*, 12th ed. (München: Pearson Studium, 2011), p. 28.

[188] Gremler, D. D. and Brown, S. W. (1996), "Service loyalty: its nature, importance, and implications," *Advancing service quality: A global perspective* 5: p. 173.

[189] Scholly, V., *Kundenloyalität im Automobilhandel: Determinanten in Verkauf und Kundendienst* (Wiesbaden: Springer Gabler, 2013), p. 170.

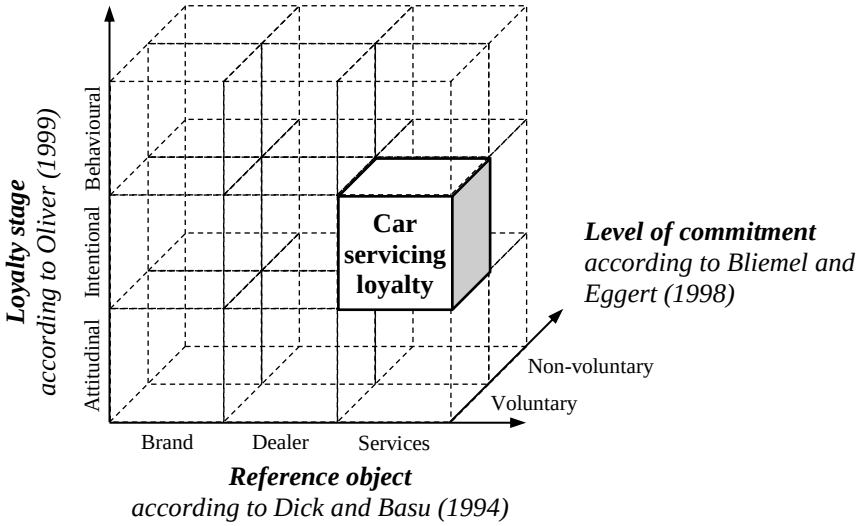

Figure 1-7: Integration of different perspectives on customer loyalty.[190]

Summarizing, the term *customer retention* is used in the sense of factual behaviour. The term *customer loyalty* is employed in the sense of attitudinal behaviour. *Customer retention management* is used to describe all of a company's measures to positively influence customer loyalty. In addition, the term *car servicing loyalty* is defined and used as follows: *Car servicing loyalty describes a future-oriented positive attitude of a customer towards the dealership which provides connected remote services, manifested by the customer's intentions of using the same dealership's car service offerings for future maintenance and repair service demands, positive word-of-mouth and the resistance towards another person's persuasion attempts regarding switching to another car service provider.*

1.4.4 Different approaches to measuring car servicing loyalty

In this chapter attitudinal and behavioural aspects of customer loyalty are analysed in detail in order to identify implications for the measurement of car servicing loyalty.

Zeithaml, Berry and Parasuraman operationalize loyalty as behavioural intentions with five items, including: (1) saying positive things about the company to others; (2) recommending the company to someone who seeks advice; (3) encouraging friends and relatives to do business

[190] Author's illustration under use of the concepts of Dick, A. S. and Basu, K. (1994), "Customer Loyalty: Toward an Integrated Conceptual Framework.," *Journal of the Academy of Marketing Science* 22, no. 2; Bliemel, F. and Eggert, A. (1998), "Kundenbindung-die neue Sollstrategie?," *Marketing ZFP* 29, no. 1; Oliver, R. L. (1999), "Whence Consumer Loyalty?," *Journal of Marketing* 63.

with the company; (4) considering the company to be the first choice to purchase services; and (5) doing more business with the company in the next few years.[191]

Jones and Taylor examined dimensionality in a service-loyalty context, with the result that they identified different consumer responses (loyalty-related outcomes). These loyalty related outcomes can be assigned to two main dimensions. First, the combined behavioural/intentional dimension (consisting of repurchase intentions, switching intentions, and exclusive purchasing intentions), and second, a combined cognitive/attitudinal dimension (consisting of consumers' strength of preference, advocacy, altruism, willingness-to-pay more, and identification with the service provider).[192] This approach essentially captures what Oliver referred to as, "what the consumer does" as behavioural loyalty and the psychological meaning of customer commitment (cognitive/attitudinal loyalty).[193] Table 1-4 provides an overview of the two loyalty dimensions, i.e. behavioural including intentions, and attitudinal/cognitive and outcome-related concepts for measurement.

Table 1-4: Loyalty dimensions and related outcomes.[194]

Dimension	Outcome	Definition	Related research
Behavioural/ intentional	Repurchase intentions	Customer's aim to maintain a relationship with a particular service provider and make his or her next purchase in the category from this service provider.	Zeithaml, Berry and Parasuraman (1996)
	Switching intentions	Customer's aim to terminate a relationship with a particular service provider and patronize another in the same category.	Bansal and Taylor (1999); Dabholkar and Walls (1999)
	Exclusive intentions	Customer's aim to dedicate all of his or her purchases in a category to a particular service provider.	Reynolds and Arnold (2000); Reynolds and Beatty (1999)
	Resistance to persuasion by third parties	The extent to which the customer is resistant towards persuasion attempts by another person.	Klingenberg (2000)
Cognitive/ attitudinal	Relative attitude	The appraisal of the service, including the strength of that appraisal and the degree of differentiation from alternatives.	Dick and Basu (1994); Pritchard et al. (1999)
	Willingness to recommend	Consumer willingness to recommend a service provider to other consumers.	Butcher et al. (2001); Javalgi and Moberg (1997); Zeithaml et al. (1996)

Table continued next page

[191] Zeithaml, V. A., Berry, L. L., and Parasuraman, A. (1996), "The Behavioral Consequences of Service Quality," *Journal of Marketing* 60, no. 2: p. 34.

[192] Jones, T. and Taylor, S. F. (2007), "The conceptual domain of service loyalty: How many dimensions?," *Journal of Services Marketing* 21, no. 1: p. 45.

[193] Oliver, R. L. (1999), "Whence Consumer Loyalty?," *Journal of Marketing* 63: p. 34.

[194] Author's table based on Jones, T. and Taylor, S. F. (2007), "The conceptual domain of service loyalty: How many dimensions?," *Journal of Services Marketing* 21, no. 1: p. 38.

Altruism	Consumer's willingness to assist the service provider or other service consumers in the effective delivery of the service.	Price et al. (1995)
Willingness to pay more	Consumer's indifference to price differences between that of his or her current service provider and others in the same category.	Anderson (1996); de Ruyter et al. (1998)
Exclusive consideration	The extent to which the consumer considers the service provider as his or her only choice when purchasing this type of service.	Dwyer, Schurr and Oh (1987); Ostrowski et al. (1993)
Identification	Sense of ownership over the service, affiliation with the service provider, or congruence of values that exists between service provider and consumer.	Butcher et al. (2001); Fournier (1998)

The identified loyalty-related consequences describe indicators of the various possible ways to operationalize the concept of car servicing loyalty, according to the research approach. Specifically, repurchase intentions, exclusive intentions, willingness to recommend, and resistance to persuasion by third parties, are considered to be suitable indicators for the operationalization of car servicing loyalty. In detail, these measurement indicators are characterized as:

- Repurchase intention describes the customer's aim to maintain a relationship with a particular dealership's car servicing offering, evidenced by his or her intention to perform the next maintenance or repair service at the same car dealership;
- Recommendation intention describes the willingness of a customer to recommend the maintenance or repair services of a specific car dealership;
- The extent to which the customer is resistant towards another person's attempts to persuade them to switch to another car dealership is referred to as resistance to persuasion attempts by third parties.

These theoretical considerations are reviewed within the operationalization of the construct car servicing loyalty in Chapter 3.3.2.

1.5 Summary of the literature review, conclusions, and implications

In this chapter, the concepts of connected remote services, customer value and car servicing loyalty are explained. Customer value was identified as a major consequence of service innovation. At the same time, customer value was also determined to be an essential antecedent of customer loyalty. Thus, it can be assumed that customer value is a potential link between connected remote services and car servicing loyalty. This linkage is also supported by a theoretical framework, such as the service profit chain described in chapter 1.2. These findings provide important starting points for the development of a research model.

Connected remote services: Although other service types, such as mobile services, have motivated a lot of current research activity, there is only a very limited amount of comparable research available, and no research specifically exploring connected remote services, as defined in this thesis. A suitable definition has been developed based on the introduction of different definitions of terms considering various perspectives. Connected remote services can be described as a service innovation, which integrates interactivity-related advantages and represents an independent type of service from both a theoretical and practical standpoint. A detailed classification of CRS and a description of this new service type compared to existing mobile services are presented. Nevertheless, an unambiguous categorization of CRS cannot be made solely on the conceptual level, because it has been seen that CRS combine several aspects of types of benefits, which also provide different approaches regarding separability of production and consumption. Consequently, it is necessary to carry out such categorization at the level of specific CRS attributes (functions) within a specific industry sector.

A literature review reveals that service innovation positively influences perceived customer value, satisfaction, service quality and trust, showing either mediated or direct impact on different types of loyalty. However, the general perception of CRS, as well as the effects on the behavioural intentions of active customers, have not been studied sufficiently. In addition, there is no clear understanding of the value added provided to customers, and no empirical data exists about the drivers of usage and car servicing loyalty. This thesis aims to fill these gaps. The existing literature shows that the impact of service innovation on customer loyalty is better explained if mediating concepts are utilized. Thus, the identification of mediating concepts, adapted to the characteristics of connected remote services, must be considered.

Customer value: The literature review on customer value provides the necessary findings for the design of a research model to measure the impact of connected remote services on car servicing loyalty. The definition used in this thesis is based on the means-end approach, stating that customer value corresponds to the customer's evaluation of a services' attributes and its consequences that arise from usage, which contribute to the customer's targets in a specific situation. If connected remote services are capable of creating benefits, which can be viewed as a positive dimension of customer value (sacrifices as a negative dimension), it can be assumed that the consecutive effects of customer value can be used in the research model to measure the contribution of connected remote services to car servicing loyalty. Several studies and their empirical results analysing the contribution of customer value towards customer loyalty have been reviewed; they show a significant positive effect throughout several industries and service

settings. Thus, it is assumed that the creation of customer value leads to an increase in customer loyalty.

Car servicing loyalty: Within relationship management, customer loyalty is shown to comprise an intentional dimension and a behavioural dimension. The intentional dimension is seen as a predecessor to the factual behaviour performed by the customer. Thus, effects describing the attitudinal aspects of loyalty should be capable of measurement independently of factual behaviour, which is not only dependent on attitude, but is also affected by issues concerning purchasing power, or other limitations that prevent the transformation of intentional loyalty into behavioural loyalty.

Next, relevant drivers of customer loyalty were investigated to derive implications for the research model. These findings were consolidated to derive a suitable definition of car servicing loyalty, to clearly classify the concept in terms of the reference object and its measurement approach, based on the attitudinal approaches for customer loyalty operationalization.

Furthermore, the analysis of current loyalty models shows that most of the empirical analysis was conducted by using structural equation modelling, which is to be considered in the design process of the research model.

Implications for the research model and measurement model of CRS: An intensive analysis of the three above-mentioned concepts provides valuable findings for the development of the research model to investigate the impact of connected remote services towards car servicing loyalty, on the issue of how connected remote services lead to increased customer value. Only characteristics that are independent of personal behaviour, (e.g., friendliness of service personnel) were considered in the context of this research. Assuming that matching consequences of service innovation and drivers of customer loyalty are potential mediators, the following concepts were identified: customer value, customer satisfaction, service quality, image, commitment, and trust. These selected drivers give first indications of a path linking the introduced concept of connected remote services and car servicing loyalty, indicating that especially customer value is of the highest relevance. Thus, the focus was placed on customer value and possible ways of measuring it in a service-oriented context.

Because existing research on connected remote services is very limited and no empirical basis was found in connection with customer loyalty, further research must be performed to identify possible key factors of connected remote services. To achieve this, an explorative research approach is necessary to identify and delimitate the correct key factors.

2 ACTUAL STATE OF FUNCTIONALITIES OF CONNECTED REMOTE SERVICES AND CURRENT SITUATION OF THE GERMAN AUTOMOTIVE AFTER-SALES BUSINESS

After discussing the theoretical foundations of connected remote services, customer value and car servicing loyalty, the relevance of these topics for the automotive industry[195] are evaluated. First, connected remote services and their specific attributes are explained in detail. Subsequently, the current state of the automotive after-sales business and the role of customer retention management are described, considering the different roles of car manufacturers and car dealerships in the process of loyalty creation. Finally, in this chapter, current models from related fields are investigated and form the basis for the development of the research model.

2.1 Current state of technology of connected remote services

In this chapter, connected remote services are approached by describing their evolution in recent years. The description of connected remote services in the automotive context regarding its functionality and attributes is provided as well. Next, a classification of functions is conducted based on underlying literature. In the final step, a comparison of CRS from selected German automotive market brands is performed to evaluate and rate the homogeneity of the service offerings which will be used in the further model development.

2.1.1 Evolution of connected remote services in the German automotive market

As one of the first car manufacturers, BMW initially introduced forerunners of today's connected remote services functions in 1999, offering automated emergency calls in the event of a major accident, detected by integrated sensors. Next, in 2008, BMW extended its offering by bundling three main functionalities, which are accessed via the communication interfaces in the car: (1) BMW Assist, focused on providing automated emergency calls in case of an accident and providing voice-based services, such as a concierge service for assisting in navigation and destination searches; (2) BMW Online, provided additional information, such as weather data, news, etc., which have become common in the automotive industry; and (3) BMW Teleservices, which features the transmission of vehicle diagnosis data to the dealership, which allows for better advance preparation by reducing diagnosis time and providing earlier availability of required spare parts. The transmission starts automatically, if the vehicle recognizes the need for

[195] The term "automotive industry" encompasses car manufacturers for passenger cars, commercial vehicles, buses, engines, bodies, and spare parts or other vehicle-related equipment, as well as wholesale and retail for sales and after-sales service.

maintenance (e.g., an oil change or replacement of brake pads). The dealership then calls the owner of the vehicle to make an appointment.[196] These services are all accessed via the communication interfaces in the car.

In the following years, the service offering was continuously extended by enhancing existing functions, as well as adding new functions to the system. The next innovation leap was the integration of mobile devices into the service delivery process. The introduction of smart phones[197] has allowed the integration of increasingly complex applications, offering new opportunities for interaction between a provider and its customers. This trend has been picked up by the automotive industry. In 2014, Mercedes-Benz introduced Mercedes Me, an application-based version of connected remote services using mobile devices as a main interface to synchronously connect the customer, the car, the car dealership's service department, and the vehicle manufacturer. This fulfils the characteristics of CRS in accordance with the definition in chapter 1.1.3, since the use and integration of a mobile device became obligatory.

A phenomenon, which is frequently observed in the automotive industry, is that the introduction of innovations follows a top-down process. Innovative features are first introduced in the so-called premium segment, usually in the higher vehicle classes. After broader relevance for all customer segments has been confirmed, the availability of the innovations is continuously expanded to lower vehicle classes and introduced into the volume segment.[198] This is also the case with the CRS diffusion process. Currently, many automobile manufacturers offer CRS with similar characteristics and service offerings. Therefore, in the next chapter, the functionalities of CRS are described in detail, and the service offerings of six German vehicle brands representing the premium segment[199] and the volume segment[200] are compared. The focus is on the premium segment because of length of market presence and range of functions. The longer the service's market presence, the higher the number of users that can be assumed. Another reason is that these vehicles exhibit higher rates of optional equipment, such as navigation, pre-heaters, and theft alarm systems. Among others, these systems are important in conjunction with CRS, because these systems can be e.g. controlled or preconditioned via CRS.

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196 Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), pp. 44–48.

197 In 2007, Apple introduced the iPhone, which is an important milestone in the development of CRS and its smartphone integration.

198 The premium segment comprises luxury cars and delimitates itself from the volume segment mainly by price and in some cases by rarity as well.

199 Audi, BMW and Mercedes-Benz.

200 Opel, Skoda and Volkswagen.

2.1.2 Functionality of connected remote services

Connected remote services are characterized by the integration of additional services into the customer's daily vehicle usage process. The contents provided aim to enhance the perceived benefits of connectivity, not only during the driving process, but also during the time that the vehicle is not in the customer's physical proximity. The services assist the customer to prepare better for a drive, e.g., by being able to check tyre pressures and fuel level or sending a preconfigured navigation from a smart phone to the car, avoiding re-entering the navigation data into the vehicle.

The analysis of the six brands' CRS functions shows that there are small differences within the service-offerings, which can be traced back to each brand's differing customer segments and to the varying times that the services have been provided in the market. Table 2-1 shows descriptions of CRS functionalities and their assignment to the VDMA (German Machinery and Plant Manufacturers' Association) categories.

Table 2-1: Summary of CRS functions and authors' assignment according to VDMA.[201]

No.	Function	Description	Category
1.	Vehicle status	Query of important vehicle condition data, such as tyre pressure, wiper water level, brake wear, tank level, battery status, or the necessity of a service.	Remote monitoring
2.	Vehicle localization	Indicates the last vehicle position for quick location of the vehicle or for monitoring vehicle movements.	Remote monitoring
3.	Breakdown call	Connects with a manufacturer's call centre agent and forwards the current location and vehicle data to the call centre.	Remote diagnostics
4.	Emergency call	In emergency situations, it automatically enables a voice connection with the emergency call centre and transmits relevant data, such as location.	Remote diagnostics
5.	Remote air conditioning	Activation and deactivation of the heater by app for pre-air conditioning of the vehicle.	Remote control
6.	Tele diagnosis	Informs one early about warning messages, e.g., low battery voltage and transmits the vehicle condition data to your maintenance and repair shop.	Remote diagnostics
7.	Concierge service	The call centre helps with the selection of your destinations, e.g., a restaurant. The address will be sent directly to your navigation system.	Remote diagnostics
8.	Service appointment	Informs you about an upcoming service and initiates the automated appointment with your preferred maintenance and repair shop.	Remote diagnostics
9.	Locking and unlocking	Indicates whether the doors are locked and allows unlocking and locking the doors via the app without using the key.	Remote control
10.	Online theft alarm system	Informs you about the activation of your theft alarm system on your smart phone and by e-mail. Alarm messages are logged and archived.	Remote monitoring
11.	Velocity notification	Enables the setting of individual speed limits which force the driver to comply with the set limit. On violation, the owner is automatically notified.	Remote monitoring
12.	Area notification	Enables the setting of individual area limits. If the vehicle leaves the set area, the owner is automatically notified.	Remote monitoring

[201] Author's table using the categorization of VDMA, *Teleservice - ein Werkzeug zur Sicherung der Produktion und Minimierung der Kosten für Hersteller, Anwender und Betreiber: Ein Leitfaden zu "Wirtschaftlichkeit durch Teleservice"* (Frankfurt am Main: VDMA-Verl., 2006), p. 7.

Research on CRS functions has demonstrated that several differences exist regarding the range of functions among the analysed brands' CRS solutions. The differences affect the availability of specific functions, as well as the content or method of using a function. Differences regarding the usage method are not the subject of this research. The focus is set on differences regarding the availability of comparable functions. Table 2-2 shows that seven out of twelve (58%) functions are provided by all brand's CRS solutions. Another 25% of the functions are provided by at least four out of six automobile brands.

Table 2-2: Available functions of brand-specific CRS.[202]

No.	Function	Audi Connect	BMW Connected Drive	Mercedes Me	Opel On-Star	Skoda Connect	VW Car Net
1.	Vehicle status	x	x	x	x	x	x
2.	Vehicle localization	x	x	x	x	x	x
3.	Breakdown call	x	x	x	x	x	x
4.	Emergency call	x	x	x	x	x	x
5.	Remote air conditioning	x	x	x			x
6.	Tele-diagnosis	x	x	x	x	x	x
7.	Concierge service		x	x	x		x
8.	Service appointment	x	x	x	x	x	x
9.	Locking and unlocking	x	x	x	x	x	x
10.	Online theft alarm system	x			x	x	x
11.	Velocity notification					x	x
12.	Area notification					x	x

It is defined that only functions which are covered by at least four out of six brands are considered in the further process of research, leading to ten prioritized functions (No. 1–10). In total, the theoretical coverage of prioritized functions is 90%, which can be considered sufficient for ensuring comparable results between the various brands, as well as for the cross-brand usability of the questionnaire to be developed. For a better understanding of the functions, three examples are explained in detail to demonstrate the CRS operation processes.

The first example, which addresses remote control, describes a situation in which the customer wants to check whether the car is locked, although the car is not in sight. By using CRS, the

[202] Author's table, developed by using the following sources as well: Audi AG, *Audi Connect*. Brochure (Ingolstadt, 2013). BMW AG, *BMW Connected Drive*. Brochure (München, 2014); Adam Opel AG, *Opel On-Star*. Brochure (Rüsselsheim, 2016); Daimler AG, *Mercedes Me*. Brochure (Stuttgart, 2016); Volkswagen AG, *Car-Net Apps & Dienste*. Brochure (Germany, 2016); Skoda Auto a.s., *Skoda Connect Online services*. Brochure (Czech Republic, 2017).

customer can check the status of the lock, and if necessary lock or unlock it via their smart phone.

In the second example, which demonstrates remote monitoring, the process is initiated by the service object, i.e., the car, itself. The battery's integrated condition monitoring system detects a critically low battery voltage. An alert message is sent out by the car to the customer's smart phone, to inform them of the critical status. As an add-on service, the message displays different options, such as instantly making an appointment at a desired brand service-station and provides solutions to relieve the battery of electricity consumption.

In the third example, the service provider has continuous access to the car in order to perform vehicle condition monitoring and remote diagnostics. Data about mileage, brake condition, oil level, etc., are continuously transmitted to the service provider. When the status of one or more of the controlled items indicates that maintenance of the vehicle is necessary, the service provider automatically contacts the customer to make a service appointment.

Figure 2-1 depicts the service blueprint of the function *vehicle status* graphically. The vehicle continuously transmits data vital to the vehicle's condition, such as tyre pressure, oil level, brake wear, battery voltage, etc. The customer can access this data via their CRS application for monitoring purposes. In the event of a malfunction a warning message is displayed in the CRS application via a push notification. If the malfunction can be handled by the customer themselves (e.g., correction of tyre pressure), the customer is asked to perform the correction. If the malfunction can only be handled by a maintenance and repair shop, the customer is asked to contact the maintenance and repair shop for a service or repair appointment. The connected maintenance and repair shop is informed simultaneously about the malfunction, and tele-diagnosis data can be accessed prior to the appointment. This enables the maintenance and repair shop to prepare for the service better, e.g. by pre-ordering necessary spare parts.

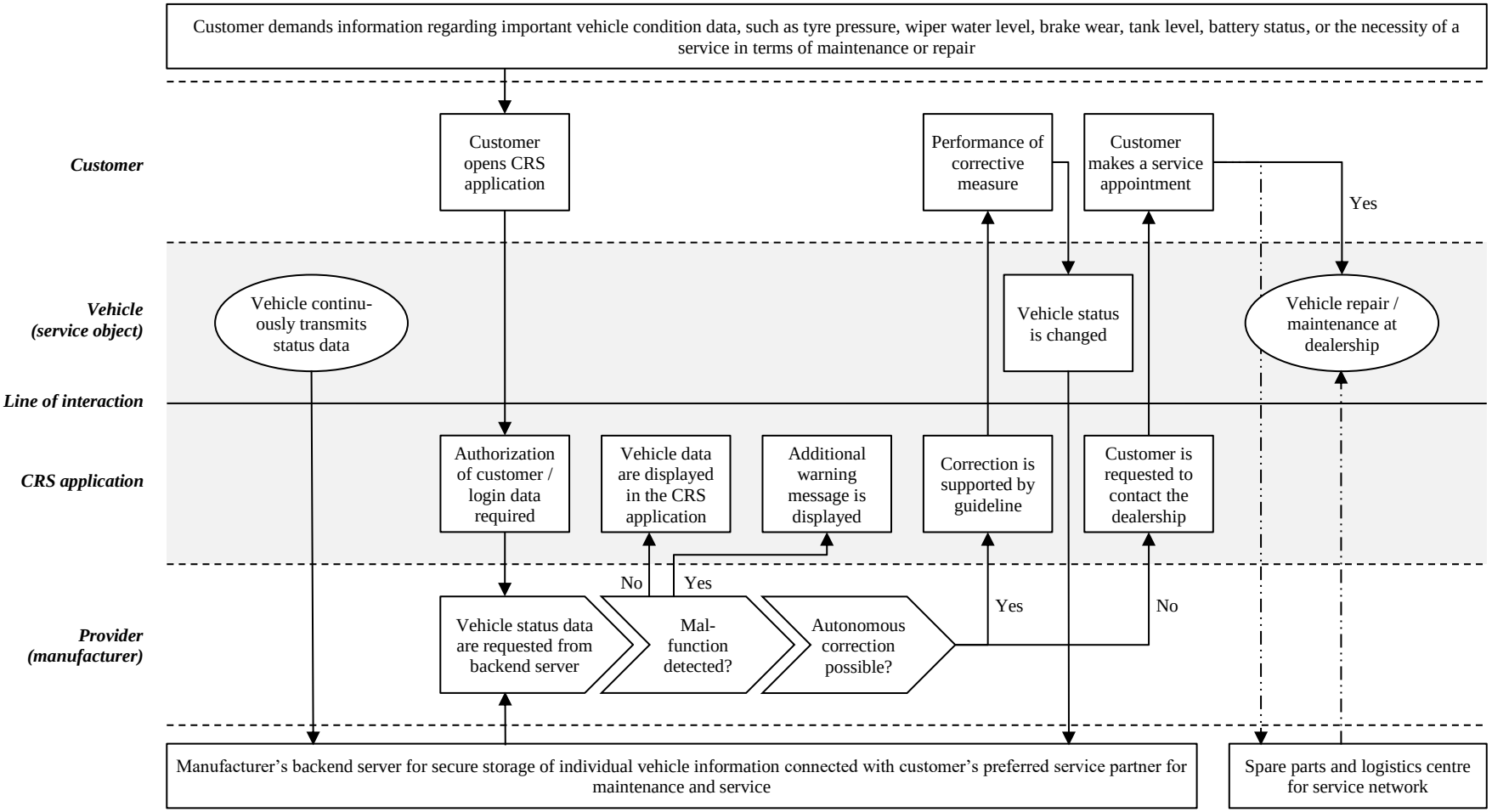

Figure 2-1: Service blueprint of CRS function vehicle status.[203]

[203] Author's illustration based on interviews with experts from the CRS design department and dealership network of Mercedes-Benz, Germany in 2016.

2.2 Customer retention management in the automotive after-sales business

The customer lifecycle in the automotive after-sales business can be separated into three main phases. The first phase is described as the customer acquisition phase, which focuses on activities to obtain new customers. The second phase concerns existing customers and customer retention. The third phase concentrates on former customers and on activities to recover them.[204] As shown in Figure 2-2, the focus is on active customers in this thesis.

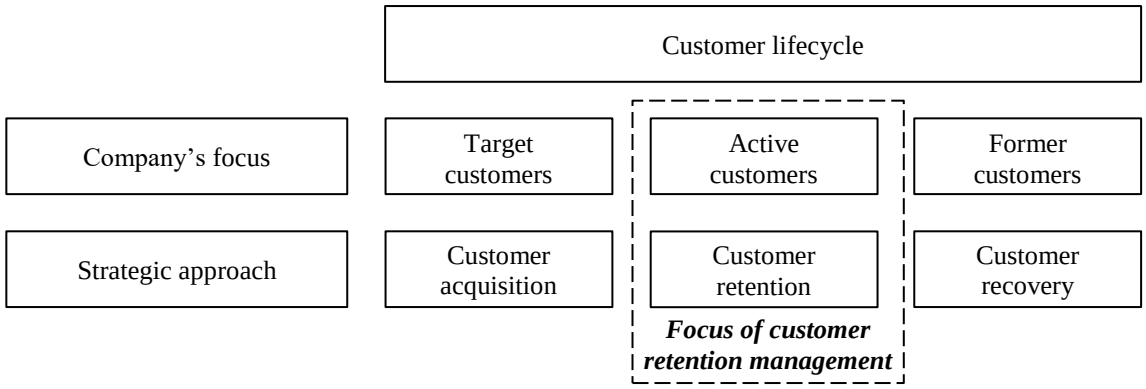

Figure 2-2: Customer lifecycle in the automotive after-sales business.[205]

In the active customer stage, the relationship involves one or more episodes over time in which the customer enjoys services provided by the supplier. Some industries, e.g. such as car services, require the customer to engage in multiple service encounters over an extended period.[206] Depending on the product, these time points can be predictable if, e.g. due to the type of product, regular maintenance is necessary or due to seasonal conditions or statutory regulations.

This situation applies to car servicing, a field of this research. Due to the wear on the product (vehicle), there is a regular need to maintain the vehicles. This provides the opportunity for the dealer to contact the customer in advance to schedule the maintenance. Seasonal conditions also apply, since, in most countries, it is necessary to change from summer to winter tyres and vice versa twice a year. By statutory regulation every vehicle must be checked every 24 months[207] by the road traffic department in Germany. Here, the dealer has opportunities to offer services

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[204] Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen,* 4th ed. (München: Franz Vahlen, 2015), p. 65.

[205] Author's illustration based on Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen,* 4th ed. (München: Franz Vahlen, 2015), p. 65.

[206] Dagger, T. S. and Sweeney, J. C. (2007), "Service Quality Attribute Weights: How Do Novice and Longer-Term Customers Construct Service Quality Perceptions?," *Journal of Service Research* 10, no. 1: p. 23.

[207] New vehicles initially after 36 months, afterwards every 24 months.

to their customers, which provide them with additional value, e.g., combining maintenance, tyre change, and renewal of road traffic approval.[208] Within this lifecycle, each episode between company and customer is relevant.

According to this concept, the relationship to a car service provider can be divided into several episodes. Each of these episodes consists of several single transactions (encounters/ touch points), such as vehicle acceptance, maintenance, repair, vehicle pick-up, etc. Consequently, all the single transactions and episodes experienced flow into the customer's overall perception or evaluation of the service.[209] Figure 2-3 graphically depicts multiple influencing factors on customer after-sales perceptions experienced in each interaction episode.

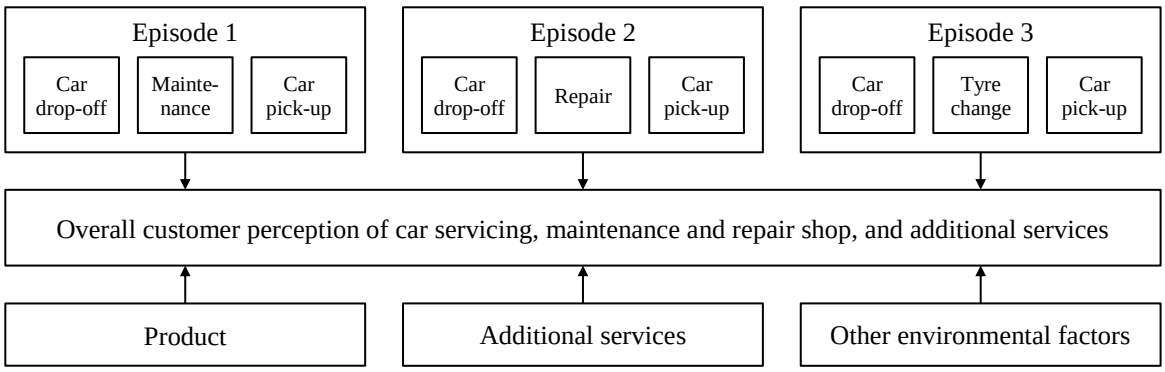

Figure 2-3: Influencing factors on customers' perception of car servicing.[210]

The focus of car manufacturers and dealerships has evolved from quality to also include customer satisfaction and customer loyalty. In the past, these concepts were often viewed as isolated solutions, rather than links in a chain. Understanding the links from quality to satisfaction to loyalty has become a key to sustainable success in the automotive industry. This evolution can be seen on both the sales and after-sales sides. Consequently, the emphasis has shifted from replacing lost customers with new ones, to keeping current customers in the sense of customer satisfaction and retention.[211] In recent decades, an additional change took place, which moved

[208] Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen,* 4th ed. (München: Franz Vahlen, 2015), p. 64.

[209] Ibid., p. 3.

[210] Author's illustration, extended from Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen,* 4th ed. (München: Franz Vahlen, 2015), p. 3.

[211] Johnson, M. D. et al., "An Introduction to Quality, Satisfaction and Retention - Implications for the Automotive Industry," in *Customer Retention in the Automotive Industry: Quality, Satisfaction and Loyalty,* eds. M. D. Johnson et al. (Wiesbaden, 1997), pp. 2–4.

the focus from transaction marketing to relationship marketing. This process is partially regarded as a paradigm shift.[212] Since a relationship consists of several transactions, this change can be viewed as the logical further development of the traditional marketing approach.[213] Its target is "not only the maximization of the output of single transactions, but the long-term relationship focus aiming to retain the customer".[214]

The most important differentiator is the targeted time scope; transaction marketing has a short-term character, whereas relationship marketing pursues a long-term approach by designing lasting customer relationships. The concept is based on a "stay-in-contact with the customer" strategy to retain active clients, who will be motivated to repurchase products or services in the future. The economic targets of this approach are the increase in customer value over time and higher profit margins.[215] Table 2-3 describes the two different approaches.

Table 2-3: Differences between relationship marketing and transactional marketing.[216]

Criterion	Relationship marketing	Transactional marketing
Primary object	Relationship	Single transaction
General approach	Interaction-related	Action-related
Long-term vs. short-term	Long-term perspective	Short-term perspective
Strategy	Maintenance of existing relationships	Acquisition of new customers
Focus in decision process	Focus on post-sales decision and action	Focus on pre-sales activities
Intensity of contact	High	Low
Degree of mutual dependence	Generally high	Generally low
Dominant quality dimension	Quality of interaction	Quality of output
Production focus	Mass customization	Mass production

In line with Grönroos' view that all contact-points between the customer and the company are moments-of-truth, communication is an essential part of the service, which in consequence makes innovations in communication between a dealership and its customers essential.[217] These

[212] Brodie, R. J. et al. (1997), "Towards a Paradigm Shift in Marketing? An Examination of Current Marketing Practices," *Journal of Marketing Management* 13, no. 5: p. 383.

[213] Gummesson, E. (1994), "Making Relationship Marketing Operational," *International Journal of Service Industry Management* 5, no. 5: pp. 5–6.

[214] Peter, S. I., *Kundenbindung als Marketingziel: Identifikation und Analyse zentraler Determinanten* (Wiesbaden: Gabler Verlag, 1997), p. 1.

[215] Bruhn, M., *Relationship Marketing: Das Management von Kundenbeziehungen*, 4th ed. (München: Franz Vahlen, 2015), p. 16.

[216] Author's table based on Hennig-Thurau, T. and Hansen, U., "Relationship Marketing — Some Reflections on the State-of-the-Art of the Relational Concept," in *Relationship marketing: Gaining competitive advantage through customer satisfaction and customer retention: with 24 tables*, ed. Thorsten Hennig-Thurau (Berlin u. a.: Springer, 2010), p. 5.

[217] Grönroos, C., *Service management and marketing: Customer management in service competition*, 3rd ed. (Chichester u.a.: Wiley, 2007).

contact points, in other words, form and influence the consumer's perceived value of the service. This perspective is accentuated even more when long-term customer relationships are considered. Customer communication thus becomes an issue, both managerially and theoretically,[218] which also describes one central aspect of connected remote services, as additional communication and interaction channels between customer, vehicle, dealership and car manufacturer. For companies, long-term relationships with their customers are assumed to be mainly beneficial. In the next chapter, the actual situation of the German after-sales business is discussed with special attention to the competitive situation between the authorized dealer networks and the independent workshops.

2.3 The current state of the German automotive industry and the after-sales business

In the first step, a limitation must be stated. The present thesis investigates the contribution of CRS to car servicing loyalty in the private car market and is focused on passenger cars. Consequently, the following description of the actual situation in the automotive industry is limited to this segment. Issues regarding commercial customers, as well as commercial vehicles, are therefore not considered in this description. In addition, geographically, the work focuses on the German market.

The automotive industry is one of the most important economic sectors in Germany in terms of employment, value added, investment and exports, as well as for innovative research and development. For example, in 2016, sales of 405 billion € were generated, of which 148 billion € were transacted in Germany alone. Figure 2-4 shows the development of the German automotive industry's turnover generated for the years 2007 until 2016. The global crisis in 2009 had a significant impact on the automotive business, especially in sales to foreign countries. Between 2008 and 2009, total sales dropped by 20.5% due to the worldwide financial crisis. This was interrupted in 2009 by the introduction of the wrecking-bonus, as a government subsidy to stabilize sales levels. This led to significant pre-emptive effects of acquisitions.

[218] Heinonen, K. and Strandvik, T. (2005), "Communication as an element of service value," *International Journal of Service Industry Management* 16, no. 2: p. 187.

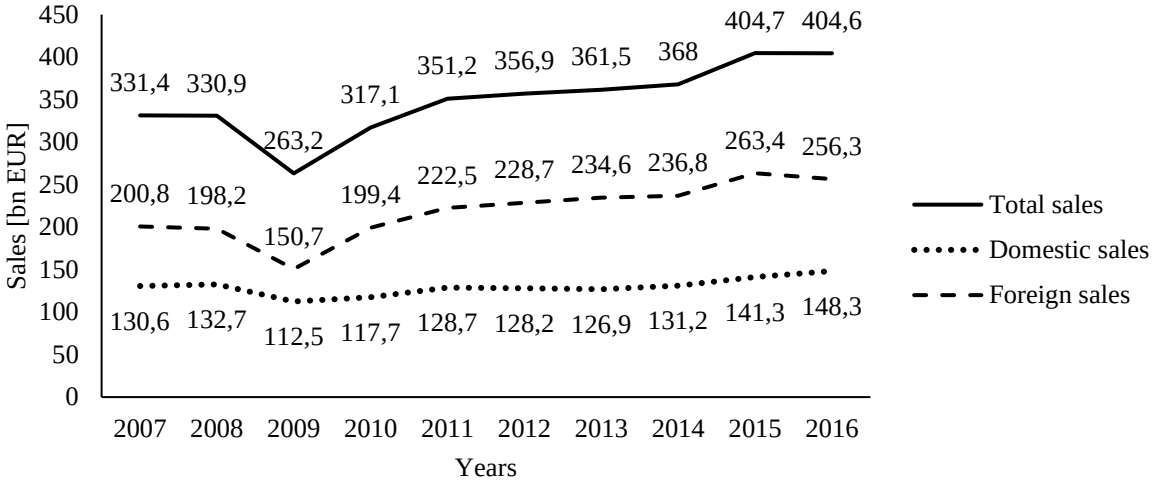

Figure 2-4: Development of passenger car sales in the German automotive industry.[219]

In the period from 2008 until 2017, the recovery of the economy led to a growth in vehicle population of 11.2%. In 2017, the German car population comprised 45.8 million vehicles. Figure 2-5 illustrates the development of the passenger car population in Germany.

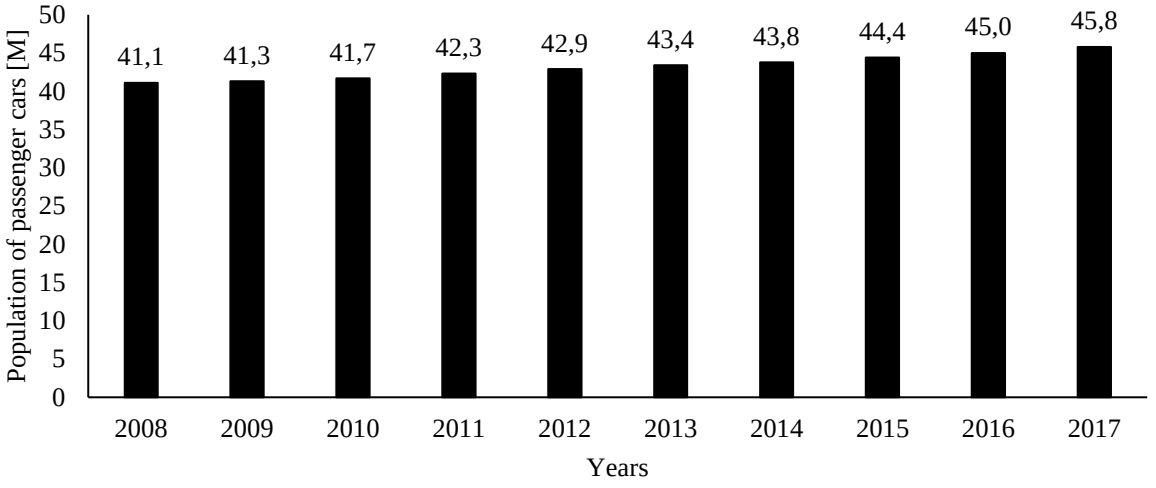

Figure 2-5: Development of passenger car population in Germany.[220]

According to these numbers the German automotive market can be classified as saturated market as it shows the corresponding characteristics, specifically: stagnation or low growth rates;

[219] Author's chart based on Statistisches Bundesamt, "Sales figures of the German automotive industry 2005 - 2016," Cited via https://de.statista.com, 2017, https://de.statista.com/statistik/daten/studie/160479/umfrage/umsatz-der-deutschen-automobilindustrie/, accessed December 2017.

[220] Author's chart based on Kraftfahrtbundesamt, "Bestand an Pkw in den Jahren 2005 bis 2017," 2017, https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/MarkenHersteller/b_mark_pkw_zeitreihe.html?nn=663630, accessed December 2017.

increased product variety; and a wide range of accessible, independent information for customers. In such saturated markets, growth can only be achieved by increased market penetration, the introduction of innovations and particularly, strengthening the after-sales business, which is more profitable than vehicle sales.[221]

Analysing the reasons for the market saturation it is necessary to understand cars as *specialty goods*, which are bought on a regular basis, but still require high financial resources. One reason for the market saturation is that 90% of all car sales are replacement sales. This leads to a low growth rate, and thus to high competition.[222] Another indication of the market saturation, is the holding period (in the private sector), which has been steadily increasing to an average of 6.5 years in 2015.[223] The procurement of a car is very dependent on the decision-making process. In this process, essential considerations are made by customers, so that it cannot be compared to classical continuance consumption.[224]

An extension of the holding period makes customer retention more difficult, because the purchasing interval is prolonged. The longer this interval is, the more customer retention and their commitment to the brand decreases. In addition, service maintenance intervals also increase. This means that there is a significant decrease in contact frequency. This can be traced back to better vehicle quality and technologies that further minimize maintenance requirements. According to DAT, average number of maintenance procedures per year for vehicles has decreased from 1.29 in 1990 to 0.88 in 2017.[225] A similar development can be seen for repairs. In real terms, this means that customers currently visit maintenance and repair shops less than once a year.[226]

The extensive saturation and the competitiveness of the German automotive market leads to market development, which is now increasingly concentrated on the preservation of existing customers. The focus of the market development activities is no longer the acquisition of new

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[221] Bernhard Ebel and Markus B. Hofer, eds., *Automotive Management: Strategie und Marketing in der Automobilwirtschaft,* 2nd ed. (Berlin: Springer, 2014), p. 6.

[222] Diez, W., *Automobil-Marketing: Erfolgreiche Strategien, praxisorientierte Konzepte, effektive Instrumente,* 6th ed. (München: Vahlen, 2015), p. 24.

[223] Deutsche Automobil Treuhand GmbH, "DAT Report 2016," p. 49.

[224] Heß, A. (1997), "Aktuelle Entwicklungen in der Vertriebsnetzgestaltung in der Automobilwirtschaft - Ursachen, Hintergründe, Zukunftsperspektiven," *Jahrbuch für Absatz- und Verbrauchsforschung* 43: p. 28.

[225] Deutsche Automobil Treuhand GmbH, "DAT Report 2017," pp. 54–55.

[226] Diez, W., "Der Kunde in der Automobilwirtschaft – Kundenzufriedenheit und Kundenbindung," in *Automotive Management: Strategie und Marketing in der Automobilwirtschaft,* 2nd ed., eds. Bernhard Ebel and Markus B. Hofer (Berlin: Springer Gabler, 2014), p. 441.

customers, but the preservation of existing customers.[227] This leads to the requirement to compensate for the ended customer contact, by the introduction of alternative relationship management strategies using modern information and communication technology to establish and maintain long-term customer relationships.[228] Since it is to be expected that the German automotive market will continue to be characterized by high competition and saturation, there is no reason for the automotive manufacturers to deviate from this strategy. Instead, customer loyalty will continue to gain in importance.

Regarding after-sales service as an important source of profitability, in 2016, the average amount spent on maintenance was EUR 265 per vehicle, which is an increase of EUR 20 compared to 2015. The highest costs are caused by automobiles which are six to eight years old. Overall, the segment of four to ten-year-old cars is especially attractive for dealers.[229] Applying Reichheld and Sasser's statement regarding profitability of car service customers (see Chapter 2.4) customer loyalty in this age segment significantly increases profitability. Figure 2-6 shows spending on vehicle maintenance over vehicle age in Germany.

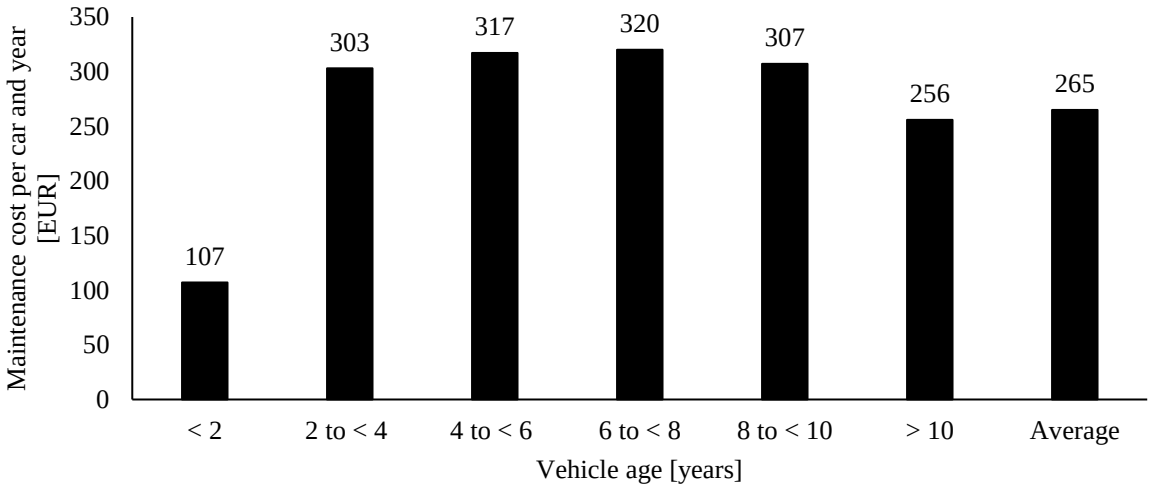

Figure 2-6: Spending on vehicle maintenance over vehicle age in Germany.[230]

The after-sales business is already a reduced market, while a significant shift occurs from authorized dealerships towards independent aftermarket providers as vehicle age increases. The older the vehicle, the more likely it is that a customer is willing to transfer maintenance and

[227] Diez, W., "Der Kunde in der Automobilwirtschaft – Kundenzufriedenheit und Kundenbindung," in *Automotive Management: Strategie und Marketing in der Automobilwirtschaft,* 2nd ed., eds. Bernhard Ebel and Markus B. Hofer (Berlin: Springer Gabler, 2014), p. 430.

[228] Hettich, S., Hippner, H., and Wilde, K. (2000), "Customer Relationship Management," *WISU,* 10/2000: pp. 1346–1348.

[229] Deutsche Automobil Treuhand GmbH, "DAT Report 2017," p. 55.

[230] Author's chart based on Deutsche Automobil Treuhand GmbH, "DAT Report 2017," p. 55.

service work to an independent workshop.[231] Combined with the high attractiveness identified above regarding costs and potential profit per vehicle, vehicle manufacturers' customer retention management and that of their authorized dealership networks, are aimed precisely at this segment. In comparison with previous years, customer loyalty towards the authorized dealership networks has declined further, and thus their traditional service offerings aimed at increasing loyalty were less successful. Figure 2-7 describes the distribution of market share per vehicle age.

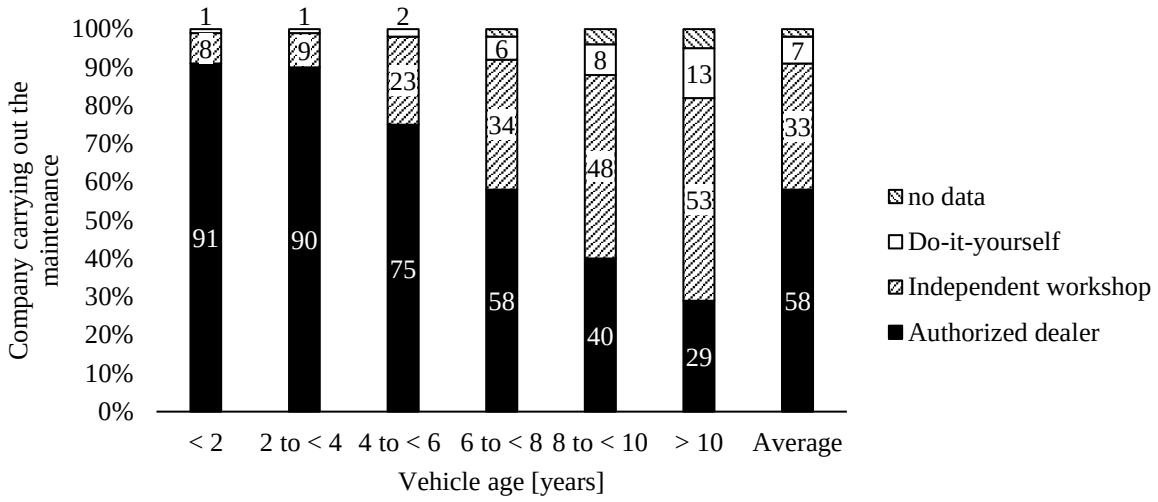

Figure 2-7: Distribution of market share for maintenance and repair per vehicle age.[232]

The figures in this chapter depict competition present in the automotive after-sales business. The analysis of the maintenance sector shows that the attractive older vehicle segment is moving away from authorized dealerships towards independent car service providers. As the average vehicle age is also increasing,[233] this trend is expected to intensify. Until now, traditional customer retention management measures have been unable to prevent or reserve this process, indicating a need for innovative approaches to maintain customer relationships. In the automotive business vehicle sales and after-sales services are strongly intertwined, although various customer channels exist for both. In the German market three main customer interfaces can be distinguished. First, premium brands (e.g., BMW, Mercedes-Benz, and Porsche) maintain their own retail networks, which perform sales and after-sales only for the specific vehicle manufacturer's products. Second, authorized dealerships perform sales and after-sales products strictly regulated by contracts and guidelines defined by the brands, which mainly regulate legal and

[231] Deutsche Automobil Treuhand GmbH, "DAT Report 2017," p. 56.

[232] Author's chart based on Deutsche Automobil Treuhand GmbH, "DAT Report 2017," p. 56.

[233] In 2015, the average vehicle age in Germany was 9.0 years, compared to 8.1 in 2007 according to Deutsche Automobil Treuhand GmbH, "DAT Report 2016," p. 57.

economic issues.[234] Third, the independent market delivers its after-sales services to customers. As seen in Figure 2-7, the authorized dealership networks dominate the after-sales market for maintenance and repair, but their market share declines with vehicle age. The independent aftermarket has the highest market share for vehicles older than eight years, and this share continues to grow.

Vehicle manufacturers and dealerships both strive to increase customer loyalty, while having different motives. While manufacturers primarily focus on brand loyalty, dealers focus on dealership loyalty, which can further be distinguished into sales loyalty and car servicing loyalty. In his empirical study, Burman shows that customers' loyalty towards dealers is lower than their loyalty towards the brand. Consequently, dealers must put greater efforts into loyalty-building measures than the manufacturer. Examining the antecedents of both types of loyalty, the author reveals that product satisfaction is the most essential factor for brand loyalty. Service satisfaction only has a marginal impact. It is different in the case of dealership loyalty. Here, service satisfaction is the most important driver, but product satisfaction becomes more important over time.[235] In order to increase (dealership) loyalty, (own) customer retention management strategies are implemented with measures, which focus on additional services for customers.[236] When introducing service innovation, the competitive advantage for car manufacturers and their authorized dealer networks is mainly based on the advantages made possible by direct customer interaction with active customers via CRS. Here, CRS are an additional communication channel allowing the providers to market their services and present individual service offerings to the customers, leveraging the positive effects of CRS on car servicing loyalty by its pure functionality.

CRS can be classified as customer retention management measures developed by the car manufacturer and provided by car dealerships to their individual customer base. The content and range of services are defined by the manufacturer, and the service is offered to all the customers of a specific brand, regardless of the dealership. Existing research has demonstrated the positive

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[234] Terporten, M., *Wettbewerb in der Automobilindustrie: eine industrieökonomische Untersuchung des deutschen Pkw-Marktes unter besonderer Berücksichtigung der nationalen Hersteller* (Gerhard-Mercator-Universität), p. 127.

[235] Burmann, C. (1991), "Konsumentenzufriedenheit als Determinante der Marken- und Händlerloyalität," *Marketing: Zeitschrift für Forschung und Praxis* 13, no. 4: p. 249.

[236] Hättich, H., *Markenloyalität im Aftersales-Marketing: Konzept zur Erhöhung der Markenloyalität in der deutschen Automobilbranche durch Optimierung eines herstellerinitiierten Aftersales-Marketing*. Zugl.: Hamburg, Univ., Fakultät für Wirtschafts- und Sozialwissenschaften, Diss., 2009, 1st ed. (München: Hampp, 2009), pp. 214–216.

effect of brand loyalty on dealership loyalty,[237] which leads to the dealers having a co-interest in introducing CRS and rapidly increasing the service's market penetration. Several brands have market penetration targets for CRS connected to a specific dealership bonus system.[238] These targets are designed to motivate sales and after-sales employees of the dealerships to take responsibility for the penetration of connected remote services, based on the assumption that increased loyalty pays off for the dealership in the long term. In the next chapter the benefits and disadvantages of car servicing loyalty are analysed with a special focus on the dealers' perspective.

2.4 Benefits and disadvantages of car servicing loyalty from the dealers' perspective

Having explained the centrality of customer loyalty within the German automotive after-sales business, the specific benefits of car servicing loyalty from the provider's perspective are examined.

In the literature, a variety of positive effects from the supplier's perspective are attributed to customer loyalty. In terms of revenue, loyal customers are often more willing to pay higher prices. This allows price increases with a direct effect on earnings.[239] Diller assigns the potential effects of customer loyalty to economic targets, such as security, growth, and profitability. Accordingly, customer loyalty leads to more stable, trust-based relationships, and thus to greater security for the provider. This results in higher demand and thus growth in complementary segments. The resulting growth, while reducing costs, leads to increased profitability.[240] Consistent with Diller, Homburg and Krohmer identify the potential benefits from the supplier's perspective, which may be associated with customer retention as a result of customer loyalty,

[237] Bauer, H. H., Huber, F., and Bräutigam, F., *Determinanten der Kundenloyalität im Automobilsektor: Eine empirische Studie im Neu- und Gebrauchtwagenmarkt* (Mannheim: Inst. für Marketing, 1997); Bloemer, J. M.M. and Pauwels, K. (1998), "Explaining brand loyalty, dealer sales loyalty and dealer after-sales loyalty: the influence of satisfaction with the car, satisfaction with the sales service and satisfaction with the after-sales service," *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior* 11.

[238] Based on expert interviews with dealer sales personnel of Mercedes-Benz and BMW in Germany, 2016.

[239] Manfred Bruhn and Christian Homburg, eds., *Handbuch Kundenbindungsmanagement: Strategien und Instrumente für ein erfolgreiches CRM*, 8th ed. (Wiesbaden: Springer Gabler, 2013), p. 18.

[240] Diller, H. (1995), "Kundenbindung als Zielvorgabe im Beziehungsmarketing," *Lehrstuhl für Marketing, Arbeitspapier Nr. 40, Universität Erlangen-Nürnberg, Nürnberg:* p. 31.

as turnover-related, cost-related, and stability-related advantages.[241] However, in reality, the individual effects are not detached from each other, but rather overlap.[242]

The *sales-related effects* of customer loyalty are initially described as higher sales volume through repeat purchases by existing customers. Heskett et al.,[243] as cited by Zeithaml, states that the longer the relationships with the loyal customers, based on repeat sales, the higher the profitability of each sale opportunity, which thereby increases the profitability of each customer.[244] Over time, the relationship also becomes more stable, and customer tolerance increases, while at the same time the motivation to explore alternatives decreases.[245] The objective is to decrease the customer's willingness to switch to another provider or brand. Therefore, it is important to activate hidden potentials in the existing relationship in order to reduce the risk of losing the customer.[246] Another consequence is increased sales volume, triggered by purchase frequency or volume per purchase. These additional purchases may also include the purchase of other products and services (cross-buying).[247] Moreover, bound customers are said to have lower price sensitivity. According to Hennig-Thurau and Hansen, this willingness to pay more, or lower price sensitivity, can be explained by the fact that bound customers are interested in continuing the business relationship. Accordingly, price increases from the vendor or price reductions of a competitor are not immediately used as an opportunity to terminate the relationship.[248] Finally, higher volumes may also be obtained via references and referrals from existing customers, because with higher customer loyalty reference readiness is more pronounced. Such referrals are considered to be an effective and inexpensive marketing tool for attracting new customers.[249]

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[241] Homburg, C. and Krohmer, H., *Marketingmanagement: Strategie - Instrumente - Umsetzung - Unternehmensführung*, 3rd ed. (Wiesbaden: Gabler, 2009), p. 422.

[242] Peter, S. I., *Kundenbindung als Marketingziel: Identifikation und Analyse zentraler Determinanten* (Wiesbaden: Gabler Verlag, 1997), p. 41.

[243] Heskett, J. L. et al. (1994), "Putting the Service-Profit Chain to Work," *Harvard Business Review* 72, no. 2.

[244] Zeithaml, V. A. (2000), "Service Quality, Profitability, and the Economic Worth of Customers: What We Know and What We Need to Learn," *Journal of the Academy of Marketing Science* 28, no. 1: p. 80.

[245] Dick, A. S. and Basu, K. (1994), "Customer Loyalty: Toward an Integrated Conceptual Framework.," *Journal of the Academy of Marketing Science* 22, no. 2: pp. 106–107.

[246] Netzer, F. and Ueding, R., "Beziehungsmarketing - neue Wege zur Kundenbindung," in *Arbeitspapier Nr. 90 der Wissenschaftlichen Gesellschaft für Marketing und Unternehmensführung*, eds. H. Meffert, H. Wagner and K. Backhaus (Münster, 1994), p. 3.

[247] Homburg, C. and Bruhn, M., "Kundenbindungsmanagement - eine Einführung in die theoretischen und praktischen Problemstellungen," in *Handbuch Kundenbindungsmanagement: Strategien und Instrumente für ein erfolgreiches CRM*, 8th ed., eds. Manfred Bruhn and Christian Homburg (Wiesbaden: Springer, 2013), p. 13.

[248] Hennig-Thurau, T. and Hansen, U., "Relationship Marketing — Some Reflections on the State-of-the-Art of the Relational Concept," in *Relationship marketing: Gaining competitive advantage through customer satisfaction and customer retention: with 24 tables*, ed. Thorsten Hennig-Thurau (Berlin u. a.: Springer, 2010), p. 7.

[249] Eggert, A. and Helm, S. (2000), "Determinanten der Weiterempfehlung: Kundenzufriedenheit oder Kundenbindung?," *der markt* 39, no. 2: p. 63.

Cost-related benefits result from declining information and coordination costs in the course of the business relationship.[250] Reichheld and Sasser summed up these costs as acquisition costs.[251] The cost of maintaining a customer relationship is five to ten times lower than that of acquiring a new customer.[252] By increasing the understanding of customers' needs, measures to increase customer loyalty can be set cost-effectively. This also includes an increased readiness to provide information about loyal customers and further individual development of the services provided by the vendor.[253]

Stability-related benefits describe the effect that the risk of customer defection can be reduced by a long-term business relationship with loyal customers. The term *habituation* describes the tendency of loyal customers to purchase out of habit. In these cases, customers tend to ignore information about other providers' offers. A possible opposite of this effect is *variety seeking*. Diller explains that the risk of losing a customer to the competition descreases due to the *immunization effect*, resulting in competitors having fewer opportunities for customer contact and therefore fewer business opportunities. The more regularly a customer has their needs met by the same vendor, the less frequently they can test the competition's performance, and therefore they are also less interested in change. The *tolerance effect* describes another stabilizing factor. The loyal customer's tolerance for errors caused by vendors is higher due to cognitive dissonance. Customers are actively maintaining the positive image of the vendor, and thus the business relationship.[254] A loyal customer base is less susceptible to competitive offers, confirming that customer retention management is a key instrument for protecting a provider's customers.[255]

The explained importance of customer loyalty with its revenue-, cost-, and stability-related benefits ultimately flows into a *profit effect* for the company. This effect is described by Reichheld and Sasser, who provide one of the few concrete numerical examples, because of which it is most frequently cited in the literature. Among others, they analysed profits in the automotive

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[250] Homburg, C. and Krohmer, H., *Marketingmanagement: Strategie - Instrumente - Umsetzung - Unternehmensführung*, 3rd ed. (Wiesbaden: Gabler, 2009), p. 423.

[251] Reichheld, F. F. and Sasser Jr, W. E. (1990), "Zero Defections: Quality comes to services," *Harvard Business Review* 68, no. 5.

[252] Reeg-Müller, A., *Service-Wegweiser: Erfolgsstrategien zur Kundenbindung: Stand Januar 1999* (Bonn, 1999), p. 13.

[253] Eggert, A., *Kundenbindung aus Kundensicht: Konzeptualisierung - Operationalisierung - Verhaltenswirksamkeit* (Wiesbaden: Deutscher Universitätsverlag, 1999), p. 46.

[254] Diller, H., "Die Bedeutung des Beziehungsmarketing für den Unternehmenserfolg," in *Grundlagen des CRM*, eds. Hajo Hippner and Klaus D. Wilde (Wiesbaden: Gabler Verlag, 2004), pp. 101–102.

[255] Müller, W. and Riesenbeck, H. (1991), "Wie aus zufriedenen Kunden auch anhängliche Kunden werden," *Harvard Business Manager* 13, no. 3: p. 68.

after-sales sector, which increase over the years as presented in Figure 2-8. The longer the relationship lasts, the higher the profits per customer. These figures underpin the importance of customer loyalty in the automotive after-sales business. Moreover, the authors reveal that a reduction in the churn rate of 5% leads to a profit increase of 25% to 85%. For the automotive after-sales sector, they conclude that a 5% reduction in the churn rate leads to an increase in customer lifetime value* of 30% (* average profit that a customer contributes during the business relationship). This is explained by increasing sales over time, realizable price increases, cost savings through reduced acquisition expenses, and revenue effects from referrals. On the basis of their investigations the authors call for a culture of zero defections and thereby invoke a quality offensive in the manufacturing industry, which has successfully anchored and has now firmly embedded the zero-defect target for production processes.[256]

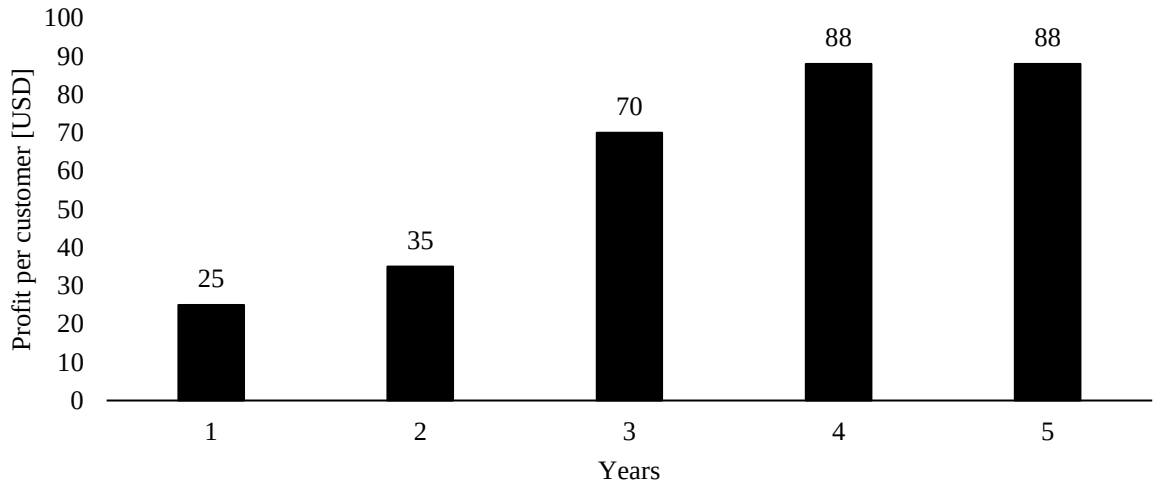

Figure 2-8: Development of profits of loyal car service customers over the years.[257]

However, the assertion that having loyal customers would be the best predictor for profitability is shown to be a generalization.[258] Criticizing that the association between loyalty and profitability is not as strong as assumed in previous studies, Dowling and Uncles argue that, "Contention that loyal customers are always profitable is a gross oversimplification"[259] and call for an individual assessment of this relationship for each company. Overall, it can be asserted that

[256] Reichheld, F. F. and Sasser Jr, W. E. (1990), "Zero Defections: Quality comes to services," *Harvard Business Review* 68, no. 5: pp. 106–111.

[257] Author's chart based on Reichheld, F. F. and Sasser Jr, W. E. (1990), "Zero Defections: Quality comes to services," *Harvard Business Review* 68, no. 5: p. 107.

[258] Ranaweera, C. (2007), "Are satisfied long-term customers more profitable?: Evidence from the telecommunication sector," *Journal of Targeting, Measurement and Analysis for Marketing* 15, no. 2: p. 119.

[259] Dowling, G. R. and Uncles, M. (1997), "Do Customer Loyalty Programs Really Work?," *Sloan Management Review* 38, no. 4: p. 78.

loyalty results in either the stability of the relationship, or growth or profitability in different forms. Thus, potential disadvantages of loyalty also need to be considered.

Peter points out that customer loyalty does not only have positive effects and states that customer retention management measures also cause expenses on the supplier side. A negative impact on growth could arise if a unilateral customer structure is promoted by excessive customer retention, for example, if, based on recommendations, the customer base remains within old population segments and the vendor focuses less on the development and acquisition of new customer segments.[260] Another negative effect of customer loyalty on growth is the danger that negative events, such as less successful product innovations or product defects, are communicated faster through negative word-of-mouth than it would be with unbound customers. This would, of course, only be the case if the tolerance for negative experience was exceeded.

Overall, the positive effects of customer loyalty on growth significantly outweigh the negative. This applies to a greater extent if the negative effects of unbound customers are also integrated into the analysis, which might arise in the context of negative word-of-mouth.[261] Table 2-4 provides an overview of the effects.

Table 2-4: Summary of positive and negative effects of customer loyalty.[262]

Effects	Increase of security	Increase of growth	Increase of profits
Positive	Increased stability in business relationship: - Habituation; - Immunization; - Tolerance. More feedback: - Willingness to complain; - Readiness to provide information; - Level of cooperation. Increased scope of action; Increased confidence.	Increased market penetration: - Concentrated sourcing; - Buying frequency; - Buying intensity; - Cross buying. Increase of recommendations: - Pass on addresses; - Readiness to provide testimonial; - Positive word-of-mouth. Customer referrals.	Cost reduction: - Return on investment; - Less opportunity costs of customer acquisition; - Reduced handling costs; - Efficient order processing; - Less scattering loss. Increase in revenue by reduced price elasticity; Cross-selling margins.
Negative	Inflexibility; Lethargy; Risk of reactance.	Unilateral customer structure; Negative word-of-mouth.	Retention costs; Sales deduction.

[260] Peter, S. I., *Kundenbindung als Marketingziel: Identifikation und Analyse zentraler Determinanten* (Wiesbaden: Gabler Verlag, 1997), pp. 50–51.

[261] Diller, H., "Die Bedeutung des Beziehungsmarketing für den Unternehmenserfolg," in *Grundlagen des CRM*, eds. Hajo Hippner and Klaus D. Wilde (Wiesbaden: Gabler Verlag, 2004), pp. 110–111.

[262] Author's table based on Diller, H., "Die Bedeutung des Beziehungsmarketing für den Unternehmenserfolg," in *Grundlagen des CRM*, eds. Hajo Hippner and Klaus D. Wilde (Wiesbaden: Gabler Verlag, 2004), p. 101.

In summary, in literature there is a predominant opinion in support of the positive effects of customer loyalty. According to it, bound customers generate more revenue at lower costs, and therefore generate higher profits. However, customer retention management needs to cope with the potential risks of loyalty, such as retention costs and a unilateral customer structure. A successful provision of CRS allows the positive effects of achieved customer loyalty to prevail.

2.5 Current models in the context of technology acceptance research

In this chapter, selected approaches within the field of technology acceptance research are described. The selection was made according to the extent to which these concepts can supplement this research with further information. Context, targets, as well as the concepts used and findings, are explained in detail to derive applicable results from the specific approach.

2.5.1 The technology acceptance model

The technology acceptance model (TAM) is a theory explaining the drivers of reuse intention within the context of information technology (IT) research. Davis' model can be traced back to the theory of reasoned action,[263] which explains the prerequisites for consciously intended behaviours. On this basis, the author's target is to explain user behaviour for various IT systems and applications, "to provide a basis for tracing the impact of external factors on internal beliefs, attitudes and intentions".[264] The approach is based on the main assumption that reuse intention is determined as a prerequisite of the factual use and is influenced by the user's attitude towards the innovative information system to be introduced. Two studies were compiled by a total of 147 users of computer applications. The results lead to the derived TAM. The main determinants of the model were labelled *perceived usefulness* and *perceived ease-of-use*. The study confirms that these two factors determine the factual use of information systems, mediated by the factors *attitude* and *behavioural intention*:

- Perceived usefulness, which is defined as, "the prospective user's subjective probability that using a specific application system will increase his […] performance";
- Perceived ease-of-use, which is defined as, "the degree to which the prospective user expects the target system to be free of effort".[265]

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[263] Fishbein, M. and Ajzen, I., *Belief, attitude, intention and behavior: An introduction to theory and research* (Reading Mass. u.a.: Addison-Wesley, 1975).

[264] Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* 35, no. 8: p. 985.

[265] Ibid., p. 985.

The hypothesized relationship of perceived usefulness and ease of use as determinants has been consistently confirmed. Perceived usefulness and perceived ease-of-use both influence a user's attitude towards an IT system. Behavioural intention is also affected by perceived usefulness, which is again the prerequisite for factual use. The influence of perceived usefulness on usage behaviour is significantly higher than that of perceived ease-of-use. The external variables include certain aspects, such as system characteristics, user skills, and user involvement in system development.[266] Figure 2-9 describes elements and interrelations in the TAM.

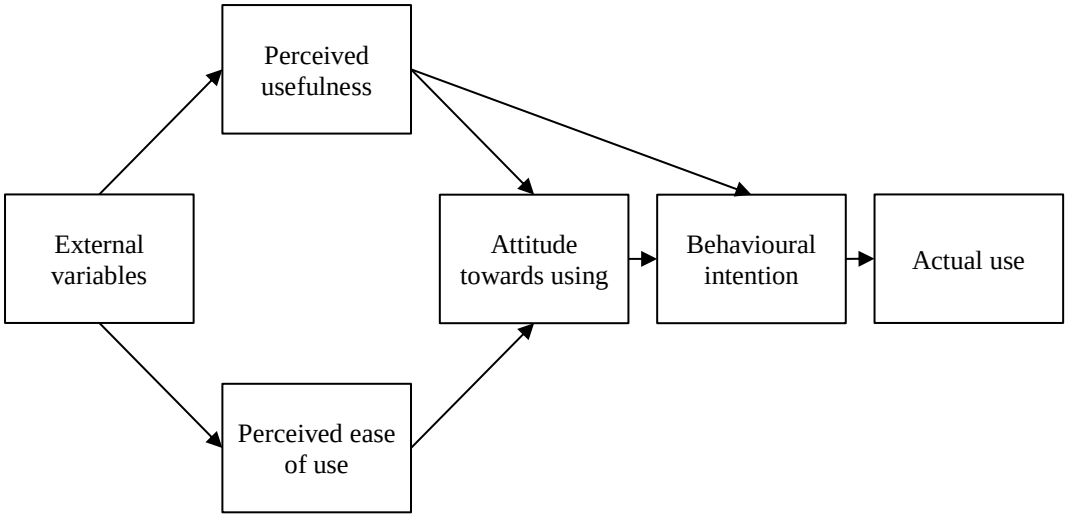

Figure 2-9: Technology acceptance model.[267]

Further findings within the process of model evaluation showed that both perceived usefulness and perceived ease-of-use have a direct influence on behavioural intention. Consequently, the attitude construct was eliminated within Venkatesh and Davis's enhanced TAM.[268]

Adams, Nelson and Todd validated the relationship between ease-of-use, usefulness, and system usage and, among others, empirically confirmed the TAM.[269] Since the introduction of the

[266] Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* 35, no. 8: pp. 985–988.

[267] Author's illustration based on Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* 35, no. 8: p. 985.

[268] Venkatesh, V. and Davis, F. D. (1996), "A Model of the Antecedents of Perceived Ease of Use: Development and Test," *Decision Sciences* 27, no. 3.

[269] Adams, D. A., Nelson, R. R., and Todd, P. A. (1992), "Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication," *MIS Quarterly* 16, no. 2: pp. 245–247.

TAM, numerous extensions have been derived to investigate the acceptance of innovative information technology.[270]

Röcker questions whether the focus on the usefulness and ease-of-use factors, which were used to examine technology acceptance over the past 20 years, would still be sufficient in the future. He states that new factors might be important for innovative technologies, indicating a need for deeper research to identify additional or replacing factors, which influence the acceptance of future information systems and adapt the existing TAM accordingly.[271]

Because of the review of existing research within the field of technology acceptance, Davis's model[272] and its enhancement by Venkatesh and Davis[273] can be assumed to be an applicable foundation in the context of CRS, although the necessity of further adapting and improving the model to strengthen its explanatory status is acknowledged.

2.5.2 Applications of the technology acceptance model in related fields of research

In Wünderlich's research on remote services as a subset of technology-mediated services, she explores the perception and acceptance of remote services in a B2B environment. Drivers of remote service adoption and reuse were identified based on a qualitative study conducted in the markets of Germany, the U.S.A. and China, and the ITSUM (Interactive Technology-Mediated Service Usage Model) was developed. The ITSUM analyses customers' beliefs about collaboration within remote services, especially regarding the usefulness of the service, the characteristics of the technology setting used, and the customers' organizational characteristics. The most important drivers for usage intention were identified as the customer company's employees' beliefs about the task and process of their collaboration with the remote service and its perceived usefulness. In addition, the trustworthiness of the service was identified to be highly relevant for predicting usage intention. Further aspects, such as role clarity and subjective

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[270] Liang, C.-J. and Wang, W.-H. (2004), "Attributes, Benefits, Customer Satisfaction and behavioral Loyalty - an integrative research of financial services industry in Taiwan," *Journal of Services Research* 4, no. 1; Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009); Wünderlich, N. V., *Acceptance of Remote Services: Perception, Adoption, and Continued Usage in Organizational Settings* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009); Park, E. et al. (2014), "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," *Telematics and Informatics* 31, no. 1.

[271] Röcker, C. (2010), "Why Traditional Technology Acceptance Models Won't Work for Future Information Technologies?," *World Academy of Science, Engineering & Technology, no.* 41: p. 241.

[272] Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly* 13, no. 3.

[273] Venkatesh, V. and Davis, F. D. (1996), "A Model of the Antecedents of Perceived Ease of Use: Development and Test," *Decision Sciences* 27, no. 3.

norms, from the user's perspective, were identified as also influencing the adoption and acceptance of remote services.[274] The findings about perceived usefulness and trustworthiness have been especially considered in the course of this research. The concept of perceived usefulness applied by Wünderlich shows parallels to the concept of customer value. However, it should be considered that, in her research, the user of remote services is defined as a technician in a B2B context, so that the aspect of benefit cannot be viewed solely from a person's individual point of view, but also from the company's perspective. The concept of trustworthiness applied by Wünderlich, can be understood as the customer's perception of the remote service technician's integrity, benevolence, and ability. If the customer thinks that the remote service technician acts in a competent and benevolent way, and displays only the agreed behaviour, they are more likely to utilize remote services.[275] This finding implies that perceived trust can be an influencing factor for the usage of connected remote services. Thus, in distinction to Wünderlich's research, in this thesis the concept of trust needs to be applied towards CRS, because with it, no personal interaction with service personnel occurs. This aspect marks a significant distinction between remote services as defined by Wünderlich and connected remote services as defined by the author (see Chapter 1.1.3).

Supplementing the original dimensions of perceived usefulness and perceived ease-of-use postulated in Davis' technology acceptance model, additional possible dimensions were identified within various studies to extend the original TAM. The TAM-based conceptualization of connected services by Hiraoka, utilizes the concepts of perceived usefulness and perceived ease-of-use, and amends several connected service specific dimensions, based on qualitative explorative research. The empirical analysis is limited to one German automobile manufacturer's service offering. The criteria of perceived usefulness and perceived ease-of-use (for a detailed description, see Chapter 2.5.1) have been shown to be significant. The focus is on the empirically demonstrated contributions of the dimensions *brand reputation of connected services*, *perceived enjoyment*, and *price fairness.*[276] *Perceived enjoyment* describes the customers' motivation for using a specific service just for experiencing pleasure.[277] Consistently, Childers et al. address the hedonic aspects of enjoyment. While some customers may use services primarily

[274] Wünderlich, N. V., *Acceptance of Remote Services: Perception, Adoption, and Continued Usage in Organizational Settings* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), p. 176.

[275] Ibid., p. 135.

[276] Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), p. 110.

[277] Venkatesh, V., Thong, J. Y.L., and Xu, X. (2012), "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly* 36, no. 1: p. 158.

for sensible purposes, others may use, e.g., online-services, just to enjoy these interactive media. In their empirical analysis in the context of online-shopping, it was shown that enjoyment is a significant predictor of attitude toward interactive shopping.[278]

In the context of innovative self-service technologies, Xiaoren, Xiangdong and Ling compare the impact of enjoyment on the adoption of innovative self-service technologies, such as automated teller machines of commercial banks and automated boarding machines of airlines. The results show that, in both cases, enjoyment has a significant impact on adoption, and demonstrating higher contributions to the adoption of automated boarding machines than to automated teller machines. Thus, depending on the context, customers pay attention to perceived enjoyment.[279] Recent research in the mobile consumer sector found evidence that enjoyment positively impacts the adoption of technologies.[280]

Brand reputation was empirically shown to influence users' satisfaction with connected services in the automotive industry, confirming a higher level of influence on heavy users than on average users.[281] The results show that whether the services are provided by the manufacturer itself or by a third party is important to customers. The finding can be attributed to the relevance of brand images in consumer choice decisions. Jacoby and Chestnut state that brand names themselves lead to a perception of quality, which is projected onto the product.[282] Premium brands have an additional hedonic potential that extends beyond consumer satisfaction, since it involves a promise of pleasure and satisfaction, which fosters brand reputation.[283] As there is an inevitable link between CRS and the brand providing the service, the customer's perception of the brand can affect their attitude towards the specific CRS.

In his work, Hiraoka refers to *price fairness* as the influence of both price offer and price procedure as direct factors and simultaneously as indicators for the price fairness construct.[284] In

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[278] Childers, T. L. et al. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior," *Journal of Retailing* 77, no. 4: p. 524.

[279] Xiaoren, Z., Xiangdong, C., and Ling, D. (2013), "Comparative Study of Self-service Technology Adoption based on Product Function," *Information Technology Journal* 12, no. 12.

[280] Agrebi, S. and Jallais, J. (2015), "Explain the intention to use smartphones for mobile shopping," *Journal of Retailing and Consumer Services* 22; Avcilar, M. Y. and Alkevli, A. (2017), "The Antecedents of Mobile Repurchasing Intentions: An Empirical Investigation among Turkish Mobile Shoppers," *International Journal of Business and Management* 12, no. 3: p. 116.

[281] Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), p. 113.

[282] Jacoby, J. and Chestnut, R. W., *Brand loyalty measurement and management* (New York, NY: Wiley, 1978).

[283] Hagtvedt, H. and Patrick, V. M. (2009), "The broad embrace of luxury: Hedonic potential as a driver of brand extendibility," *Journal of Consumer Psychology* 19, no. 4.

[284] Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009), p. 75.

their conceptual framework, Xia, Monroe and Cox emphasize the importance of price fairness, arguing that perceived price unfairness triggers negative emotions which can result in customers' negative word-of-mouth, or even in the termination of the relationship. The perception of price fairness derives from social norms, beliefs, and knowledge of the surrounding market, including value perceptions as an additional variable mediating the relationship between price fairness and behavioural reactions.[285] The impact of price fairness on customer satisfaction has also been validated in the automotive context by Herrmann et al., showing that price fairness positively affects customers' satisfaction with the dealership's service, as well as purchase satisfaction.[286] Understanding customers' price fairness perceptions in the context of innovation is essential, because commercializing a service innovation remains a crucial, but challenging, task for companies introducing new services.[287] In their study on different kinds of innovations, Kuester et al. investigate price fairness perceptions about launch prices, finding that perceived price fairness significantly affects customers' intentions of adopting a specific innovation.[288]

In the context of acceptance of innovative Driver Assistance Systems (DAS), Arndt investigates the influence of various DAS attributes on customers' purchase attitude. The findings show that customers' attitudes were especially affected by factors such as image and trust. It was also demonstrated that the factors safety and comfort positively influenced normative convictions which, in addition to attitude, positively influenced purchase intentions.[289]

Next, research from the field of mobile services in other sectors is analysed to identify potential implications for CRS. The empirical analysis by Park et al., based on an online survey, investigated dimensions of mobile social network applications and demonstrated that the attitude towards the application and reuse intention is mainly influenced by the factors enjoyment, interactivity, control and skill, ease-of-use, usefulness, and mobility.[290] In their empirical analysis, using four surveys in a comparative approach, Nysveen, Pedersen and Thorbjørnsen discovered that, in addition to traditional dimensions such as usefulness and ease-of-use, notable effects on

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[285] Xia, L., Monroe, K. B., and Cox, J. L. (2004), "The Price Is Unfair!: A Conceptual Framework of Price Fairness Perceptions," *Journal of Marketing* 68, no. 4.

[286] Herrmann, A. et al. (2007), "The influence of price fairness on customer satisfaction: An empirical test in the context of automobile purchases," *Journal of Product & Brand Management* 16, no. 1: pp. 55–56.

[287] Jhang, J. H., Grant, S. J., and Campbell, M. C. (2012), "Get It?: Got It. Good! Enhancing New Product Acceptance by Facilitating Resolution of Extreme Incongruity," *Journal of Marketing Research* 49, no. 2.

[288] Kuester, S. et al. (2015), "Comparing the incomparable?: How consumers judge the price fairness of new products," *International Journal of Research in Marketing* 32, no. 3: p. 276.

[289] Arndt, S., *Evaluierung der Akzeptanz von Fahrerassistenzsystemen: Modell zum Kaufverhalten von Endkunden* (Wiesbaden: VS Verlag für Sozialwissenschaften / Springer Fachmedien Wiesbaden GmbH Wiesbaden, 2011), p. 160.

[290] Park, E. et al. (2014), "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," *Telematics and Informatics* 31, no. 1: p. 11.

reuse intention were also shown by perceived expressiveness and perceived enjoyment, which highlights the importance of taking into consideration relatively untraditional antecedents of technology usage when studying intention to use mobile services.[291] Here, the concept of expressiveness is described as using mobile services as symbolic capital. Becker identifies the factors of convenience, playfulness, interactivity, status improvement, sustainability, and the credibility of the mobile service, as influential factors for customer satisfaction, positive word-of-mouth and loyalty towards the service.[292] These differences indicate that the significance of factors influencing the acceptance of mobile services vary across various cultures, and infrastructure or industry conditions. Table 2-5 summarizes the findings of research in the context of innovative self-service technologies.

Table 2-5: Overview of empirical results from contemporary studies on technology acceptance of different services.[293]

Source → / Factor ↓	Nysveen, Pedersen and Thorbjørn-sen (2005)	Wang, Lin and Luarn (2006)	Hiraoka (2009)	Arndt (2010)	Jeong and Yoon (2013)	Park et al. (2014)	Becker (2016)
Usefulness	x	x	x		x	x	
Ease-of-use / control	x	x			x	x	
Monetary value		x	x		x		
Enjoyment	x		x			x	x
Self-efficacy		x			x		
Credibility / trust				x	x		x
Interactivity						x	x
Mobility						x	
Convenience							x
Expressiveness	x						x
Sustainability				x			x
Comfort				x			
Safety				x			

The empirical findings listed show how manifold possible key factors of CRS can exist. To summarize the literature review, the TAM and its extensions, together with loyalty research,

[291] Nysveen, H., Pedersen, P. E., and Thorbjørnsen, H. (2005), "Explaining intention to use mobile chat services: Moderating effects of gender," *Journal of Consumer Marketing* 22, no. 5: p. 342.

[292] Becker, F., *Kundenbegeisterung durch Serviceinnovationen: Eine Analyse am Beispiel technologiebasierter Self-Services* (Dissertation, Universität Hohenheim, 2016), pp. 168–169.

[293] Author's table based on sources mentioned in this chapter.

provide suitable reference points both for conceptualizing connected remote services and for developing a research model to link CRS to car servicing loyalty.

Relevant to defining the key factors of CRS, in particular the TAM and its extensions provide possible concepts from a rather technology-specific perspective: *usefulness, ease-of-use, enjoyment, convenience,* and *interactivity*. These aspects need to be considered within the conceptualization of CRS. Research on customer loyalty yields rather global concepts, such as *customer value, satisfaction, service quality, commitment, image*, and *trust.* These concepts are to be considered in the development of the research model.

Because of the lack of research on connected remote services, the novelty of the concept within science and the one-sided orientation of existing research to acceptance instead of loyalty, it is necessary to identify and develop the key factors of CRS from the perspective of the service-value-loyalty chain, as explained in Chapter 1.2. Specifically, although it can be assumed that a high value for the identified key factors leads to acceptance, it does not necessarily also lead to loyalty. Thus, in the next chapter an explorative approach using qualitative research methods is used to identify the key factors of connected remote services.

3 MODEL DEVELOPMENT AND EMPIRICAL EVALUATION OF THE IMPACT OF CONNECTED REMOTE SERVICES ON CUSTOMER VALUE AND CAR SERVICING LOYALTY

This chapter is devoted to the development of a research model to investigate the impact of connected remote services on car servicing loyalty. Therefore, one target is to develop a basic understanding of CRS (conceptualization) and to make it measurable (operationalization). For this purpose, the key factors of CRS will be identified based on empirical research, using an explorative approach applying qualitative methods. Once established, the conceptualization of CRS will then be embedded in a research model for further evaluation by quantitative methods using causal analyses. The following procedure is used:

1. An explorative study is performed to identify the relevant CRS key factors. The results form the basis for the conceptualization, and lead to the description of the key factors identified;
2. Next, the mediating concepts between CRS and car servicing loyalty are conceptualized, based on existing research approaches and taking into account the results from the explorative study;
3. Subsequently, the construct interrelations are developed as hypotheses and combined into a comprehensive research model;
4. Finally, the developed research model is quantitatively tested by collecting data from active CRS users in Germany.

3.1 Exploration of connected remote services using the means-end chain analysis as qualitative research method

In this chapter a qualitative approach is used to identify the determinants, also referred to as key factors of connected remote services. To develop an understanding of CRS on an empirical basis, the relevant characteristics of CRS are identified within an exploratory study approach. This approach assumes that the CRS key factors are to be derived from linking numerous functions (attributes) and experiences that arise in the usage of CRS, which can in turn be attributed to certain key factors. The target of this approach is to identify the key factors of CRS from a customer’s perspective.

3.1.1 Foundations of the means-end chain method for the exploration of connected remote services

Means-end chain analysis sets the methodological framework for the semi-structured explorative survey. This method is utilized within the framework of product design to investigate the interrelationship between functional aspects of a product or service and the effects which it triggers in the customers' perception. The functions, which have a positive effect in means of value to the customer, are identified in the means-end analysis. This also identifies the intended targets behind the functions, which the provider pursues in the CRS design. The method is based on the work of the social psychologist Tolman, who postulates that customers of a certain product or service regard its attributes as a means for realizing certain values (ends).[294] Rosenberg underpins this with the traditional expectancy value model, which assumes that a customer's attitude towards a product or service is determined by the importance of the motif (affective component), as well as the suitability of the product or services for the fulfilment of the motifs (cognitive component).[295] This model is often viewed as the origin of the means-end chain approaches. Applied to the context of this thesis, the basic idea of the means-end approach is that a customer decides to use a product or service to achieve certain wishes or targets. Consequently, the mechanism of a means-end chain makes it possible to track perceived consequences back to certain attributes or functions of a product or service. Figure 3-1 shows the concept of a means-end chain.[296]

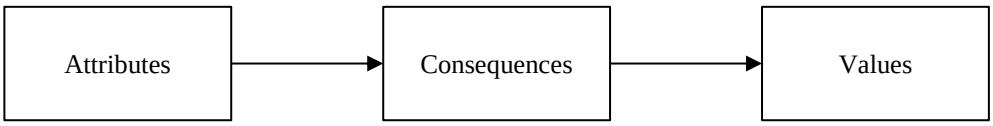

Figure 3-1: Concept of means-end chain.[297]

Specific attributes or functions of a product or service refer to physical characteristics, such as performance or price; whereas, consequences resulting from usage of a product or service, are perceived benefits, such as comfort or playfulness. Consequences can also be negative, such as lack of data security. In the final step, instrumental values flow into terminal values, such as

[294] Tolman, E. C., *Purposive Behaviour in Animals and Men* (New York, 1932), pp. 18–20.

[295] Rosenberg, M. J. (1956), "Cognitive structure and attitudinal affect," *The Journal of Abnormal and Social Psychology* 53, no. 3: pp. 368–370.

[296] Gutman, J. (1982), "A Means-End Chain Model Based on Consumer Categorization Processes," *Journal of Marketing* 46, no. 2: pp. 60–62.

[297] Author's illustration based on Gutman, J. (1982), "A Means-End Chain Model Based on Consumer Categorization Processes," *Journal of Marketing* 46, no. 2: p. 60.

happiness or confidence. The terminal values are usually shaped by personal and social background.[298]

Relevant key factors will be identified based on the defined functions of connected remote services. Through adaptation of the means-end methodology to the context of this thesis, CRS functions correspond to the attributes/characteristics that create perceived benefits and are the upstream consequences in between attributes and values. These consequences are helpful for designing the key factors regarding content. The means-end analysis usually comprises four steps:

1. The CRS' concrete attributes are identified and prioritized based on current customer literature on connected remote services, applying a theoretical coverage of prioritized functions of 90% (see Chapter 2.1.2);
2. The attributes captured in step 1 serve as a starting point for the actual bottom-up laddering survey concept. In this, the identified attributes are presented to CRS users. The users are then asked why a specific attribute is essential to them. The goal of the survey is to map the entire association chain, ideally up to the terminal values;
3. The survey results are evaluated by means of a content analysis. For this purpose, the individual answers are analysed and grouped into categories, and the elements i.e., attributes, consequences, and values, are assigned to the various levels of the means-end chain (See Figure 3-1);
4. In the final step, the hierarchical value map is designed. It represents an aggregated structure of the collected data at the different levels of the means-end chain. The map describes the direct and indirect relationships between the individual elements. Direct relationships occur when hierarchically directly neighboured elements are related. Indirect relationships describe relationships between non-directly neighbouring elements.

[298] Keuper, F., Hannemann, H., and Hintzpeter, R., "Means-End-Chains-Analyse zur Positionierung und Gestaltung von Services," in *Sales & Service: Management, Marketing, Promotion und Performance*, eds. Frank Keuper and Bernhard Hogenschurz (Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler | GWV Fachverlage GmbH Wiesbaden, 2008), pp. 182–183.

3.1.2 Results of means-end chain analysis for the identification of connected remote services key factors

The means-end chain analysis requires the identification of relevant CRS attributes in terms of functions to be examined and to determine a suitable sample. The field of investigation was initially limited to six brands for the selection of functions. The means-end chain analysis is performed for 10 CRS-specific functions, which are listed in Table 3-1.

The description of the functions is based on existing customer literature on connected remote services in the German market, as described in Chapter 2.1.2. Additionally, expert interviews were conducted with employees from car manufacturers' design departments, as well as sales and after-sales experts in the authorized dealership networks, to identify the most important functions from the experts' perspective. The requirement also emerged for the selected functions to be, so far as possible, a spectrum along the range of CRS functionality. In summary, the selection performed in Chapter 2.1.2 was confirmed.

Table 3-1: Attributes of connected remote services.[299]

No.	Attribute	No.	Attribute
1	Vehicle status	6	Tele-diagnosis
2	Vehicle localization	7	Concierge service
3	Breakdown call	8	Service appointment
4	Emergency call	9	Locking and unlocking
5	Remote air conditioning	10	Online theft alarm system

For the survey, conducted during the period of April and May 2017 in Germany, customers of four different brands[300] were approached while waiting at the dealership's service counter or waiting lounge. As a prerequisite, the participants should have owned and used a version of CRS during the past 6 months. The participants are also referred to as *users of CRS*. The sample for the written customer surveys consists of 18 participants. 83% of the participants were between 35 and 54 years-old, 72% were male, and 28% female. 61% of the respondents, state that they used CRS regularly or often. 39% seldom use it. Non-users are not included in the survey. The sample used does not claim to be representative of the automotive brands' customer structures. For this qualitative investigation, to explore the manifold aspects of CRS precisely, representativeness is only of secondary importance. According to Guba and Lincoln, the analysis

[299] Author's table based on sources mentioned in Chapter 2.1.2 and interviews, conducted with experts of BMW and Mercedes-Benz to validate the consideration met, in which functions are prioritized by coverage by different brands. Results confirm the focus on the listed functions.

[300] Audi, BMW, Mercedes-Benz and Porsche.

of theoretical saturation of this qualitative analysis, shows that the last six interviews, which comprise 30% of the sample, show no additional contribution in terms of new categories on the coded level.[301] Additionally, the chosen sample size corresponds to Ulaga and Eggert's recommendation, who state that the sample size n=10 is sufficient for qualitative research with an explorative character.[302] Thus, it can be assumed that a larger sample size would not provide additional findings, and the identified results are sufficiently meaningful.

The survey was performed using the "hard"-laddering technique. In contrast to "soft"-laddering, this type of laddering uses self-filling written surveys, which can be seen as a benefit in this approach because the attributes are preselected and provided to the customers within the survey document. According to Russel et al., the hard-laddering approach is an appropriate method, especially in the case of predefined elements.[303] Another advantage is the avoidance of interview bias, as well as the avoidance of the customers' tendency not to allow insights into their personal values.[304]

In the content analysis, the answers are categorized according to the Gutman method.[305] In the process, systematic queries are utilized to investigate the consequences of those CRS functions which are relevant to the customer. In the next step, coding based on certain and recurring keywords, a summary of the consequences and the values of CRS is obtained. For example, the answers "I feel comfortable", "It increases my comfort", and "More comfortable" were assigned to the group "comfort". This procedure was applied in cases where it could be assumed that the individual quotes had the same meaning.[306] 254 text passages were associated with means-end category conseqences, which were then summarized into nine consequence clusters. In addition, 74 text passages were associated with a value level, and divided into four value clusters. The results of the content analysis are presented in Table 3-2. The numbers in brackets describe the answer frequency value after coding.

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[301] Lincoln, Y. S. and Guba, E. G., *Naturalistic inquiry,* 3rd ed. (Beverly Hills Calif.: Sage Publ, 1985), p. 202.

[302] Ulaga, W. and Eggert, A. (2006), "Value-Based Differentiation in Business Relationships: Gaining and Sustaining Key Supplier Status," *Journal of Marketing* 70, no. 1: p. 121.

[303] Russell, C.G. et al. (2004), "A comparison of three laddering techniques applied to an example of a complex food choice," *Food Quality and Preference* 15, no. 6: p. 582.

[304] Balderjahn, I. and Will, S. (1998), "Laddering - Messung und Analyse von Means-End Chains," *M&M-Toolbox, no.* 42: p. 68.

[305] Gutman, J. (1982), "A Means-End Chain Model Based on Consumer Categorization Processes," *Journal of Marketing* 46, no. 2.

[306] Böcker, A., *Extern segmentierte Laddering-Daten: Wann sind Segmentvergleiche zulässig und wann Unterschiede zwischen Segmenten signifikant? - ein Vorschlag für einen Homogenitätstest* (Giessen: Inst. für Agrarpolitik und Marktforschung, 2005), p. 9.

Table 3-2: Survey results after content analysis and coding process.[307]

Attributes	Consequences	Values
1. Vehicle status (15)	Convenience (81)	Customer value (42)
2. Vehicle localization (16)	Interactivity (52)	Trust (25)
3. Breakdown call (17)	Safety (48)	Well-being (5)
4. Emergency call (17)	Reliability (32)	Satisfaction (2)
5. Remote air conditioning (15)	Comfort (31)	
6. Tele-diagnosis (15)	Mobility (4)	
7. Concierge service (14)	Service quality (3)	
8. Service appointment (15)	Enjoyment (2)	
9. Locking and unlocking (15)	Competence (1)	
10. Online theft alarm (15)		

In the means-end chain analysis, the importance of a specific function, consequence, or value is derived from the number of responses and the number of direct and indirect connections with other elements. To evaluate whether this approach captures the participants' actual perception of a function's relevance and to eventually account for this, the survey also included a query about each function's individual importance using a 5-point Likert scale (1 = very important, 5 = totally unimportant). The impact factor for each category is calculated for this purpose. The impact factor is defined as the product of response rate and standardized importance. The response rate describes the relationship between the number of respondents, who provided information about a specific function and total respondents. The standardized importance is the result of the normalization of the average importance within the mentioned 5-point Likert scale. Detailed results can be found in Appendix B.

The attributes emergency call, breakdown call, vehicle status, tele-diagnosis, and online theft alarm system were very highly relevant with impact factors higher than 65%. The other attributes had impact factors of between 59–63%, with the exception of the concierge service attribute, which shows an impact factor of 47%. For the interpretation of survey data, it can therefore be concluded that the importance of the attributes is almost homogenous. Figure 3-2 shows the attributes ranked by impact factor.

[307] Author's table based on qualitative survey results.

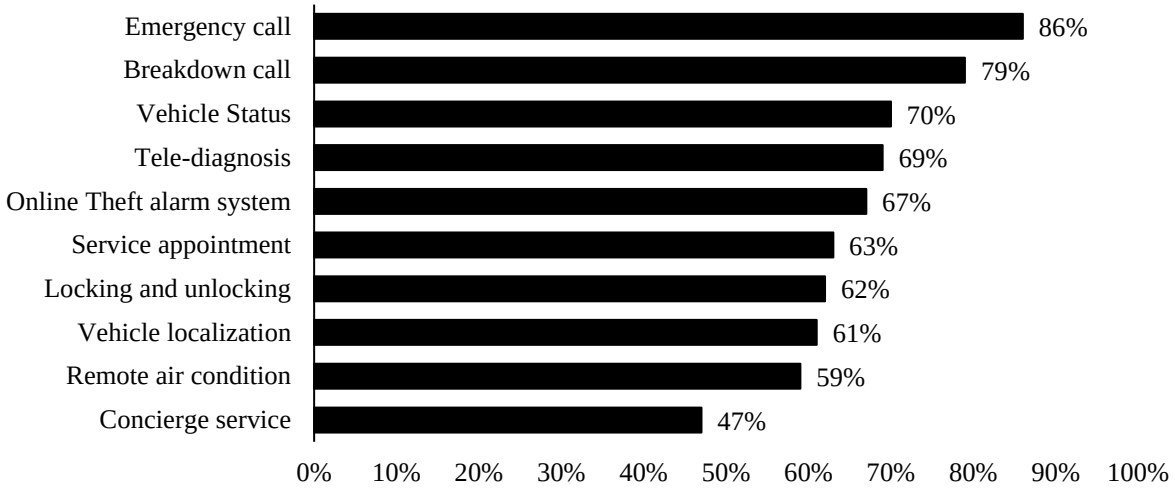

Figure 3-2: Impact factors of attributes.[308]

In the next step, the attributes and the derived consequences and values were summarized in an implication matrix, which contains information about the relationship between the individual elements obtained by capturing the number of customers who directly and indirectly link an attribute to a specific consequence or value category.[309] For details, see Appendix C.

The identified frequency values form the basis for developing the hierarchical value map (HVM). It graphically depicts the most important relationships between individual elements of the means-end chain in the form of a tree-like, hierarchical structure. In terms of clarity, a so-called cut-off level is defined, which is a compromise between detail and clarity.[310] It determines the minimum frequency at which an association must be mentioned before it is used in the HVM. In accordance with Gengler and Reynolds's requirement, the minimum threshold value chosen should not be lower than 70% of the connections; a level between 75–85% is recommended.[311] Following Gutman and Reynolds, who recommend setting a cut-off level at between three and five connections,[312] the cut-off level was set at three connections. This leads to the exclusion of the concepts enjoyment, mobility, and satisfaction, which exhibited two or less connections. In total, 81.7% of all the connections to be represented in the HVM, fulfilled Gengler and Reynolds's requirement mentioned above. Figure 3-3 presents a visualization of

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308 Author's chart based on qualitative survey results.

309 Böcker, A., *Extern segmentierte Laddering-Daten: Wann sind Segmentvergleiche zulässig und wann Unterschiede zwischen Segmenten signifikant? - ein Vorschlag für einen Homogenitätstest* (Giessen: Inst. für Agrarpolitik und Marktforschung, 2005), p. 10.

310 Ibid., pp. 11–12.

311 Gengler, C. E. and Reynolds, T. J. (1995), "Consumer understanding and advertising strategy: analysis and strategic translation of laddering data," *Journal of Advertising Research* 35, no. 4: p. 25.

312 Reynolds, T. J. and Gutman, J. (1988), "Laddering theory, method, analysis, and interpretation," *Journal of Advertising Research* 28, no. 1: p. 24.

the HVM. For increased clarity, only the direct relationships are displayed. The numbers in brackets describe the number of connections, which is an indicator of the factor's importance at the consequence- and value-level.

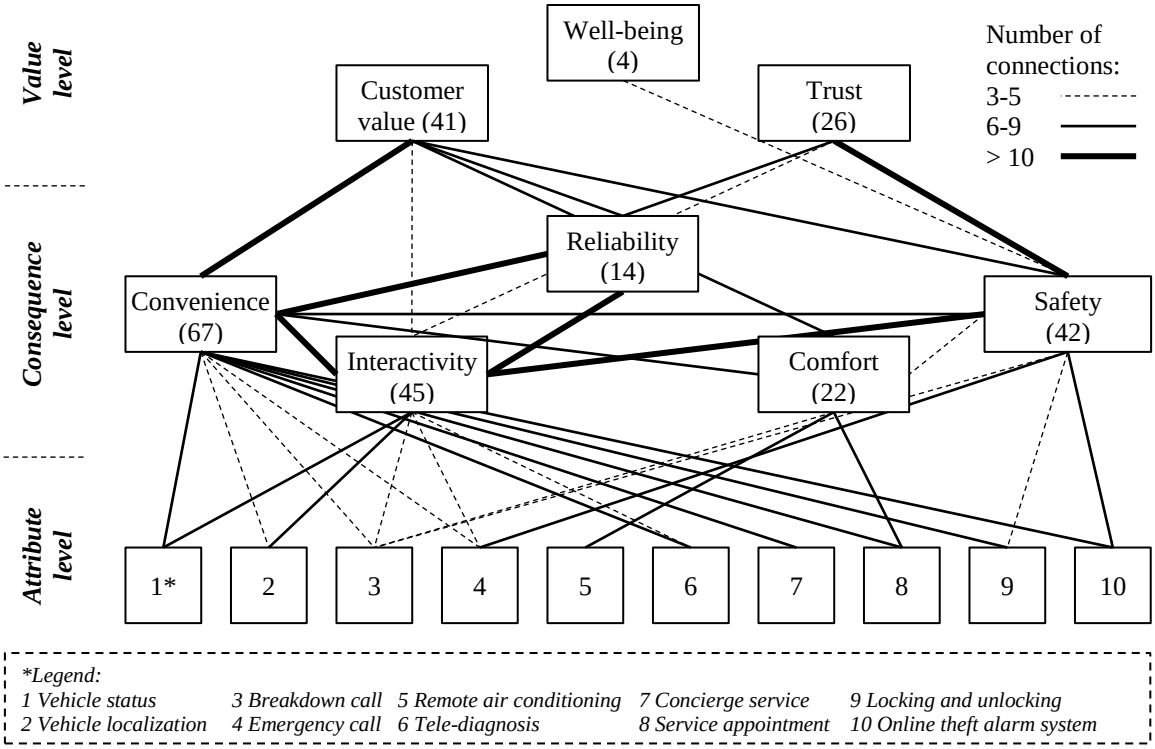

Figure 3-3: Hierarchical value map.[313]

The consequences *convenience*, *interactivity* and *safety* show the highest numbers of connections, and thus substantially determine the connected remote services' construct. The consequences *comfort* and *reliability* exhibit lower levels of connections, but are still at a significant level, and thus are also considered as key factors for the further research process. The identified consequences *mobility*, *service-quality*, and *enjoyment* are not considered in the HVM because they do not fulfil the cut-off level requirement. These aspects are assumed not to be relevant for the CRS concept. On the value level, three elements were identified, i.e., *customer value*, *trust*, and *well-being;* of these *customer value* and *trust* show strong connections; while *well-being* just reaches the cut-off level and only exhibits connections with *safety*. Consequently, the focus is on the factors *customer value* and *trust*. Terminal values are often unspecific representations of a human's preference for a final state of existence specifying a general lifetime goal. Therefore, the terminal value *well-being* is ignored in the further research process.[314]

[313] Author's illustration using the hierarchical value map method of Gutman, J. (1991), "Exploring the nature of linkages between consequences and values," *Journal of Business Research* 22, no. 2: p. 145.

[314] de Souza Leão, André Luiz M. and Benício de Mello, Sérgio C. (2007), "The means-end approach to understanding customer values of a online newspaper," *BAR - Brazilian Administration Review* 4, no. 1: p. 3.

In summary, the following conclusions are drawn from the results of the explorative research:

1. The qualitative study underlines the assumption that connected remote services is a multidimensional construct, consisting of the key factors convenience, interactivity, comfort, safety, and reliability;
2. The HVM shows that two different main concepts could be distinguished on the value level. The creation of customer value is essential for most CRS users. Especially, the key factors convenience, comfort, safety and reliability, lead directly to customer value provided by CRS;
3. The second concept on the value level that was identified by this study is trust. In particular, the key factors safety and reliability exhibited a high number of interrelations with trust;
4. The identified key factor interactivity captures connected remote services' particularity, which extends beyond the previous understanding of existing research within related fields. The aspect of simultaneous connectivity towards a service object and a vendor is conceptualized in this key factor;
5. The literature review shows that customer value and trust are antecedents for customer loyalty.[315] Accordingly, CRS key factors are drivers for car servicing loyalty, if they provide value and create trust in customers. Thus, customer value and trust are defined as mediating concepts to link the CRS key factors to CRS reuse intention and car servicing loyalty.

The described qualitative, explorative approach leads to the identification of relevant connected remote services key factors. The key factors identified show an overlap with findings in existing literature, especially in the field of technology acceptance. The central concern of the explorative approach was the identification of suitable CRS key factors. In view of the lack of existing research on CRS, the derived results show a high degree of concretization. These results make an important contribution to the further development of the research model.

[315] Garbarino, E. and Johnson, M. S. (1999), "The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships," *Journal of Marketing* 63, no. 2; Spiteri, J. M. and Dion, P. A. (2004), "Customer value, overall satisfaction, end-user loyalty, and market performance in detail intensive industries," *Industrial Marketing Management* 33, no. 8.

3.1.3 Definition and modelling of key factors of connected remote services

The findings from the previous chapter, as well as from the literature review about potential CRS determinants, form the basis for the conceptualization of connected remote services. In Table 3-3, the identified CRS key factors based on the qualitative analysis, are related to the theoretical references from the literature review regarding drivers of customer loyalty (see Chapter 1.4.2), as well as to references from the review regarding drivers of reuse intention within technology acceptance research (see Chapter 2.5.2). On the one hand, there is clearly an overlap between drivers of customer loyalty and the results of the qualitative analysis on the value level. The identified overlaps possibly constitute the bridge between the concepts of CRS and car servicing loyalty. On the other hand, an overlap can be also observed between drivers of reuse intention within TAM adoptions and consequences identified in the qualitative analysis of this research.

Table 3-3: Referencing of the identified CRS key factors towards findings from the literature review.[316]

Assignment to literature review	Drivers identified within literature review	Results of qualitative analysis	Assignment to means-end chain level
Drivers of loyalty in the literature review on customer loyalty	Customer value	Customer value	Value
	Customer satisfaction	Customer satisfaction*	Value
	Trust	Trust	Value
	Service quality	Service quality*	Consequence
Drivers of reuse intention in the literature review on TAM adoption	Enjoyment / playfulness	Enjoyment*	Consequence
	Convenience	Convenience	Consequence
	Interactivity	Interactivity	Consequence
	Mobility	Mobility*	Consequence
	Safety	Safety	Consequence
	Comfort	Comfort	Consequence
	-	Reliability	Consequence

** Below cut-off level as defined in previous chapter.*

It can be assumed that consequences that exhibit an overlap are of crucial importance for the conceptualization of CRS, since existing theories and qualitative results are covered. Consequences, which are not included (reliability) in existing theories, can be assumed to be key factors that determine the difference between CRS and existing concepts, and are thus major novel issues within the CRS concept.

[316] Author's table based on sources mentioned in chapters above.

In the further process of conceptualization, it is necessary that the construct's key factors show a high degree of independence and do not overlap with each other.[317] The implication matrix reveals that there are no interrelations between the attributes, which is a positive indicator of the difference of the key factors to be derived from these attributes. On the consequence level, two potential key factors are not further considered in the conceptualization process. The factor *mobility* shows a low number of responses in the survey, and the number of interrelations is below the defined cut-off level (see Table 3-2). Moreover, the delimitation from interactivity is insufficient. If perceived *mobility* is constituted by the customers' ability to use CRS regardless of location, it can be assumed that this is the same as the degree to which a customer feels simultaneously connected to the service object and service provider, independent of spatial distance. However, that aspect mainly determines the key factor *interactivity*. Consequently, perceived *mobility* is not considered further and is absorbed into *interactivity*. *Service quality* is also not included in the CRS concept, because it can be subsumed into the aspect of perceived *reliability*. The evaluation of responses showed similarities between *service quality* and *reliability*, if an increase in *service quality* is taken to mean enhancing the sustainability of the vehicle by the use of CRS. This is also supported by the implication matrix, which reveals that all outgoing direct interrelations lead to *reliability*. Having applied the defined cut-off level, the potential key factor *enjoyment* is also not considered in the further research process.

Based on the groups of consequences formed in the qualitative analysis and assuming sufficient differentiation, the key factors convenience, interactivity, comfort, safety, and reliability are to be further considered in the CRS conceptualization. These aspects are largely supported by existing technology acceptance research findings. Therefore, these five consequences are assumed to be key factors, which form the concept of connected remote services.

The key factors identified are now explained in detail, focusing on clarifying the meaning and deriving a suitable definition for continuing this research. For the key factors that overlap with existing theories, the aspects of these theories are considered in the definitions. For key factors that are not covered by existing theories, the description of the construct and definition is based on the results of the qualitative research.

Perceived convenience is an important driver of reuse intention within technology acceptance research, and based on the results of the qualitative research, it is also confirmed as a suitable key factor for CRS. Brown and McEnally suggested that convenience is present if a product or

[317] Bortz, J. and Döring, N., *Forschungsmethoden und Evaluation: Für Human- und Sozialwissenschaftler,* 4th ed. (Heidelberg: Springer, 2006), p. 147.

service can, for example, reduce consumers' efforts in performing a purchasing process, provide flexibility regarding time and place of usage, require less mental effort, or provide time savings. Overall, the main concept of convenience signifies saving users' energy and time with the help of innovative technology, as well as improving the efficiency of users' instant and rapid information acquisition.[318] Berry, Seiders and Grewal define service convenience as "consumers' time and effort perceptions related to purchasing or using a service", considering the specific context of necessary activities that customers perform while using a service or performing a specific task.[319] In the context of mobile services, Lin and Lu showed that mobile convenience directly and positively influences customer value and user satisfaction, because users may use a mobile phone to gather information and carry out transactions at any time or place and obtain value based on convenience, derived from the effective and prompt transmission of information.[320] In conclusion, the main concept of convenience lies in saving users' time or energy, while the purpose of the convenience offered by technology is to improve the efficiency of users' information acquisition, to reduce the time and energy spent by users, and to help users acquire relevant information instantly.[321] This idea of convenience agrees with the results of the qualitative analysis, in which convenience is often described as simplification and increased flexibility, compared to handling specific functions without using CRS. The key factor convenience is therefore defined as follows: *convenience describes the degree of simplification and increased promptness a user experiences by the use of CRS.* The qualitative study demonstrated that perceived convenience was usually connected to customer value on the value level.

Further, based on the qualitative analysis, interactivity was identified as a CRS key factor. Especially, the aspect of established permanent connectivity between the customer and the service object is to be emphasized. Interactivity, as explained in the survey responses, comprises both directional aspects. On the one hand, it was mentioned that the user values interactivity in terms of receiving push notifications about the status of the service object. On the other hand, interactivity also describes the possibility of the customer controlling the service object remotely. Wamba and Akter use the term *perceived connectivity* to mean the ability of a technology to

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[318] Brown, L. G. and McEnally, M. R., "Exploring the Construct of Convenience," in *Proceedings of the 1991 Academy of Marketing Science (AMS) Annual Conference*, ed. Robert L. King (Cham: Springer, 2015), pp. 42–43.

[319] Berry, L. L., Seiders, K., and Grewal, D. (2002), "Understanding Service Convenience," *Journal of Marketing* 66, no. 3: p. 1.

[320] Lin, K.-Y. and Lu, H.-P. (2015), "Predicting mobile social network acceptance based on mobile value and social influence," *Internet Research* 25, no. 1: pp. 121–122.

[321] Chiu, Y.-K. and Huang, C.-W., "Using Behavior of Social Network Sites Based on Acceptance Model," in *Information Computing and Applications: 4th International Conference, ICICA 2013, Singapore, August 16-18, 2013 Revised Selected Papers, Part II*, eds. Yuhang Yang, Maode Ma and Baoxiang Liu (Berlin/Heidelberg: Springer Berlin Heidelberg, 2013), p. 60.

link people to people or other objects.[322] In their investigation of the acceptance of mobile services with a hedonistic character, Park et al. define interactivity as, "the degree that users are cognitively and emotionally connected with the world, its resources, and people."[323] This is consistent with the central aspect of connected remote services, which is characterized by the possibility of bidirectional communication between user and service object, combining the aspects of monitoring, e.g., for diagnostics, control and modification of the service object.[324] The second aspect of simultaneous interactivity to the service provider developed within this thesis also fits into the definition of this key factor. Interactivity is therefore defined as follows: *interactivity describes the degree to which a customer feels connected to the service object in terms of receiving or querying information and sending commands to it, and simultaneously being connected to the dealership.* The qualitative study revealed that perceived interactivity was most often associated with customer value as direct consequence, as well as indirectly according to convenience.

In perceived comfort, the qualitative analysis has shown a facet of CRS that is supported by existing theories from TAM research. Slater described comfort as a pleasant state characterized by physiological, psychological, and physical harmony between human being(s) and (their) environment.[325] In the automotive context, Hess defines comfort as, "the transportation of an automobile passenger in so easy a manner that the trip will be a pleasure and not a hardship."[326] Comfort can be perceived both positively and negatively. The term *discomfort* is used for the negative state.[327] Thus, the reduction of stress (physical and psychological) can lead to an increased perception of comfort or the avoidance of discomfort. Vehicle HVAC (heating, ventilation, and air conditioning) systems aim to ensure that passengers feel thermally comfortable.[328]

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[322] Wamba, S. F. and Akter, S., "Impact of Perceived Connectivity on Intention to Use Social Media: Modelling the Moderation Effects of Perceived Risk and Security," in *Social media: the good, the bad, and the ugly: 15th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2016, Swansea, UK, September 13-15, 2016: proceedings*, eds. Yogesh K. Dwivedi et al. (Switzerland: Springer, 2016), p. 220.

[323] Park, E. et al. (2014), "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," *Telematics and Informatics* 31, no. 1: p. 6.

[324] VDMA, *Teleservice - ein Werkzeug zur Sicherung der Produktion und Minimierung der Kosten für Hersteller, Anwender und Betreiber: Ein Leitfaden zu "Wirtschaftlichkeit durch Teleservice"* (Frankfurt am Main: VDMA-Verl., 2006), p. 7.

[325] Slater, K., *Human comfort* (Springfield, Ill., U.S.A.: C.C. Thomas, 1985).

[326] Hess, S. P. (1924), "Automobile Riding-Comfort," *Journal of the Society of Automotive Engineers* 15, no. 1: p. 82.

[327] Engeln, A. and Vratil, B., "Fahrkomfort und Fahrgenuss durch den Einsatz von Fahrerassistenzsystemen," in *Fortschritte der Verkehrspsychologie: Beiträge vom 45. Kongress der Deutschen Gesellschaft für Psychologie*, 1st ed., eds. Jens Schade and Arnd Engeln (Wiesbaden: VS Verlag für Sozialwissenschaften / GWV Fachverlage GmbH Wiesbaden, 2008), p. 283.

[328] Brusey, J. et al. (2017), "Reinforcement learning-based thermal comfort control for vehicle cabins," *Mechatronics:* p. 1.

Traditionally, the HVAC-system is controlled as soon as the passenger enters the vehicle. Analysing the responses of the qualitative survey, the term temperature preconditioning was often connected with *comfort* by remote control of the HVAC-system. This leads to an accelerated adjustment to the customer's desired thermal condition. It is assumed that a perceived increase in comfort leads to an increased system acceptance.[329] The key factor comfort is defined as: *the degree to which the customer perceives physical relaxation (increased comfort) and the degree of stress avoidance (decreased discomfort) while driving the vehicle*. Comfort shows high interrelations with the key factor convenience, revealing that comfort can lead to an increased perception of convenience. At the value level, comfort has been often connected to customer value. No interrelation with trust has been identified in the qualitative analysis. Instead, comfort, similarly to the key factor safety, has shown interrelations with well-being at the terminal value level, however below the defined cut-off level.

The key factor safety describes the aspect that the use of CRS increases customers' perceptions of feeling secure. Especially the possibility of obtaining immediate assistance in the case of an emergency provided by CRS leads to this perception. It is therefore assumed that perceived safety is a defining element of the concept. Automotive safety systems are divided into active and passive safety systems. Active systems prevent accidents; passive systems, for example, the automatic triggering of an emergency call, help to mitigate the consequences of accidents or breakdowns. In addition, the vehicle status monitoring leads to active security, because a malfunction can be detected early, and an accident can be prevented. In the context of automotive transport, Joewono and Kubota describe security as, "the actual degree of safety from accidents and the feeling of security resulting from that."[330] It includes the aspects of safety from accidents, the presence of help, the avoidance of hazards, and active safeguarding. Aspects of crime are also included, e.g. vehicle theft. The aspect of crime is more likely to be connected to the term *security*, while the technical aspect of the vehicle is connected to *safety*. Within the evaluation of the survey responses, both terms are utilized synonymously, which is also due to the fact that the German language uses the term *Sicherheit* for both the aspects explained above. Because of this, specific functions of CRS, such as emergency calls, as well as online theft alarms, both lead to the statement "increases safety" in German. On the other hand, if the survey had been carried out in English, it could be assumed that, in the case of online theft alarms, the

[329] Arndt, S., *Evaluierung der Akzeptanz von Fahrerassistenzsystemen: Modell zum Kaufverhalten von Endkunden* (Wiesbaden: VS Verlag für Sozialwissenschaften / Springer Fachmedien Wiesbaden GmbH Wiesbaden, 2011).

[330] Joewono, T. B. and Kubota, H. (2006), "Safety and security improvement in public transportation based on public perception in developing countries," *IATSS Research* 30, no. 1: p. 87.

statement could have been "increases security." Despite this potential confusion, safety is described as: *the subjective feeling of minimizing the individual risk of harm to their physical integrity or to increase the probability of ensuring their physical integrity.* At the value level, safety was often connected to customer value and trust. In addition, safety exhibited a high number of interrelations with "well-being" at the terminal value level.

For *reliability* the qualitative analysis demonstrated a facet of CRS that is partially supported by existing theories from TAM research. In the existing literature, the credibility of a service is a driver for reuse intention. *Credibility* is described as the extent to which a customer believes that using a service will be free of threats in terms of security.[331] In contrast to this interpretation, the analysis of the responses for the term *reliability* in the survey, demonstrated that it was often used in relation to the increased reliability of the service-object itself, meaning that utilizing a specific function increases the perceived reliability of the vehicle. According to Bracke and Haller, reliability is defined as the degree of sustainability increase, e.g. through the avoidance of repairs by enhancing the opportunities for monitoring the service object's condition.[332] From the customer's point of view, reliability is an essential aspect in the process of evaluating the lifecycle cost of a product and it is also connected to the factors of product quality and availability. If the product is reliable, the use of the product is possible at any time the customer desires.[333] The key factor reliability is therefore defined as follows: *reliability describes the degree of availability of the service object, which the user experiences through the use of CRS.* At the value level, reliability has been often connected to trust.

The conceptualization is completed through exploration and definition of the key factors of connected remote services. Based on a qualitative study, relevant key factors were identified, which are suitable for depicting the construct (research question 1). Since the results were obtained through an explorative approach, validation of the concept by quantitative study is necessary to provide a comprehensive answer to this research question. The operationalization, in which the indicators for measuring the individual key factors are defined, as well as the review of the relations between indicators and the latent construct, is performed later in this chapter. The key factors and their effects can finally be specified in a multi-stage research model.

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[331] Wang, Y.-S., Lin, H.-H., and Luarn, P. (2006), "Predicting consumer intention to use mobile service," *Information Systems Journal* 16, no. 2: p. 163.

[332] Bracke, S. and Haller, S., "Advanced Reliability Analysis of Warranty Databases (RAW) Concept: Contribution to Sustainable Products and Manufacturing," in *Advances in Sustainable Manufacturing: Proceedings of the 8th Global Conference on Sustainable Manufacturing*, eds. Günther Seliger, Marwan M.K. Khraisheh and I. S. Jawahir (Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg, 2011).

[333] Kleyner, A. and Sandborn, P. (2008), "Minimizing life cycle cost by managing product reliability via validation plan and warranty return cost," *International Journal of Production Economics* 112, no. 2: p. 797.

3.2 Establishment of the research model for the impact of connected remote services on customer value and car servicing loyalty

The research model and the research hypotheses are developed based on the findings from the literature review and the qualitative study. As a result of the qualitative research, two main effects of the usage of connected remote services were identified. Customer value and trust are the customers' perceived values arising from the connected remote services key factors. As shown in the literature review in Chapter 1, customer value and trust are empirically tested antecedents of customer loyalty, leading to an increase in the attitudinal aspects of repurchase intention and the intention to recommend, e.g. a specific dealer's car servicing. In the following section the constructs customer value, trust, CRS reuse intention, and car servicing loyalty are conceptualized and their interrelations with each other and towards the identified CRS key factors are formulated as hypotheses.

The exploration of CRS has demonstrated that convenience, interactivity, comfort, safety and reliability were identified as their key factors. The formulation of hypotheses assumes that all the key factors identified positively influence customer value and trust.

The conceptualization of customer value is based on a comprehensive literature review and the different aspects of customer benefits, representing one of the two main dimensions of customer value. The results of the qualitative research showed that the second dimension of customer value, customer sacrifices, can be ignored, since the main sacrifices described in the literature, such as monetary[334] and non-monetary costs,[335] are not applicable to CRS, because its use is free for customers. It should be noted that the design of the qualitative research concentrated on active users of CRS, meaning that all the participants had access to it and could use it. This is a possible explanation for why non-monetary costs did not occur. Accordingly, the concept of customer value used in this thesis is based on the findings of the literature review on customer value, summarized in Chapter 1.5, where customer value was defined as: *the customer's evaluation of service attributes and consequences that arise from usage, which contribute to the customer's targets in a specific sitution.* Consistently Gwinner et al. state that the consequences of customer value lead to positive effects on the loyalty aspects of *positive word-of-mouth* and *maintaining the relationship.*[336]

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[334] Lapierre, J. (2000), "Customer-perceived value in industrial contexts," *Journal of Business & Industrial Marketing* 15, 2/3: p. 123.

[335] Woodall, T. (2003), "Conceptualising 'Value for the Customer': An Attributional, Structural and Dispositional Analysis," *Academy of Marketing Science Review* 2003, no. 12: p. 12.

[336] Gwinner, K. P., Gremler, D. D., and Bitner, M. J. (1998), "Relational Benefits in Services Industries: The Customer's Perspective," *Journal of the Academy of Marketing Science* 26, no. 2: p. 110.

Summarizing, the research hypothesis is stated:

$H_{1a\text{-}e}$: Customer value positively mediates the effects of connected remote services' key factors on CRS reuse intention and car servicing loyalty;

Trust was identified as an independent concept triggered by the use of CRS, which is in line with the findings of Hanaysha and Hilman.[337] Moreover, trust was identified as an antecedent of customer loyalty (see Chapter 1.4.2), as it has a significant influence in terms of behavioural intentions,[338] and emphasizing that the perception of trust reduces customers' perceived risk if the services are reliable.[339] Lau and Lee state that a consumer, who has trust in their service provider, also shows a willingness to rely on it, which leads to positive intentions regarding purchase or repurchase behaviour.[340] Considering Moorman et al.'s definition to be[341] suitable in the context of the present thesis, the construct of trust is defined as: *a customer's willingness to rely on the service provider of connected remote services, consisting of the entity of car dealership and car manufacturer, in whom he has confidence.* The literature review revealed that customer value and trust influence each other. On the one hand, trust was shown to contribute to perceived customer value,[342] and on the other hand, the findings of Hennig-Thurau et al. show that customer value creates trust.[343] The results of the exploration do not indicate that a particular direction can be assumed. Therefore, for the formulation of the research hypotheses, it is *a priori* assumed that trust created by connected remote services' key factors leads to customer value, subject to confirmation of this direction by the empirical evaluation.

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337 Hanaysha, J. and Hilman, H. (2015), "The Impact of Product Innovation on Relationship Quality in Automotive Industry: Strategic Focus on Brand Satisfaction, Brand Trust, and Brand Commitment," *Asian Social Science* 11, no. 10: p. 99.

338 Gremler, D. D. and Brown, S. W. (1996), "Service loyalty: its nature, importance, and implications," *Advancing service quality: A global perspective* 5; Guenzi, P., Johnson, M. D., and Castaldo, S. (2009), "A comprehensive model of customer trust in two retail stores," *Journal of Service Management* 20, no. 3; Garbarino, E. and Johnson, M. S. (1999), "The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships," *Journal of Marketing* 63, no. 2.

339 Berry, L. L. et al. (2006), "Creating new markets through service innovation," *MIT Sloan Management Review* 47, no. 2: p. 62.

340 Lau, G. T. and Lee, S. H. (1999), "Consumers' Trust in a Brand and the Link to Brand Loyalty," *Journal of Market-Focused Management* 4, no. 4: p. 352.

341 Moorman, C., Zaltman, G., and Deshpandé, R. (1992), "Relationships between Providers and Users of Market Research: The Dynamics of Trust within and between Organizations," *Journal of Marketing Research* 29, no. 3: p. 315.

342 Guenzi, P., Johnson, M. D., and Castaldo, S. (2009), "A comprehensive model of customer trust in two retail stores," *Journal of Service Management* 20, no. 3: p. 298.

343 Hennig-Thurau, T., Gwinner, K. P., and Gremler, D. D. (2002), "Understanding Relationship Marketing Outcomes: An Integration of Relational Benefits and Relationship Quality," *Journal of Service Research* 4, no. 3: p. 240.

In consequence, the research hypothesis is stated:

H_{2a-e}: Trust positively mediates the effects of connected remote services' key factors on customer value, CRS reuse intention and car servicing loyalty.

The technology acceptance model provides the insight that the *perceived usefulness,* which was investigated, shows similarities to the concept of *customer value.* Based on the empirically tested results that this usefulness leads to reuse intention, the concept is added to the research model with the assumption that a mediating interrelationship with car servicing loyalty exists. This assumption is based on the main finding of the TAM, showing that reuse intention leads to factual reuse behaviour. Davis et al. states that the factual use of CRS can be predicted by reuse intention. This intention is an antecedent of and requirement for, factual behaviour.[344] Following this argumentation, CRS reuse intention is defined as follows: *CRS reuse intention describes the user's willingness to use CRS in the future*. It is assumed that CRS reuse intention has a positive effect on the intentional aspects of car servicing loyalty. Hence, the following hypothesis is formulated:

H_3: CRS reuse intention positively mediates the influence of customer value and trust on car servicing loyalty.

As described in chapter 1.4.3, car servicing loyalty, as the main target to be obtained by the provision of CRS by car dealerships and car manufacturers, constitutes the customers' *future-oriented positive attitude towards the dealership which provides connected remote services manifested by the customers' intentions, using the same dealership's car servicing offerings for future maintenance and repair service demands, positive word-of-mouth and the resistance against third parties' persuasion attempts regarding switching to another car servicing provider.*

The attitudinal aspects captured in this definition are also the foundation for the operationalization divided into repurchase intention,[345] positive word-of-mouth[346] and resistance to persuasion

[344] Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science* 35, no. 8: p. 985.

[345] Zeithaml, V. A. (2000), "Service Quality, Profitability, and the Economic Worth of Customers: What We Know and What We Need to Learn," *Journal of the Academy of Marketing Science* 28, no. 1: p. 78.

[346] Zeithaml, V. A., Berry, L. L., and Parasuraman, A. (1996), "The Behavioral Consequences of Service Quality," *Journal of Marketing* 60, no. 2: p. 44.

by third parties.[347] Measurement of loyalty on the intentional level is sufficient, as Bauer, Huber and Betz show that there is a high correlation between intention and later factual behaviour.[348]

Next, possible moderating effects are defined, which will be amended to fit the research model to also measure their effects within the empirical analysis. It is assumed that customers' motives and characteristics, such as enjoyment and innovativeness, have a positive influence on specific relationships. In the following step, these moderators are conceptualized, and the hypotheses are derived.

According to Childers et al., who state that some customers may utilize CRS just to enjoy the service[349] and based on findings from the mobile service sector revealing that enjoyment positively affects the adoption of technologies,[350] these findings will be applied by defining enjoyment as: *the feeling of joy and pleasure which emerges from using CRS causing an intrinsic motivation for reuse.* The following hypothesis is postulated taking this into account:

H_4: Enjoyment heightens the positive influence of customer value on CRS reuse intention.

Rogers and Shoemaker define innovativeness as, "the degree to which an individual is relatively earlier in adopting new ideas than the average member of his social system."[351] Since this definition only captures the behavioural aspect of innovativeness, Foxall, Goldsmith and Brown add the attitudinal perspective to the subject by defining innovativeness as, *"*The tendency to buy new products in a particular product category soon after they appear in the market and relatively earlier than most other consumers in the market segment."[352] Based on this, it is assumed that the customers' desire to use CRS heightens the impact of CRS reuse intention on car servicing loyalty. Consequently, the following hypothesis is stated:

H_5: Innovativeness heightens the positive influence of CRS reuse intention on car servicing loyalty.

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[347] Dwyer, F. R., Schurr, P. H., and Oh, S. (1987), "Developing Buyer-Seller Relationships," *Journal of Marketing* 51, no. 2; Klingenberg, B., *Kundennutzen und Kundentreue: Eine Untersuchung zum Treue-Nutzen aus Konsumentensicht*. Zugl.: München, Univ., Diss., 2000 (München: FGM-Verl., 2000).

[348] Bauer, H. H., Huber, F., and Betz, J. (1998), "Erfolgsgrößen im Automobilhandel: Ergebnisse einer kausalanalytischen Studie," *Journal of business economics: JBE* 68, no. 9: p. 982.

[349] Childers, T. L. et al. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior," *Journal of Retailing* 77, no. 4.

[350] Avcilar, M. Y. and Alkevli, A. (2017), "The Antecedents of Mobile Repurchasing Intentions: An Empirical Investigation among Turkish Mobile Shoppers," *International Journal of Business and Management* 12, no. 3: pp. 116–117.

[351] Rogers, E. M. and Shoemaker, F., *Communication of Innovations: A Cross-Cultural Approach,* 2nd ed. (New York: The Free Press, 1971).

[352] Foxall, G. R., Goldsmith, R. E., and Brown, S., *Consumer psychology for marketing,* 2nd ed. (London: International Thomson Business, 1998), p. 41.

Table 3-4 summarizes the postulated research hypotheses concerning the model constructs, as well the research hypotheses, regarding the moderating effects.

Table 3-4: Summary of postulated research hypotheses.[353]

H_i	Formulation
Research hypotheses of the model constructs	
H_{1a-e}	Customer value positively mediates the effects of connected remote services' key factors on CRS reuse intention and car servicing loyalty.
H_{2a-e}	Trust positively mediates the effects of connected remote services' key factors on customer value, CRS reuse intention and car servicing loyalty.
H_3	CRS reuse intention positively mediates the influence of customer value and trust on car servicing loyalty.
Research hypotheses of the moderating effects	
H_4	Enjoyment heightens the positive influence of customer value on CRS reuse intention.
H_5	Innovativeness heightens the positive influence of CRS reuse intention on car servicing loyalty.

Legend: H: Hypothesis.

After the formulation of the research hypotheses, the single elements of the model are combined into a comprehensive research model in the next step. Causal analysis and structural equation modelling (SEM) allow the measurement of latent variables and the evaluation of interrelations between these variables.[354] The integration of latent variables implies that, within SEM, two models need to be specified. The measurement model explains the interrelationships between the latent variables and their indicators. The structural model describes the causal interrelationships between the latent variables, which must also be confirmed.[355] It contains nine latent variables, of which $\xi_a - \xi_e$ are exogenous, and $\eta_1 - \eta_4$ are endogenous. All the variables in the measurement model are operationalized using a reflective measurement model.

In total, five key factors determine the CRS construct. Further, the constructs customer value, trust and CRS reuse intention are defined as determinants of car servicing loyalty. Figure 3-4 presents the research model graphically.

[353] Author's table.

[354] Baumgartner, M. and Glynn, L. (2013), "Introduction to Special Issue on 'Actual Causation'," *Erkenntnis* 78, Supplement 1: pp. 1–2.

[355] Backhaus, K. et al., *Multivariate Analysemethoden: Eine anwendungsorientierte Einführung,* 14th ed. (Berlin, Heidelberg: Springer Gabler, 2016), p. 340.

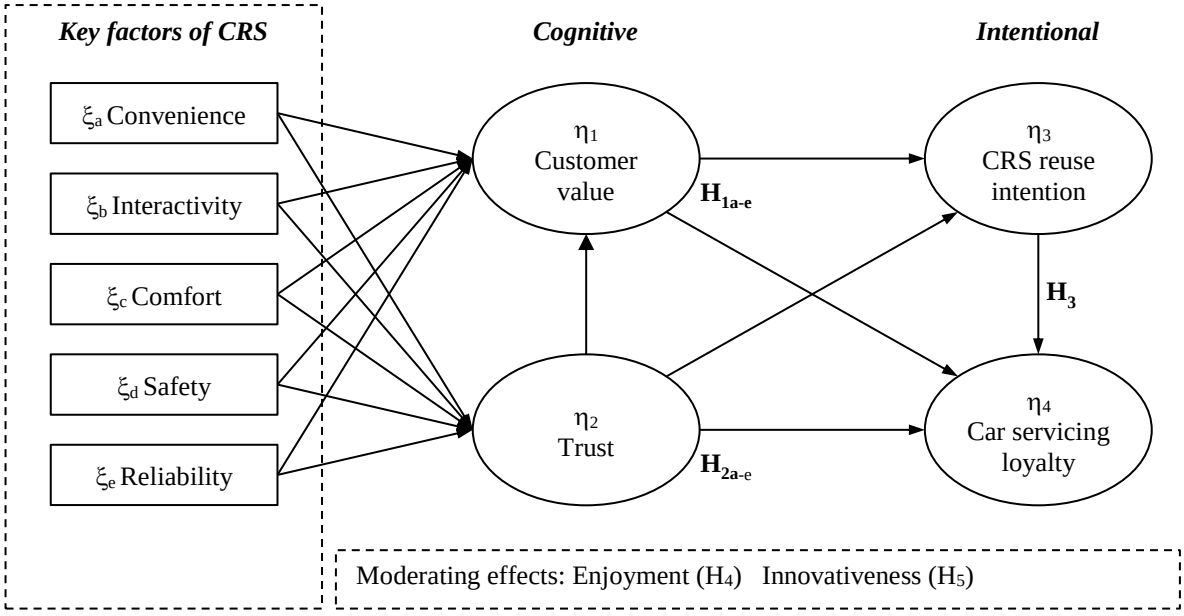

Figure 3-4: Research model of the impact of CRS key factors on customer value, trust, CRS reuse intention and car servicing loyalty.[356]

Next, the validity of the research model is tested. Therefore, in the next chapter a survey is carried out within the scope of the German automotive industry to obtain empirical data.

3.3 Operationalization of variables of the research model

Operationalization constitutes the process of developing a measurement procedure for theoretical constructs (latent variables), resulting in a comprehensive measurement model. It also includes indicators (observable variables), which make it possible to indirectly measure the constructs. Furthermore, the measuring model includes the assignment, as well as the specification, of the correlation between indicators and constructs. Essentially, latent variables can be operationalized in two different ways. The main difference between the two methods is the direction of causality.[357] The specification of the correlations can be divided into reflective and formative operationalized constructs. The distinction between formative and reflective indicators is important, because a failure to properly specify measurement relations can threaten the validity of the statistical conclusion from the study findings.[358]

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[356] Author's illustration, based on own theoretical considerations and on the results of the qualitative study.

[357] Götz, O. and Liehr-Goebbers, K. (2004), "Analyse von Strukturgleichungsmodellen mit Hilfe der Partial-Least-Squares (PLS)-Methode," *Die Betriebswirtschaft* 64, no. 6: p. 717.

[358] MacKenzie, S. B., Podsakoff, P. M., and Jarvis, C. B. (2005), "The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions," *The Journal of applied psychology* 90, no. 4: p. 711.

For a formative variable, it is assumed that the indicators cause and influence the construct. Consequently, within formative measurement models, indicators are the cause of latent constructs.[359] The single indicators do not necessarily have to correlate,[360] although a high correlation is possible.[361] In contrast, in reflective variables, the construct itself causes the assigned indicators, which leads to a measurement fault occurring.[362] Within a reflective measurement model, a latent variable is designed as a function of its indicators. Thus, a change in the construct itself is reflected in all its indicators.

Jarvis, MacKenzie and Podsakoff developed a decision matrix using ten criteria for deciding, whether a variable should be operationalized using a reflective or a formative approach.[363] In Table 3-5, seven of the ten criteria are selected to determine the character of CRS measurement. According to the evaluation of the criteria listed, the CRS concept is defined as being formative. This result is reflected in the CRS measurement model, which in consequence is defined as a multiple indicator multiple cause (MIMIC) model,[364] which combines formative measurement on the key factor level with reflective measurement on the indicator level.

Table 3-5: Application of criteria for the decision on formative or reflective operationalization of the connected remote services construct.[365]

Criteria	Convenience	Interactivity	Comfort	Safety	Reliability
Are the factors (a) defining characteristics of (b) manifestations of the construct?			← (a) →		
Would changes in the construct cause changes in the factors?			← No →		
Is the interchangeability of the factors given?			← Yes →		
Table continued next page					

[359] Christophersen, T. and Grape, C., "Die Erfassung latenter Konstrukte mit Hilfe formativer und reflektiver Messmodelle," in *Methodik der empirischen Forschung,* 3rd ed., eds. Sönke Albers et al. (Wiesbaden, s.l.: Gabler Verlag, 2009), p. 106.

[360] Diamantopoulos, A. (1999), "Viewpoint – Export performance measurement: Reflective versus formative indicators," *International Marketing Review* 16, no. 6: p. 449.

[361] Diamantopoulos, A. and Siguaw, J. A. (2006), "Formative Versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration," *British Journal of Management* 17, no. 4: p. 267.

[362] Homburg, C. and Giering, A. (1996), "Konzeptualisierung und Operationalisierung komplexer Konstrukte: Ein Leitfaden für die Marketingforschung," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 1: p. 6.

[363] Jarvis, C. B., MacKenzie, S. B., and Podsakoff, P. M. (2003), "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," *Journal of Consumer Research* 30, no. 2: p. 203.

[364] Muthén, B. O. (1989), "Latent variable modeling in heterogeneous populations," *Psychometrika* 54, no. 4: p. 563.

[365] Author's table, referring to Jarvis, C. B., MacKenzie, S. B., and Podsakoff, P. M. (2003), "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," *Journal of Consumer Research* 30, no. 2: p. 203.

Would dropping one of the factors alter the conceptual domain of the construct?	← Yes →
Do the factors covary among themselves?	← No →
Is a change in one of the factors associated with changes in the other factors?	← No →
Are the factors expected to have the same antecedents and consequences?	← No →
Result of evaluation of reflective or formative operationalization of CRS	**Key factors of connected remote services show characteristics of formative measurement**

For the operationalization of the model constructs, it is necessary to determine manifest, observable indicators, which reflect the content of the constructs semantically. Most constructs cannot be measured without error, and it is difficult for a single indicator to adequately capture the breadth of a construct. Thus, the use of multiple indicators ensures that the measures used represent the construct of interest validly and reliably.[366] Hyman, Lamb and Bulmer propose an approach using pre-existing indicators, as they are pre-tested, resulting in more validity and better data quality.[367] This approach is utilized in the operationalization process to identify potential indicators used in existing research, which depict the construct in the semantic content of the question. Next, the adaption of these indicators to the context of the current thesis is performed taking into account the findings from the qualitative research carried out to clarify the indicators semantically. This procedure ensures the inclusion of both, the existing research and the results of this study.

3.3.1 Operationalization of the key factors of connected remote services

In this part of the thesis, the identified CRS key factors are operationalized. According to the criteria described in Table 3-5, the relationships between the identified indicators and the various CRS key factors are defined as reflective relationships, while relationships between the identified key factors and the CRS construct are defined as formative relationships because the key factors represent independent aspects,[368] which indicates causality from the key factors to the construct. Table 3-6 summarizes the operationalization of each connected remote services

[366] MacKenzie, S. B., Podsakoff, P. M., and Jarvis, C. B. (2005), "The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions," *The Journal of applied psychology* 90, no. 4: p. 711.

[367] Hyman, L., Lamb, J., and Bulmer, M. (2006), "The use of pre-existing survey questions: implications for data quality.," *European Conference on Quality in Survey Statistics:* p. 7.

[368] Christophersen, T. and Grape, C., "Die Erfassung latenter Konstrukte mit Hilfe formativer und reflektiver Messmodelle," in *Methodik der empirischen Forschung*, 3rd ed., eds. Sönke Albers et al. (Wiesbaden, s.l.: Gabler Verlag, 2009), p. 106.

key factor, based on existing and tested measurement approaches from former studies, as well as formulations adapted from the results of the qualitative study carried out.

Table 3-6: Operationalization of the connected remote services' key factors.[369]

ID	Description	Source
Convenience		
COV_1	[CRS] makes me save time in obtaining information about the vehicle status.	Adapted from Chen and Tsai (2017); Ozturk et al. (2016)
COV_2	[CRS] assists me to plan an itinerary more conveniently.	
COV_3	[CRS] simplifies the use of specific functions.	
COV_4	[CRS] makes the service appointment booking process more convenient.	
Interactivity		
INT_1	I feel connected to the vehicle, because I can locate the vehicle any time via [CRS].	Adapted from Shin (2010); Park et al. (2014)
INT_2	I feel connected to the vehicle, because I can monitor its status from anywhere via [CRS].	
INT_3	I feel connected to the [brand] dealership, because I can receive proposals for service appointments due to maintenance or repair needs.	New items, based on qualitative study.
INT_4	Vehicle monitoring via tele-diagnosis makes it easier for the dealership's car service to prepare a pending maintenance.	
Comfort		
CFT_1	I feel thermally comfortable, because I can precondition the HVAC system via [CRS].	Arndt (2011), with adaptions based on qualitative study.
CFT_2	Receiving proposals for service appointments via push-notification is comfortable for me.	
CFT_3[a]	[CRS] improves comfort while driving.	
CFT_4	Automatic triggering of the breakdown call lowers my stress in emergency situations.	
Safety		
STY_1	[CRS] simplifies the rescue process in the event of an accident or vehicle breakdown.	Arndt (2011) with adaptions based on qualitative study.
STY_2	To always know whether the vehicle is locked, makes me feel secure.	
STY_3	Receiving push notifications in the event of automobile theft makes me feel secure.	
STY_4	Use of [CRS] helps to prevent safety risks.	
Reliability		
REL_1	Warning messages regarding low tyre pressure, worn brakes, and low battery voltage are important to me.	Formulations based on qualitative study.
REL_2	Vehicle breakdowns can be prevented because of the monitoring functions of [CRS].	
REL_3	Vehicle monitoring via [CRS] increases the reliability of the vehicle.	

Legend: [a]: deleted during pre-test.

[369] Author's table.

The operationalization of the key factor *convenience* is mainly according to the measurement of Yoon and Kim,[370] Ozturk et al.,[371] and Chen and Tsai.[372] The items were adapted to the CRS context and to reflect the responses in the qualitative analysis.

Measurement of the key factor *interactivity* is mainly based on the work of Shin[373] and Park et al.[374] The formulations were only adapted marginally to fit the CRS context. Based on customers' statements from the means-end chain analysis, one item was designed to capture perceived interactivity resulting from the *tele-diagnosis* function.

The key factor *comfort* is measured using existing measures from the field of automotive assistance systems research by Arndt.[375] Further, the findings from the qualitative survey performed within the exploration of CRS are considered, to adapt the indicators to the CRS context.

The operationalization of the key factor *safety* is based on Arndt's work,[376] and on findings from the qualitative survey performed within the exploration of CRS. Two items were designed based on statements from the means-end chain analysis, to capture safety perceptions regarding the locking/unlocking status of the vehicle and the alert triggered by vehicle theft.

The measurement of *reliability* is based on the responses from the qualitative survey, which is the basis for designing the items used. The items capture customers' perceptions of the vehicle's increased reliability, prevention of vehicle breakdowns, and the importance of automatically generated warning messages.

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370 Yoon, C. and Kim, S. (2007), "Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN," *Electronic Commerce Research and Applications* 6, no. 1.

371 Ozturk, A. B. et al. (2016), "What keeps the mobile hotel booking users loyal?: Investigating the roles of self-efficacy, compatibility, perceived ease of use, and perceived convenience," *International Journal of Information Management* 36, no. 6.

372 Chen, C.-C. and Tsai, J.-L. (2017), "Determinants of behavioral intention to use the Personalized Location-based Mobile Tourism Application: An empirical study by integrating TAM with ISSM," *Future Generation Computer Systems*.

373 Shin, D.-H. (2010), "Analysis of online social networks: A cross-national study," *Online Information Review* 34, no. 3.

374 Park, E. et al. (2014), "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," *Telematics and Informatics* 31, no. 1.

375 Arndt, S., *Evaluierung der Akzeptanz von Fahrerassistenzsystemen: Modell zum Kaufverhalten von Endkunden* (Wiesbaden: VS Verlag für Sozialwissenschaften / Springer Fachmedien Wiesbaden GmbH Wiesbaden, 2011).

376 Ibid.

3.3.2 Operationalization of the latent endogenous variables and moderating variables

In this chapter the latent endogenous variables are operationalized, using reflective indicators. Table 3-7 lists the defined formulations and sources.

Table 3-7: Operationalization of latent endogenous variables. [377]

ID	Description	Source
Customer value		
VAL_1	[CRS] offer value for money.	Adapted from Sweeney and Soutar (2001); Cronin, Brady and Hult (2000)
VAL_2	[CRS] are well made.	
VAL_3	[CRS] have consistent quality.	
VAL_4	Overall, the value of [CRS] to me is high.	
Trust		
TRU_1	I can rely on [CRS].	Adapted from Gwinner, Gremler and Bitner (1998); Lau and Lee (1999)
TRU_2	I feel I can trust [CRS].	
TRU_3	I feel I can rely on my [brand] dealership as the provider of the [CRS] application.	
CRS reuse intention		
REU_1	I intend to use [CRS].	Adapted from Venkatesh and Davis (1996); Nysveen, Pedersen and Thorbjørnsen (2005)
REU_2	I intend to use [CRS] for the next six months.	
REU_3	For the next six months, I intend to use [CRS] frequently.	
Car servicing loyalty		
CSL_1	I intend to have my next maintenance or repair service performed at the same [brand] dealership.	Adapted from Scholly (2013); Klingenberg (2000)
CSL_2	I intend to have future maintenances or repair services performed at the same [brand] dealership.	
CSL_3	I would recommend my current [brand] dealership's car servicing to my friends and acquaintances.	
CSL_4	I will stay with [brand] dealership, even if friends and acquaintances recommend a different dealership for car servicing.	

The measurement of customer value is based on the adaption of measures developed by Sweeney et al.[378] and Cronin et al.[379] The items were adapted to include the specific trademark of the selected CRS, indicated by square brackets.

[377] Author's table.

[378] Sweeney, J. C. and Soutar, G. N. (2001), "Consumer perceived value: The development of a multiple item scale," *Journal of Retailing* 77, no. 2.

[379] Cronin, J. J., Brady, M. K., and Hult, G. T. M. (2000), "Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments," *Journal of Retailing* 76, no. 2.

The operationalization of trust is mainly based on the concept of *confidence benefits* developed by Gwinner, Gremler and Bitner,[380] and the operationalization of trust towards a company developed by Lau and Lee.[381] The items were adapted with regard to the CRS context and the car dealership, which provides the car servicing.

The formulations for the operationalization of CRS reuse intention are mainly based on the original work by Davis[382] and its adaptions by Nysveen, Pedersen and Thorbjørnsen.[383] The formulations were only slightly changed to fit the CRS context.

In accordance with the attitudinal-oriented definition of car servicing loyalty (see Chapter 1.4.3), the operationalization is limited to indicators that capture the *ex-ante*[384] aspect of loyalty. The item formulations were adapted from Scholly[385] and Klingenberg,[386] by including the selected brand's trademark, indicated by square brackets.

Next, the assumed moderators enjoyment and innovativeness are operationalized. Three indicators are used for the measurement of enjoyment, taken from the context of research on mobile service innovation by Park et al.[387] and Hiraoka,[388] capturing the extent to which customers experience joy when using CRS.

The measurement of innovativeness is based on the Motivated Consumer Innovativeness scale developed by Vandecasteele and Geuens.[389] Three items were selected from the 20 in the initial scale, focusing on their suitability in the CRS context and hedonistic aspects corresponding to

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[380] Gwinner, K. P., Gremler, D. D., and Bitner, M. J. (1998), "Relational Benefits in Services Industries: The Customer's Perspective," *Journal of the Academy of Marketing Science* 26, no. 2.

[381] Lau, G. T. and Lee, S. H. (1999), "Consumers' Trust in a Brand and the Link to Brand Loyalty," *Journal of Market-Focused Management* 4, no. 4.

[382] Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly* 13, no. 3.

[383] Nysveen, H., Pedersen, P. E., and Thorbjørnsen, H. (2005), "Explaining intention to use mobile chat services: Moderating effects of gender," *Journal of Consumer Marketing* 22, no. 5.

[384] As described in Chapter 1.4.1, Diller (1996, p. 84) distinguishes ex-ante and ex-post aspects of customer loyalty. This approach is similar to the attitudinal loyalty and behavioural loyalty approach of Dick and Basu (1994).

[385] Scholly, V., *Kundenloyalität im Automobilhandel: Determinanten in Verkauf und Kundendienst* (Wiesbaden: Springer Gabler, 2013).

[386] Klingenberg, B., *Kundennutzen und Kundentreue: Eine Untersuchung zum Treue-Nutzen aus Konsumentensicht*. Zugl.: München, Univ., Diss., 2000 (München: FGM-Verl., 2000).

[387] Park, E. et al. (2014), "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," *Telematics and Informatics* 31, no. 1.

[388] Hiraoka, C., *Technology Acceptance of Connected Services in the Automotive Industry* (Wiesbaden: Gabler Verlag / GWV Fachverlage GmbH Wiesbaden, 2009).

[389] Vandecasteele, B. and Geuens, M. (2010), "Motivated Consumer Innovativeness: Concept, measurement, and validation," *International Journal of Research in Marketing* 27, no. 4: p. 312.

the responses in the qualitative analysis. Table 3-8 summarizes the formulations and used sources.

Table 3-8: Operationalization of moderating variables.[390]

ID	Description	Source
Enjoyment		
JOY_1	I enjoy using [CRS].	Adapted from Park et al. (2014); Hiraoka (2009)
JOY_2	I find [CRS] enjoyable and fascinating.	
JOY_3	I have fun using [CRS].	
Innovativeness		
INO_1	Using novelties gives me a sense of personal enjoyment.	Adapted from Vandecasteele and Geuens (2010)
INO_2	If a new time-saving product is launched, I will use it right away.	
INO_3	Innovations make my life exciting and stimulating.	

In the next step, the results of the operationalization were used for the development of the survey questionnaire and pre-tested to ensure validity of the measurement.

3.4 Design of survey questionnaire, pre-test and data base for the evaluation of connected remote services and the research model

A partial survey is performed based on the assumption that each person in the population has an equal probability of being included in the study.[391] To do this, a sample needs to be created that allows conclusions to be drawn about the population.[392] The basic population for the survey is made up of all active CRS users. From this population a nonprobability sample in the form of a voluntary-response sample is drawn limited to the German market. The participants are required to have used CRS. This is important, to ensure that the evaluation considers personally perceived experiences. The evaluation is based on available connected remote services, which are accessible to customers. The survey is limited to specific automobile brands, since the participants' automobile brands need to provide CRS for use.

[390] Author's table.

[391] Bentler, P. M. and Chou, C.-P. (1987), "Practical Issues in Structural Modeling," *Sociological Methods & Research* 16, no. 1: p. 80.

[392] Meffert, H., *Marketingforschung und Käuferverhalten,* 2nd ed. (Wiesbaden: Gabler Verlag, 1992), p. 189.

3.4.1 Method of data collection and results of pre-test to assess validity of the survey questionnaire

Data collection for the empirical study is conducted using an online-questionnaire. In the context of scientific research, data collection using online-questionnaires is a well-established method and has gained importance in comparison to written surveys.[393] Wagner and Hering state that the fact that the participants can be reached irrespectively of spatial distance, is one of the main advantages. The risk of errors during data collection is also reduced, because the data is automatically stored and can be accessed by the researcher at any time.[394] The main disadvantage of online surveys that participants need access to the internet using a computer or mobile device, can be ignored for this study, since all the CRS applications examined in this thesis require mobile internet access for use. Thus, it can be assumed that participants, who use connected remote services, which is a crucial requirement for participation in the survey, also have access to the internet. For the survey, customers of six different brands were approached to ensure that a wide range of users from Germany could participate in the survey. In addition, the study period was kept short.

At the beginning of the questionnaire an example was presented, to explain connected remote services and provide a common understanding. To facilitate completion of the questionnaire, the term *connected remote services* was designed as a free variable parameter (placeholder) and replaced by each CRS application's trademark, which was specified by the participants at the beginning of the survey. Individual participant IDs were used to ensure that only members of the sample could take part and to avoid multiple participation.

To improve clarity, the survey questionnaire is divided into four sections. A short introduction is given in the first section. The participants are asked to name the brand, model and year of their car and their use habits, such as mileage and private vs. commercial use. Next, the participants stated which connected remote services application was being used. This is necessary for a consistency test to ensure that the CRS application mentioned correctly matches the brand that provides it. In the case of a mismatch, the questionnaire is excluded from evaluation. In addition, the participants are asked to rate their frequency of CRS use in four scales, from "no use" to "often". Participants who entered "no use" are excluded from participation, according to the requirement that participants must be active users of CRS. The second section contains the evaluation of the CRS key factors, the CRS phantom variable (as explained later in Chapter

[393] Bauer, H. H. and Wölfer, H., *Möglichkeiten und Grenzen der Online-Marktforschung* (Universität Mannheim), p. 2.

[394] Wagner, P. and Hering, L., "Online-Befragung," in *Handbuch Methoden der empirischen Sozialforschung*, eds. Nina Baur and Jörg Blasius (Wiesbaden: Springer VS, 2014), pp. 667–669.

3.5), as well as customer value and trust. The third section comprises questions regarding CRS reuse intention, car servicing loyalty and the moderating effects. Finally, socio-demographic data regarding gender and age are collected in the fourth section. To fulfil the requirements of complex causal analysis, sections two and three are based on a five-point Likert scale ranging from "strongly agree" to "strongly disagree".[395]

A pre-test of the survey questionnaire is performed to optimize the measurement model to be used in the main empirical study, with the aim of increasing clarity, the relevance of single indicators, and ensuring that it is easy to answer. First, 11 users[396] were asked to perform an item-sort task using Anderson and Gerbing's methods,[397] and to comment on the questionnaire regarding the clarity of indicators, which resulted in the optimization of several formulations through rewording. The focus was on simplifying the formulations, while retaining content and contextual meaning. Afterwards, the resulting overall amended questionnaire was tested in an online survey setting.

The item-sort task is limited to the CRS construct, because the other constructs of the research model are predominantly based on empirically evaluated indicators. The 11 participants were asked to classify an unsorted list of 19 indicators into the five intended, key factors. Applying Anderson and Gerbing's methods, 15 out of 19 indicators show p_{sa}-values ≥ 0.75 and c_w-values ≥ 0.5, which attests a high degree of substantive agreement and substantive validity of the indicators.[398] Three indicators (COV_2; INT_3; CFT_1) have a p_{sa}-value of 0.64 and c_w-value of 0.27, which indicate a lower level of content validity, but are still close to the thresholds. One indicator (CFT_3) has a negative c_w-value, indicating a low attribution to the intended key factor, comfort. Appendix D contains the detailed results of the item-sort task.

In addition to modifying the verbal formulation of the indicators, eliminating these indicators is also possible because of the reflective approach used within the operationalization. In this case, the indicator CFT_3 was eliminated. The indicators COV_2, INT_3, and CFT_1 were verbally modified, following a review of the comments and discussion with selected pre-test participants. The participants' feedback shows that the concepts of convenience and comfort

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395 Carifio, J. and Perla, R. J. (2007), "Ten Common Misunderstandings, Misconceptions, Persistent Myths and Urban Legends about Likert Scales and Likert Response Formats and their Antidotes," *Journal of Social Sciences* 3, no. 3: p. 113.

396 According to Fassnacht and Koese, (2016, p. 28) 10 participants can be assumed to be sufficient.

397 Anderson, J. C. and Gerbing, D. W. (1991), "Predicting the performance of measures in a confirmatory factor analysis with a pretest assessment of their substantive validities," *The Journal of applied psychology* 76, no. 5: p. 732.

398 Thresholds for the p_{sa}-value and the c_w-value according to Eggert, A., *Kundenbindung aus Kundensicht: Konzeptualisierung - Operationalisierung - Verhaltenswirksamkeit* (Wiesbaden: Deutscher Universitätsverlag, 1999), p. 118.

are sometimes regarded as identical or highly related concepts. Overall, sufficient content validity is assumed for the remaining 18 indicators.

Secondly, based on the adaptions performed after the item-sort task, an online-survey was conducted using the complete questionnaire to simulate the intended survey setting of the main study. The participants were active users of CRS. In total, 34 users participated in the pre-test, fulfilling the threshold defined by Malhotra, which requires 15-30 participants.[399] The results were used to evaluate the discriminant validity of the indicators. Here, the focus was on the critical indicators identified within the item-sort task. No issues were identified. The questionnaire was also tested regarding practicability of the integrated functions, such as dynamic contents. In summary, the performance of the pre-test led to an optimized and understandable measurement system, which is utilized for the main study.

3.4.2 Database and non-response bias analysis

As the true population size is not known and can only be reached indirectly via selected dealerships which have agreed to support the study, the sample was drawn from the dealership's customer database. Based on acknowledged empirical conventions for categorical data (t-value: 1.96, margin of error: 0.05), the required sample size was determined by using the minimum sample size table developed by Bartlett et al.,[400] who recommend a minimum sample size of 370 for making inferences in respect to a population ≥ 10,000.

Data collection was conducted in the period from September 1st, 2017 until October 13th, 2017. 4,812 customers were addressed to participate in the survey via e-mail. A sampling frame of 701 respondents was utilized, corresponding to a response rate of 14.6%. 266 cases were excluded by one of the three filter questions: that a participant states that they drive an automobile brand that does not provide CRS or, if provided, the participant states that they do not use it, or the use frequency was rated as "never". A further 104 questionnaires were excluded due to incompleteness or unrealistic response times. Thus, 331 completed and valid responses were included in the evaluation. A descriptive evaluation was performed using SPSS 24. Table 3-9 provides an overview of the sample structure. Figure 3-5 presents the distribution of CRS applications and participants' age.

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399 Malhotra, N. K., *Marketing research: An applied orientation*, 4th ed. (New Jersey: Prentice-Hall, 2004), p. 301.

400 Bartlett, J., Kotrlik, J., and & Higgins, C. (2001), "Organizational research: Determining appropriate sample size in survey research," *Information Technology, Learning, and Performance Journal* 19, no. 1: p. 48.

Table 3-9: Statistics of sample, n = 331.[401]

Control variable	Percentage (%)	Control variable	Percentage (%)
Gender		**CRS application used**	
Female	40.5%	Audi Connect	24.5%
Male	59.5%	BMW Connected Drive	23.6%
Age		Mercedes Me	21.5%
18-24 years	8.8%	Opel OnStar	7.3%
25-34 years	36.8%	Skoda Connect	6.7%
35-44 years	26.9%	Volkswagen Car-Net	16.6%
45-54 years	17.2%	**Frequency of CRS use**	
55-64 years	7.3%	Seldom	41.4%
65 years an older	3.0%	Regularly	45.3%
Model year		Often	13.3%
2017	8.2%	**Annual mileage**	
2016	28.1%	0 - 10.000 km	9.1%
2015	27.8%	10.001 - 20.000 km	44.7%
2014	18.4%	20.001 – 30.000 km	31.4%
2013	11.2%	> 30.000 km	17.8%
2012 and older	6.3%		

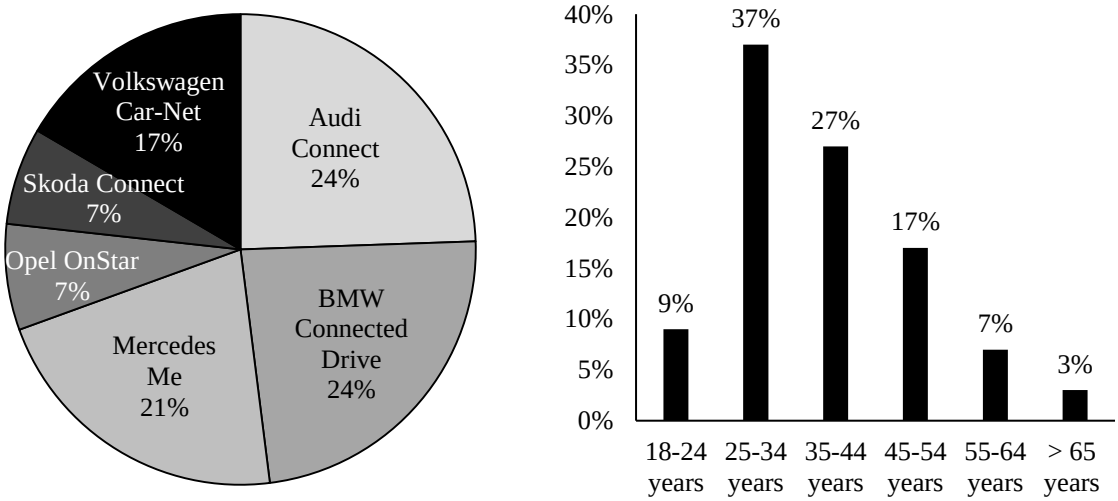

Figure 3-5: Distribution of used CRS application and participants' age.[402]

By comparing the sample's brand distribution to the corresponding vehicle registration statistics for 2016 in Germany, it can be stated that it is broadly representative for the premium and volume brands. The distribution of the CRS applications of the premium brands Audi Connect,

[401] Author's table based on survey statistics.

[402] Author's charts based on survey statistics.

BMW Connected Drive and Mercedes Me in the study corresponds well to the 2016 vehicle registration data. Likewise, the comparison of the CRS applications of the volume brands Opel OnStar, Skoda Connect and Volkswagen Car-Net confirms the study's representativeness for the volume brands. Table 3-10 summarizes the comparison of the sample with 2016 vehicle registration statistics.

Table 3-10: Comparison of sample statistics to vehicle registration data in Germany.[403]

CRS application used	Vehicle registration 2016	Vehicle registration 2016 [% of total]	Study [%]
Premium brands			
Audi Connect	289,617	33.56%	35.22%
BMW Connected Drive	262,083	30.37%	33.91%
Mercedes Me	311,286	36.07%	30.87%
Total premium brands	**862,986**		
Volume brands			
Opel OnStar	243,792	22.45%	23.76%
Skoda Connect	186,172	17.14%	21.78%
Volkswagen Car-Net	656,025	60.41%	54.46%
Total volume brands	**1085,989**		

A comparison of the sample to the relevant peer group of automotive customers shows that it is representative regarding gender. 40.5% of participants were female, 59.5% were male, displaying minor differences compared to the peer group.[404] In summary, the sample has an acceptable level of representativeness.

For the use of the maximum-likelihood approach, as the most common method in SEM, multivariate normality is required to estimate (structure) path coefficients.[405] To validate the assumption that all variables and all combinations of variables are normally distributed, the variables were tested for skewness and kurtosis. The evaluation for all latent variables showed skewness values between -1.167 and -0.386, and kurtosis values between -0.361 and 1.395. Values of $|\geq 2|$ imply that data may not be normally distributed.[406] Only the control variable "frequency of use" exhibited minor violations of the thresholds, with values for skewness of 2.133 and kurtosis of

[403] Author's table based on survey statistics and Kraftfahrtbundesamt, "Vehicle registration data," 2016, https://www.amz.de/kba-zahlen/158/1737, accessed December 2017.

[404] According to Kraftfahrtbundesamt, "KBA - Wir punkten mit Verkehrssicherheit - Statistik: Fachartikel: Halter der Fahrzeuge," 2011, p. 7., 33.2% of vehicles are registered to female owners, and 66.8% to male owners.

[405] Bollen, K. A., *Structural equations with latent variables* (New York, NY: Wiley, 1989), p. 8.

[406] Gravetter, F. J. and Wallnau, L. B., *Essentials of statistics for the behavioral sciences*, 8th ed. (Belmont, CA: Wadsworth, Cengage Learning, 2014).

2.642. These values can be assumed to be uncritical, as they still fulfil liberal thresholds of |≤3|, and the variable does not make a difference to the SEM. In summary, the evaluation of skewness and kurtosis confirms the suitability of the data for evaluation using the maximum-likelihood method.

The validation of "non-response bias" aims to test whether the answering behaviour of people approached in this survey shows systematic differences from the answering behaviour of those who did not participate. According to Armstrong and Overton, the answering behaviour of late respondents is most similar to that of non-respondents.[407] In consequence, the sample was split into three equivalent groups. The early and late respondent groups were tested for a potential non-response bias, using the Mann–Whitney U-test, which is appropriate for assessing significant disparities between two groups.[408] None of the indicators tested showed significant differences on the 5% level of significance, which clearly denies the existence of a non-response bias in the current sample. Based on this, no significant non-response bias is assumed.

The evaluation of descriptive statistics further revealed that premium brand connected remote services customers are more likely to use CRS more frequently than customers of volume brands. Table 3-11 summarizes the results of the cross-tabulation, comparing usage frequency between the two user groups: premium brand customers and volume brand customers.

Table 3-11: Comparative results of usage frequency between CRS customers of premium brands and volume brands.[409]

Frequency → / User groups ↓	Seldom	Regularly	Often	Total
Premium brand customers	36.74%	47.44%	15.81%	100%
Volume brand customers	50.00%	41.38%	8.62%	100%

Results show a significant difference between these two user groups according to the Chi-Square test on the 5% significance level (p-value = 0.034), which confirms that there is a correlation between user group and frequency of use.

[407] Armstrong, J. S. and Overton, T. S. (1977), "Estimating Nonresponse Bias in Mail Surveys," *Journal of Marketing Research* 14, no. 3: p. 397.

[408] Feltovich, N. (2003), "Nonparametric Tests of Differences in Medians: Comparison of the Wilcoxon–Mann–Whitney and Robust Rank-Order Tests," *Experimental Economics* 6, no. 3: pp. 273–274.

[409] Author's table based on survey statistics.

3.5 Validation of connected remote services as a second-order formative construct

The partial-least-squares (PLS) approach is appropriate for the assessment of the model and its constructs. First, it is suitable for models that combine both types of operationalization approaches, i.e. reflective and formative measurement. Second, PLS analysis is particularly useful in an explorative setting,[410] such as the present research. The advantage of PLS path modelling mentioned above is reflected in the model's evaluation process. In this process it is necessary to measure reflective and formative measurements separately,[411] and the results are then combined in the evaluation of the CRS structure and research model. Summarizing, the PLS approach is chosen for its problem-free combination of reflective and formative measurements and its less restrictive requirements regarding normal distribution.

The analysis of the CRS measurement model was conducted using IBM SPSS 24 and Smart PLS 3.2.7, specified as the multiple indicator multiple cause model.[412] In recent years, scholars have been recommending MIMIC model specification for formative measurements in SEM,[413] especially if it is necessary to combine reflective and formative measurements.[414] According to Diamantopoulos, a "two-construct SEM comprised of one formatively measured latent variable that impacts on a single reflectively measured latent variable is directly equivalent to a single-construct model comprising the same set of formative indicators. (i.e., a MIMIC model)"[415]

The five key factors of CRS are operationalized using reflective indicators. Simultaneously, the five key factors define the CRS construct, using a formative measurement approach. Figure 3-6 describes the structure of the developed MIMIC model as a graphic.

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[410] Götz, O. and Liehr-Goebbers, K. (2004), "Analyse von Strukturgleichungsmodellen mit Hilfe der Partial-Least-Squares (PLS)-Methode," *Die Betriebswirtschaft* 64, no. 6: p. 731.

[411] Weiber, R. and Mühlhaus, D., *Strukturgleichungsmodellierung: Eine anwendungsorientierte Einführung in die Kausalanalyse mit Hilfe von AMOS, SmartPLS und SPSS*, 2nd ed. (Berlin Heidelberg: Springer Berlin Heidelberg, 2014), pp. 76–77.

[412] Muthén, B. O. (1989), "Latent variable modeling in heterogeneous populations," *Psychometrika* 54, no. 4: p. 563.

[413] Henseler, J. (2017), "Bridging Design and Behavioral Research With Variance-Based Structural Equation Modeling," *Journal of Advertising* 46, no. 1: p. 183.

[414] Vinzi, V. E., Trinchera, L., and Amato, S., "PLS Path Modeling: From Foundations to Recent Developments and Open Issues for Model Assessment and Improvement," in *Handbook of partial least squares: Concepts, methods and applications*, ed. Vincenzo Esposito Vinzi (Berlin: Springer, 2010), p. 49.

[415] Diamantopoulos, A. (2011), "Incorporating Formative Measures into Covariance-Based Structural Equation Models," *MIS Quarterly* 35, no. 2: p. 349.

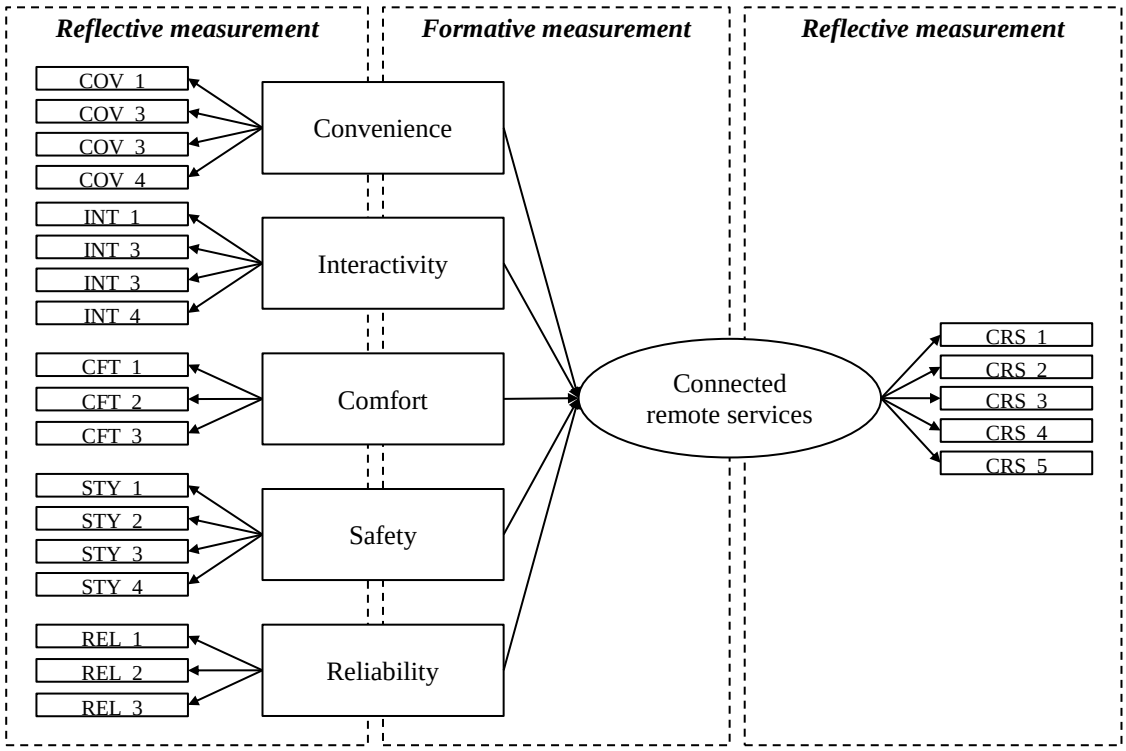

Figure 3-6: Measurement model of connected remote services.[416]

In the MIMIC measurement approach, it is necessary to specify the CRS construct's reflective measurement. Therefore, a phantom variable[417] is defined using five indicators to capture the phenomenon globally. Table 3-12 summarizes the formulation of the CRS indicators.

Table 3-12: Operationalization of connected remote services (phantom variable).[418]

ID	Description	Source
CRS_1	[CRS] simplifies the use of certain vehicle functions.	Formulations based on results of qualitative study. Each indicator globally captures one key factor of CRS.
CRS_2	By using [CRS], I feel simultaneously connected to the vehicle and to my [brand] dealership.	
CRS_3	The use of [CRS] increases my comfort.	
CRS_4	[CRS] increases safety.	
CRS_5	[CRS] increases reliability of the vehicle.	

[416] Author's illustration based on adapted MIMIC model as used in Borges, J. A. R., Tauer, L. W., and Oude Lansink, A. G.J.M. (2016), "Using the theory of planned behavior to identify key beliefs underlying Brazilian cattle farmers' intention to use improved natural grassland: A MIMIC modelling approach," *Land Use Policy* 55: p. 197.

[417] Rindskopf, D. (1984), "Using phantom and imaginary latent variables to parameterize constraints in linear structural models," *Psychometrika* 49, no. 1: p. 38.

[418] Author's table. Operationalization of the phantom variable is based on the approach to capture the phenomenon by generalized indicators related to the five key factors of CRS. Each key factor was summarized in one indicator.

The evaluation of the MIMIC model comprises two steps: First, the evaluation of the CRS key factors' construct validity, including internal indicator consistency, convergent validity and discriminant validity, is performed by applying the criteria for reflective measurement. Second, the proposed relationships between the key factors and the CRS construct are evaluated, using the methods for evaluating formative measurements.

3.5.1 Evaluation of the measurement of connected remote services' key factors

An exploratory factor analysis was performed to verify the measurement items. The five-factor model initially fits the data with R^2 at 58.8%, which confirms a sufficient level of explanatory power. The coefficient of determination (R^2) indicates the proportion of variance in the dependent variable that can be predicted from one or more independent variables. R^2 is often utilized in SEM to rate the model's predictive accuracy. Its calculation is based on the squared correlation of the actual and predicted values of an endogenous variable. According to Huber et al., the lower threshold of 0.3 must be exceeded.[419] Chin describes R^2 values of 19%, 33%, and 67% in PLS path models as weak, moderate, and substantial, respectively.[420]

Bartlett's sphericity test neglects the hypothesis that the variables in the model are uncorrelated ($p < 0.000$). The Kaiser-Meyer-Olkin index rates the adequacy of the sample size for model assessment. The value of 0.908 confirms that the number of responses ($n = 331$) is sufficient. The indicator pool initially contained 18 indicators attributed to five factors.

The exploratory factor analysis confirms that the factors convenience, interactivity, comfort, safety and reliability represent independent constructs. Each key factor of the CRS construct displays good levels of reliability. Cronbach's α (CA) reflects the reliability of a group of indicators, which measures a construct.[421] According to Nunnally, its value should be equal to or exceed 0.7.[422] Convenience (CA = 0.853), interactivity (CA = 0.813), comfort (CA = 0.800), safety (CA = 0.793), and reliability (CA = 0.806) all have Cronbach's α that are above the threshold.

Another criterion is the corrected item-to-total correlation (CITC), explained as the correlation of an indicator to the sum of all the indicators, which measure the same construct. Weiber and

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[419] Huber, F. et al., *Kausalmodellierung mit Partial Least Squares: Eine anwendungsorientierte Einführung* (Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler | GWV Fachverlage GmbH Wiesbaden, 2007), p. 45.

[420] Chin, W. W., "The partial least squares approach for structural equation modeling," in *Modern methods for business research*, ed. G. A. Marcoulides (London: Lawrence Erlbaum Associates, 1998), p. 316.

[421] Homburg, C. and Giering, A. (1996), "Konzeptualisierung und Operationalisierung komplexer Konstrukte: Ein Leitfaden für die Marketingforschung," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 1: p. 8.

[422] Nunnally, J. C., *Psychometric theory*, 2nd ed. (New York: McGraw-Hill, 1978), p. 245.

Mühlhaus consider the CITC to be sufficient if the values are equal to or exceed 0.5.[423] A test of corrected-item-total correlations confirms the reliability of the measurement.

Next, the measurement model was subjected to a confirmatory factor analysis, using Smart PLS 3.2.7. First, it could be shown that the indicator reliability (IR) is consistently above the threshold of 0.4, and the values for indicator loadings vary from 0.733 to 0.878. The factor loadings significance tests show that all t-values are above 1.96 (two-tailed) and are thus considered to be significant at the 5% level.[424]

Further, tests for composite reliability (CR) and average variance extracted (AVE) were compiled. The composite reliability test shows high values throughout, exceeding the requirement of 0.7 stated by Nunnally.[425] Regarding the AVE measurement, Fornell and Larcker require that at least 50% of the variance in a variable must be caused by the applied indicators. The threshold is therefore set at ≥ 0.5.[426] The authors state that discriminant validity can be assumed if the average variances extracted by the correlated latent variables, are greater than the square of the correlation between the latent variables. On the factor level, the average variance extracted values are above 0.5. Finally, all the measurement criteria are summarized in Table 3-13.

Table 3-13: Measurement validation of key factors of connected remote services.[427]

Description	Loading	CITC	t-value	Cronbach's α	CR	AVE
Convenience				0.853	0.900	0.693
COV_1	0.825	0.683	38.135			
COV_2	0.841	0.707	44.462			
COV_3	0.842	0.702	49.402			
COV_4	0.822	0.679	38.526			
Interactivity				0.813	0.877	0.640
INT_1	0.840	0.695	36.707			
INT_2	0.809	0.656	31.777			
INT_3	0.774	0.616	26.289			
INT_4	0.777	0.566	33.566			

Table continued next page

[423] Weiber, R. and Mühlhaus, D., *Strukturgleichungsmodellierung: Eine anwendungsorientierte Einführung in die Kausalanalyse mit Hilfe von AMOS, SmartPLS und SPSS*, 2nd ed. (Berlin Heidelberg: Springer Berlin Heidelberg, 2014), p. 139.

[424] Bartlett, J., Kotrlik, J., and & Higgins, C. (2001), "Organizational research: Determining appropriate sample size in survey research," *Information Technology, Learning, and Performance Journal* 19, no. 1: p. 45.

[425] Nunnally, J. C., *Psychometric theory*, 2nd ed. (New York: McGraw-Hill, 1978), p. 245.

[426] Fornell, C. and Larcker, D. F. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research* 18, no. 1: p. 46.

[427] Author's table based on own empirical results.

Comfort				0.800	0.882	0.714
CFT_1	0.848	0.655	41.572			
CFT_2	0.859	0.660	43.837			
CFT_3	0.828	0.617	33.743			
Safety				0.793	0.865	0.616
STY_1	0.733	0.553	22.223			
STY_2	0.805	0.626	34.900			
STY_3	0.795	0.628	28.754			
STY_4	0.804	0.602	36.705			
Reliability				0.806	0.886	0.721
REL_1	0.827	0.628	38.867			
REL_2	0.841	0.636	46.517			
REL_3	0.878	0.697	63.490			

Legend: AVE: Average variance extracted; CITC: Corrected item-to-total correlation; CR: Composite reliability.

Discriminant validity is analysed using the Fornell-Larcker criterion, which requires the square root of each construct's AVE to exceed its correlation with another construct.[428] As shown in Table 3-14, all five key factors are distinct from each other.

Table 3-14: Evaluation of discriminant validity of key factors of connected remote services.[429]

CRS key factor	Convenience	Interactivity	Comfort	Safety	Reliability
Convenience	0.833				
Interactivity	0.572	0.800			
Comfort	0.455	0.435	0.845		
Safety	0.451	0.413	0.397	0.785	
Reliability	0.530	0.441	0.401	0.529	0.849

3.5.2 Evaluation of the formative structure model of connected remote services

In the next step the analysis evaluates the reflective measured CRS phantom variable as a prerequisite for the holistic analysis of the formative operationalized part of the MIMIC model. Exploratory factor analysis for the five indicators confirms the phantom variable's one-dimensionality. The corrected item-to-total correlations test shows that all indicators are well above

[428] Homburg, C. and Giering, A. (1996), "Konzeptualisierung und Operationalisierung komplexer Konstrukte: Ein Leitfaden für die Marketingforschung," *Marketing: Zeitschrift für Forschung und Praxis* 18, no. 1: p. 11.

[429] Author's table based on own empirical results.

the threshold, confirming the reliability of the measurement. On the factor level the values for Cronbach's α, AVE and CR also exceed the requirements. Table 3-15 summarizes the results.

Table 3-15: Evaluation of reliability of the CRS phantom variable.[430]

Description	Loading	CITC	t-value	Cronbach's α	CR	AVE
CRS (phantom variable)				0.819	0.874	0.580
CRS_1	0.752	0.604	27.254			
CRS_2	0.753	0.589	20.377			
CRS_3	0.768	0.615	28.555			
CRS_4	0.745	0.593	22.043			
CRS_5	0.790	0.650	30.063			

Legend: AVE: Average variance extracted: CITC: Corrected item-to-total correlation; CR: Composite reliability.

The assessment of multicollinearity is measured by the variance inflation factor (VIF), which is defined as reciprocal to tolerance value.[431] If the VIF is one, multicollinearity can be ruled out.[432] A conservative threshold was used in this thesis; the VIF should not exceed 3.3.[433] The path coefficients ($\lambda \geq 0.1$) and the p-value as level of significance ($\alpha \leq 0.05$ at the 5% level) are also measured.[434] In the final step, the external validity on the key factor level is tested. In some cases, a formative measured construct cannot be fully captured. This can be compensated by the parallel measurement of the construct by reflective indicators using the so-called MIMIC-model, which makes it possible to measure a latent variable using both formative and reflective measurement. The VIF values are first considered in the evaluation of the formative part of the model. The values obtained (all VIF values ≤ 3.3) confirm the absence of multicollinearity. The analysis of the path coefficients shows that four out of five values exceed the threshold of 0.1. Only comfort ($\lambda_3 = 0.043$) falls below this threshold. This is also reflected by a low effect size for comfort ($f^2 = 0.003$). The effect size f^2 determines the substantive impact of a latent exogenous variable on a latent endogenous variable. The thresholds ≥ 0.02, ≥ 0.15 and ≥ 0.35 respectively indicate low, medium, and strong effect sizes.[435] Nevertheless, the construct is retained

[430] Author's table based on own empirical results.

[431] Hair, J. F., *Multivariate Data Analysis,* 7th ed. (Upper Saddle River, NJ: Pearson Prentice Hall, 2010), p. 222.

[432] Backhaus, K. et al., *Multivariate Analysemethoden: Eine anwendungsorientierte Einführung,* 14th ed. (Berlin, Heidelberg: Springer Gabler, 2016), p. 117.

[433] Hair, J. F., *A primer on partial least squares structural equation modeling (PLS-SEM)* (Los Angeles: Sage Publ, 2014), p. 170.

[434] Götz, O. and Liehr-Goebbers, K. (2004), "Analyse von Strukturgleichungsmodellen mit Hilfe der Partial-Least-Squares (PLS)-Methode," *Die Betriebswirtschaft* 64, no. 6: p. 729.

[435] Chin, W. W., "The partial least squares approach for structural equation modeling," in *Modern methods for business research,* ed. G. A. Marcoulides (London: Lawrence Erlbaum Associates, 1998), pp. 316–317.

in the research model because, based on the other criteria, the measurement's reliability can still be assumed. Effect size values f^2 for convenience (0.068), interactivity (0.092), safety (0.104) and reliability (0.065), are all above the threshold. The results of the t-value (two-tailed) evaluation show that comfort fails to meet the threshold, while the other four factors show t-values clearly above the threshold for the 5% significance level of $t \geq 1.96$.

Overall, safety ($\lambda_4 = 0.257$) shows the highest effect on CRS, followed by interactivity ($\lambda_2 = 0.250$), convenience ($\lambda_1 = 0.227$), reliability ($\lambda_5 = 0.212$) and comfort. R^2 is 0.588, meaning that 59% of the variance of the CRS concept can be explained by this model. The Stone-Geisser criterion (Q^2) can be used to predict the strength of a relationship. Q^2 evaluates the predicted influence of a latent variable towards its successor. If Q^2 is > 0, the model has predictive relevance.[436] The results show that the Stone-Geisser criterion ($Q^2 = 0.317$) is clearly above Nitzl's threshold,[437] indicating appropriate predictive relevance. Results of the evaluation of the formative structure model are displayed in Table 3-16.

Table 3-16: Evaluation of CRS as a second-order formative construct.[438]

Key factor	Path coeff.	VIF	Effect size	t-value	p-value	R^2	Q^2
Convenience	0.227**	1.836	0.068	3.369	< 0.01	0.588	0.317
Interactivity	0.250***	1.640	0.092	4.325	< 0.001		
Comfort	$0.043^{n.s.}$	1.411	0.003	0.939	0.348		
Safety	0.257***	1.540	0.104	4.113	< 0.001		
Reliability	0.212***	1.678	0.065	4.044	< 0.001		

*Legend: VIF: Variance inflation factor; R^2: Coefficient of determination; Q^2: Stone-Geisser criterion; n.s.: Not significant; *: Significant at the 5% level; **: Significant at the 1% level; ***: Significant at the 0.1% level.*

Measurement on the level of key factors confirms that the necessary quality criteria for all key factors are met. Tests on reliability and validity deliver satisfactory results. Therefore, it is assumed that the CRS key factors have high measurement quality. Figure 3-7 illustrates the results of the evaluation for the formative structure model of CRS.

[436] Huber, F. et al., *Kausalmodellierung mit Partial Least Squares: Eine anwendungsorientierte Einführung* (Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler | GWV Fachverlage GmbH Wiesbaden, 2007), p. 43.

[437] Nitzl, C., *Eine anwenderorientierte Einführung in Partial Least Square (PLS)-Methode* (Arbeitspapier Nr. 21, Universität Hamburg, 2010), p. 37.

[438] Author's table based on own empirical results.

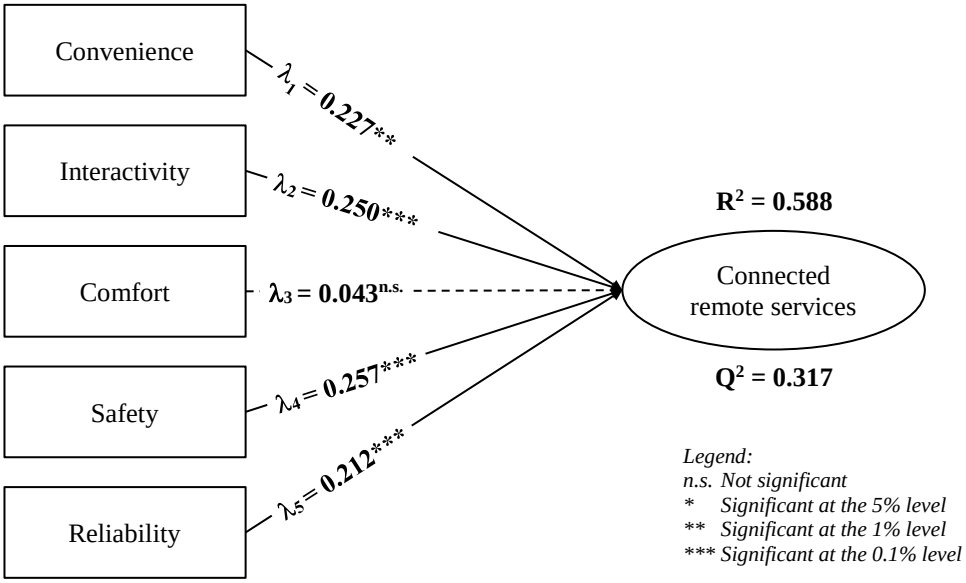


Figure 3-7: Formative structure model of connected remote services.[439]

The evaluation of the formative measurement model questions the assumption that the overall CRS construct consists of five key factors. The path coefficients, except comfort, are significant. Convenience at the 1% level; interactivity, safety and reliability are significant at the 0.1% level. For comfort, however, no significance is given, leading to the assumption that the concept of comfort may not be a key factor of connected remote services. Nevertheless, the key factor is retained for evaluating the research model because the results of the qualitative research have demonstrated that comfort is relevant. Whether comfort will be retained as a CRS modelling key factor will be decided depending on the results of the evaluation of the research model. The measured criteria of goodness, also show satisfying results, confirming an adequate level of predictive power ($R^2 = 0.588$, $Q^2 = 0.317$).

A comparison of the path coefficients shows that four out of five key factors have a similar impact on the overall CRS construct. Safety has the highest contribution to the evaluation of CRS (25.9%), followed by interactivity (25.2%), convenience (23.0%) and reliability (21.5%). As expected, perceptions on comfort (4.4%) have the lowest impact on CRS.

In summarising the classification and conceptualization of CRS, it should be noted that the explored concept of interactivity, was empirically confirmed to be a considerable, relevant CRS key factor. According to the definition (see Chapter 1.1.3), interactivity is a unique attribute of CRS that delimitated it from other, similar, phenomena. Overall, the CRS classification developed, although not considered in previous research, was confirmed empirically to a great extent.

[439] Author's illustration based on own empirical results.

3.6 Empirical analysis of the impact of connected remote services' key factors on customer value, trust, CRS reuse intention and car servicing loyalty

To answer research questions 2 and 3, the research model developed will be analysed to evaluate the hypotheses postulated. To achieve this, it is necessary to evaluate the validity of the research model and the constructs contained within it. The evaluation process is divided into two steps. First, the reflective operationalized endogenous constructs customer value, trust, CRS reuse intention and car servicing loyalty, are evaluated. Second, the research model is evaluated, using the same quality criteria as for the evaluation of the CRS MIMIC model.

3.6.1 Analysis of the endogenous constructs customer value, trust, CRS reuse intention and car servicing loyalty

To evaluate the research model, it is necessary to assess the constructs customer value, trust, CRS reuse intention, and car servicing loyalty individually.

In the evaluation of the construct customer value the indicator reliability of the indicator VAL_1 (IR = 0.375) violates the minimum threshold. Further, the CITC value was below the threshold (CITC = 0.420). For these reasons, the indicator was eliminated.[440] The adjusted results are shown in Table 3-17. The remaining indicators all show significant loadings, with CITC and t-values clearly above the thresholds to be adhered. In addition, composite reliability (0.855) and Cronbach's α (0.745) are adequate, and the AVE is 0.663.

The loadings and t-values of the indicators of the construct trust are all above the relevant thresholds. On the factor level composite reliability (0.897), Cronbach's α (0.829), and AVE (0.745) are adequate.

For CRS reuse intention, all the indicator loadings, CITC, and t-values are above the thresholds. Composite reliability (0.880), Cronbach's α (0.796) and AVE (0.710) are sufficient.

Loadings, CITC, and t-values for the indicators of the construct car servicing loyalty, are all above the corresponding thresholds. On the factor level composite reliability (0.881), Cronbach's α (0.820) and AVE (0.650), are good.

[440] Indicator VAL_1 was formulated as follows: "[CRS] offers value for money." The low correlation can be attributed to conceptual inconsistency towards the other indicators which leads to a low covariance.

Table 3-17: Evaluation of the endogenous variables customer value, trust, reuse intention and car servicing loyalty.[441]

Variable	Loading	CITC	t-value	Cronbach's α	CR	AVE
Customer value				0.745	0.855	0.663
VAL_1 (eliminated)						
VAL_2	0.809	0.567	33.048			
VAL_3	0.833	0.615	33.851			
VAL_4	0.873	0.530	28.042			
Trust				0.829	0.897	0.745
TRU_1	0.837	0.667	35.491			
TRU_2	0.873	0.690	59.993			
TRU_3	0.878	0.704	60.137			
CRS reuse intention				0.796	0.880	0.710
REU_1	0.841	0.633	41.211			
REU_2	0.833	0.625	37.746			
REU_3	0.855	0.659	45.608			
Car servicing loyalty				0.820	0.881	0.650
CSL_1	0.835	0.678	44.152			
CSL_2	0.808	0.644	35.457			
CSL_3	0.799	0.635	33.687			
CSL_4	0.783	0.616	26.849			

Legend: AVE: Average variance extracted: CITC: Corrected item-to-total correlation; CR: Composite reliability.

In accordance with the evaluation of the CRS key factors' discriminant validity, (see Table 3-14) discriminant validity of the latent endogenous variables of the research model is assessed applying the Fornell-Larcker criterion. Table 3-18 shows that all endogenous constructs possess adequate discriminant validity.

Table 3-18: Results of the evaluation of discriminant validity of the endogenous variables.[442]

Endogenous variable	Customer value	Trust	CRS reuse intention	Car servicing loyalty
Customer value	0.814			
Trust	0.678	0.863		
CRS reuse intention	0.687	0.606	0.843	
Car servicing loyalty	0.721	0.635	0.736	0.806

[441] Author's table based on own empirical results.

[442] Author's table based on own empirical results.

After the validation of all constructs used in the research model the interrelations between these constructs, upon which the postulated hypotheses can be tested, are evaluated.

3.6.2 Assessment of the research model and the postulated research hypotheses

The constructs customer value, trust and CRS reuse intention have a highly significant influence on car servicing loyalty at the 1% and 0.1% significance levels, and their path coefficients ($\lambda_5 = 0.327$; $\lambda_7 = 0.164$; $\lambda_8 = 0.412$) confirm that the three antecedents have a relevant influence.

Moreover, customer value and trust have a highly significant influence on CRS reuse intention at the 0.1% significance level, with path coefficients ($\lambda_4 = 0.511$; $\lambda_6 = 0.260$), which confirm that both antecedents reliably predict CRS reuse intention.

The influence of trust on customer value, is also highly significant at the 0.1% level with the corresponding path coefficient $\lambda_3 = 0.389$.

The analysis of CRS key factors reveals varying outcomes. The influence of convenience on customer value is significant at the 1% level. Convenience shows the highest path coefficient ($\lambda_{1a} = 0.185$), followed by safety ($\lambda_{1d} = 0.148$) and interactivity ($\lambda_{1b} = 0.110$). Impacts of interactivity and safety on customer value are significant at the 5% level. The effect sizes for these key factors are all above the threshold. The influences of comfort and reliability are not classified as significant. Path coefficients ($\lambda_{1c} = 0.023$; $\lambda_{1e} = 0.076$), t-values (0.474; 1.283), p-values (0.636; 0.200), and effect sizes (0.001; 0.007) are all below their corresponding thresholds.

For trust, the impacts of reliability ($\lambda_{2e} = 0.273$), interactivity ($\lambda_{2b} = 0.266$) and safety ($\lambda_{2d} = 0.242$) all meet the requirements for significance at the 0.1% level. The impacts of convenience and comfort on trust are not classified as significant. Their respective path coefficients ($\lambda_{2a} = 0.081$; $\lambda_{2c} = 0.042$), corresponding t-values (1.471; 0.825), p-values (0.142; 0.410) and the effect sizes (0.007; 0.002) are clearly below the minimum thresholds. Table 3-19 summarizes the interpreted results in detail.

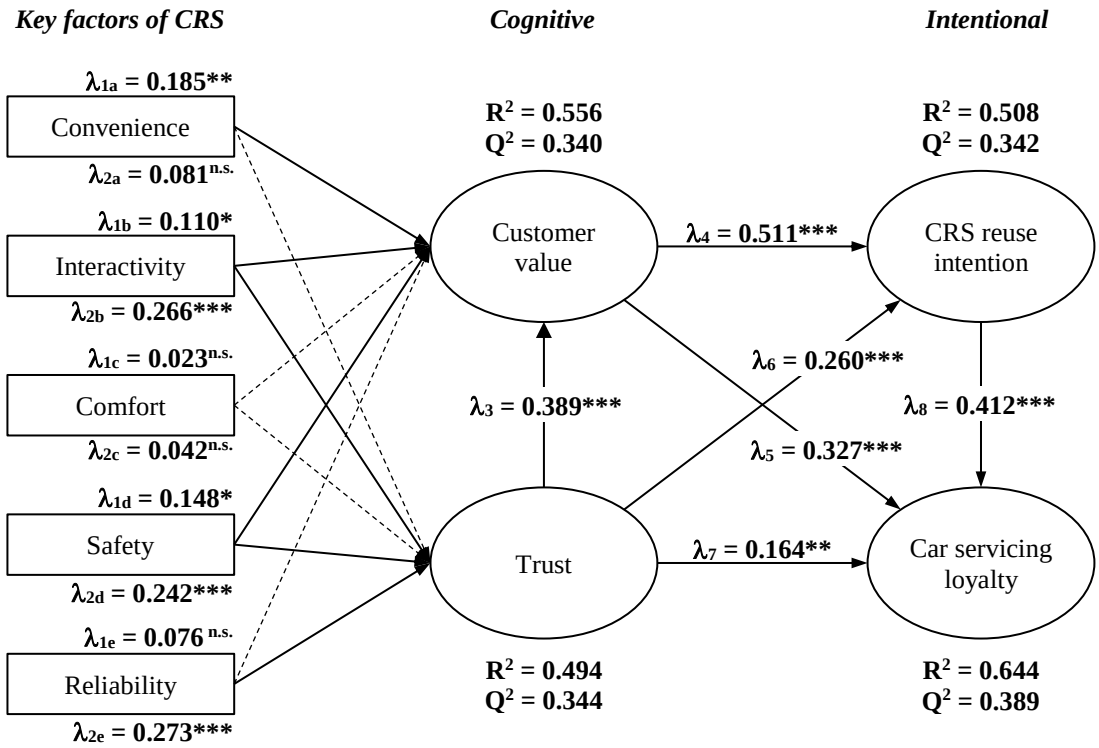
Table 3-19: Results of evaluation of the research model.[443]

Antecedent	Descendent	Path coefficient	t-value	p-value	VIF	Effect size	R^2	Q^2
Convenience	Customer value	0.185**	3.272	< 0.01	1.851	0.042	0.556	0.340
Interactivity		0.110*	2.121	< 0.05	1.783	0.015		
Comfort		0.023[n.s.]	0.474	0.636	1.416	0.001		
Safety		0.148*	2.096	< 0.05	1.654	0.030		
Reliability		0.076 [n.s.]	1.283	0.200	1.823	0.007		
Trust		0.389***	5.612	< 0.001	1.978	0.173		
Convenience	Trust	0.081[n.s.]	1.471	0.142	1.838	0.007	0.494	0.344
Interactivity		0.266***	4.519	< 0.001	1.643	0.085		
Comfort		0.042[n.s.]	0.825	0.410	1.413	0.002		
Safety		0.242***	4.074	< 0.001	1.539	0.075		
Reliability		0.273***	4.571	< 0.001	1.676	0.088		
Customer value	CRS reuse intention	0.511***	9.455	< 0.001	1.849	0.287	0.508	0.342
Trust		0.260***	3.937	< 0.001	1.850	0.074		
Customer value	Car servicing loyalty	0.327***	5.809	< 0.001	2.380	0.126	0.644	0.389
Trust		0.164**	3.211	< 0.01	1.986	0.038		
CRS reuse intention		0.412***	7.853	< 0.001	2.033	0.234		

*Legend: VIF: Variance inflation factor; R^2: Coefficient of determination; Q^2: Stone-Geisser criterion; n.s.: Not significant; *: Significant at the 5% level; **: Significant at the 1% level; ***: Significant at the 0.1% level.*

All constructs of the model show valid VIF values, which exclude the presence of multicollinearity. In terms of its explanatory power, it can be assumed that the evaluated model is adequate-to-good. R^2 varies from 0.494 (trust), 0.556 (customer value), 0.508 (CRS reuse intention) to 0.644 (car servicing loyalty). It can be stated that 64% of the variance of the target construct car servicing loyalty, can be explained by the antecedent constructs customer value, trust and CRS reuse intention. Furthermore, the Stone-Geisser criterion shows values > 0 throughout the model. Therefore, the postulated interrelations are appropriate for evaluating the constructs. Figure 3-8 contains the illustration of the research model evaluation.

[443] Author's table based on own empirical results.



*Legend: n.s.: Not significant; *: Significant at the 5% level; **: Significant at the 1% level; ***: Significant at the 0.1% level*

Figure 3-8: Results for the research model on the impact of key factors of connected remote services on customer value and car servicing loyalty.[444]

In summary, the tested research model can be deemed to be suitable for evaluating the postulated research hypotheses. However, based on the evaluation of the research model, not all of the postulated research hypotheses can be confirmed unreservedly.

The evaluation of hypotheses H_{1a-e} must be differentiated. For the key factor convenience (H_{1a}), the hypothesis is confirmed at the 1% significance level; for interactivity (H_{1b}) and safety (H_{1d}), at the 5% level. The hypotheses for the key factors comfort (H_{1c}) and reliability (H_{1d}) are rejected.

The evaluation of hypotheses H_{2a-e} is performed similarly. For the key factors convenience (H_{2a}) and comfort (H_{2c}), the hypotheses are rejected. The hypotheses for the key factors reliability (H_{2e}), interactivity (H_{2b}) and safety (H_{2d}) are confirmed at the 0.1% level of significance.

Hypothesis H_3 can be confirmed at the 0.1% significance level, leading to the conclusion that the developed research model measures the impacts of certain connected remote services key factors on car servicing loyalty reliably.

[444] Author's illustration based on own empirical results.

The evaluation of the moderating effects enjoyment and innovativeness is conducted using multi-group causal analysis. The generation of groups is based on the median split concept,[445] which delivers two groups for each concept, covering the high-level and the low-level ratings. By item-parcelling, each concept, measured by three indicators, is reduced onto one variable. This method generates the following sub-samples:

- "Enjoyment low" (n = 157) and "Enjoyment high" (n = 174)
- "Innovativeness low" (n = 110) and "Innovativeness high" (n = 221)

Subsequently, the SEM was tested for each group using the same conditions as for the full sample. Each group generated a new path coefficient as an output, which will be compared. To determine whether the differences identified are significant, the p-values were calculated. According to the overall model requirements, the threshold for significance requires a t-value ≥ 1.96. Table 3-20 shows the comparison of path coefficients for each group and the corresponding calculated p-values.

Table 3-20: Test of hypotheses of moderating effects.[446]

Moderator	Formulation	λ low	λ high	p-value	Effect
Enjoyment	Enjoyment heightens the positive influence of customer value on CRS reuse intention.	0.383	0.455	0.502	n.s.
Innovativeness	Innovativeness heightens the positive influence of CRS reuse intention on car servicing loyalty.	0.359	0.401	0.691	n.s.

The hypothesis that enjoyment heightens the positive influence of customer value on CRS reuse intention is not supported. The group comparison demonstrated that participants with a high level of enjoyment do not exhibit a significantly higher level of CRS reuse intention.

Likewise, the hypothesis that innovativeness heightens the positive influence of CRS reuse intention on car servicing loyalty cannot be confirmed. The comparison of the groups revealed no statistically significant difference in the effect of innovativeness on the relationship between CRS reuse intention and car servicing loyalty. A summary of the research hypotheses tested is presented in Table 3-21.

[445] Iacobucci, D. et al. (2015), "The median split: Robust, refined, and revived," *Journal of Consumer Psychology* 25, no. 4: p. 691.

[446] Author's table based on own empirical results.

Table 3-21: Summary assessment of the research hypotheses.[447]

H_i	Formulation	Effect	*Limitation
Research hypotheses of the model constructs			
H_{1a-e}	Customer value positively mediates the effects of connected remote services' key factors on CRS reuse intention and car servicing loyalty.	(✓)*	H_{1c}; H_{1d}: Rejected. Comfort and reliability have no significant influence on customer value.
H_{2a-e}	Trust positively mediates the effects of connected remote services' key factors on customer value, CRS reuse intention and car servicing loyalty.	(✓)*	H_{2a}; H_{2c}: Rejected. Convenience and comfort have no significant influence on trust.
H_3	CRS reuse intention positively mediates the influence of customer value and trust on car servicing loyalty.	✓	
Research hypotheses of the moderating effects			
H_4	Enjoyment heightens the positive influence of customer value on CRS reuse intention.	X	
H_5	Innovativeness heightens the positive influence of CRS reuse intention on car servicing loyalty.	X	

Legend: H_i: Hypothesis; ✓: Confirmed; X: Rejected; (✓): Partially confirmed with limitations.*

In addition, the two segments, premium brands and volume brands, are compared in terms of differences in effects among the endogenous variables. The target is to detect whether a specific interrelation between the research model constructs is influenced by the brand segment. For this purpose, the path coefficients are calculated for both the premium brand segment (n = 215), and the volume brand segment (n = 116). The differences identified were tested for significance, according to the research model requirements. Table 3-22 shows the comparison of path coefficients for each group and the corresponding, calculated p-values.

Table 3-22: Comparison of path coefficients of premium brands to volume brands.[448]

	Customer value			**CRS reuse intention**			**Car servicing loyalty**		
	λ Premium	**λ Volume**	**p-value**	**λ Premium**	**λ Volume**	**p-value**	**λ Premium**	**λ Volume**	**p-value**
Trust	0.421	0.331	0.591	0.406	0.148	0.027*	0.179	0.150	0.832
Customer value				0.583	0.412	0.141	0.388	0.288	0.419
CRS reuse intention							0.445	0.360	0.408

*Legend: λ: Path coefficient; * Significant at the 5%-level.*

The comparison shows that the premium brand segment shows higher path-coefficients throughout the model. However only significance for the difference in the interrelation between trust and CRS reuse intention (t-value = 2.226; p-value = 0.027) is given, indicating that for

[447] Author's table based on own empirical results.

[448] Author's table based on own empirical results.

customers of premium brands, the trust building aspect of CRS contributes significantly more highly to their future CRS reuse intention, than for customers of volume brands.

The other measured differences cannot be confirmed as significant with reference to the 5% confidence level. This leads to the conclusion that except for one interrelation, the model shows that connected remote services are perceived by customers of premium brands in the same way as by customers of volume brands, leading to mostly similar effects on CRS reuse intention and car servicing loyalty.

3.7 Discussion and interpretation of results

The results of the literature review (chapter 1), the functional description of connected remote services and previous studies (chapter 2) as well as the qualitative and quantitative studies presented in this thesis (chapter 3), have various implications and need to be discussed in detail.

Firstly, the empirical findings of this thesis contribute greatly to clarity and structure in respect of the key factors of connected remote services. The key factors identified in the exploration of CRS, are mainly confirmed by the empirical evaluation. However, comfort was demonstrated to have no significant influence on customer value and trust. Consequently, it can be stated that the concept of connected remote services consists of four key factors: convenience, interactivity, safety, and reliability.

Further, for the key factors convenience and safety, the qualitative comparison of the findings shows similarities between theory, i.e. the previous studies by Arndt[449] and Becker,[450] and the research results of this thesis regarding their underlying concepts.

In contrast, the other key factors identified, interactivity and reliability, show no overlaps to previous studies. Especially interactivity, as identified in the exploration and statistically confirmed in the empirical part, constitutes a particularity of connected remote services which hasn't been described previously in literature. The findings in this thesis confirm that interactivity is relevant and needs to be acknowledged as a fundamental characteristic of CRS. It therefore supplements the body of knowledge as a driver for ICT based service innovation in a mobile service context and describes an important aspect for future research in this field, which is also addressed in the conclusions and suggestions chapters.

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[449] Arndt, S., *Evaluierung der Akzeptanz von Fahrerassistenzsystemen: Modell zum Kaufverhalten von Endkunden* (Wiesbaden: VS Verlag für Sozialwissenschaften / Springer Fachmedien Wiesbaden GmbH Wiesbaden, 2011).

[450] Becker, F., *Kundenbegeisterung durch Serviceinnovationen: Eine Analyse am Beispiel technologiebasierter Self-Services* (Dissertation, Universität Hohenheim, 2016)

Secondly, the findings reveal that the key factors of connected remote services can be classified into three groups of drivers, namely value-drivers, trust-drivers and combined value and trust drivers. The analysis of their relative impacts further helps to rank the key factors in each group. Overall, it can be stated that that the key factors interactivity and safety are the only ones to impact both customer value and trust. Thus, it is concluded that these two key factors are of central importance for the CRS concept. Table 3-23 lists the ranked factors of CRS.

Table 3-23: Classification of key factors of connected remote services.[451]

Key factor	Rank as driver for customer value	Rank as driver for trust
Convenience	1	-
Interactivity	3	2
Safety	2	3
Reliability	-	1

Thirdly, in general, the positive impact of certain key factors of connected remote services on customer value and trust and their descendants, CRS reuse intention and car servicing loyalty, can no longer be denied. The combination of customer value and trust as drivers for car servicing loyalty, agrees with the findings of Bansal, Irving and Taylor[452] and Meyer.[453]

Customers of premium brands and volume brands alike rate connected remote services as important regarding the creation of superior value and for building trust. Coefficients of determination and the significance levels of the path coefficients without a doubt prove the positive impact that connected remote services have on customer value outcomes, such as car servicing loyalty. Thus, connected remote services need top management attention and awareness as an effective measure for customer retention management.

It should also be mentioned that the direct impact of trust on car servicing loyalty was shown to exist to a lesser extent and with a lower level of significance than the impacts of customer value and CRS reuse intention on car servicing loyalty. At the same time, the impact of trust on customer value is highly important and highly significant. Trust therefore supplements the research model fundamentally by underpinning the importance of the qualitative pre-study. A research model developed based only on a literature review, in particular on the service profit

[451] Author's table based on own empirical results.

[452] Bansal, H. S., Irving, P. G., and Taylor, S. F. (2004), "A Three-Component Model of Customer to Service Providers," *Journal of the Academy of Marketing Science* 32, no. 3.

[453] Meyer, A., "Erklärungsmodell der Kundenbindung im gewerblichen Automobilmarkt," in *Kundenbindung im gewerblichen Automobilmarkt*, ed. Andreas Meyer (Wiesbaden: Gabler, 2010).

chain theory of Heskett et al.,[454] might have overlooked trust and may have focused solely on customer value as a direct consequence of connected remote services. Instead the suggestion to managers is to be aware of connected remote services' potential for building trust. It must be emphasised that the consequences of ICT-based service innovation regarding trust are comparable to the consequences of trust from services delivered by human interaction.

Fourth, the results in respect to the moderating effects have shown that a higher perception of enjoyment does not lead to increased CRS reuse intention. It can be concluded that hedonic aspects are not relevant for CRS. This finding can be explained by the fact that CRS are instead perceived as a utility and additive service which supplements the core service. In addition, responses of joy as consequence of use in the qualitative study were underrepresented and below the cut-off level. The customers' self-assessment of their innovativeness revealed that it has no measurable impact on the interrelationship between CRS reuse intention and car servicing loyalty. It can therefore be concluded that CRS do not only appeal to innovative customers, but also have the potential for broad acceptance.

Finally, even though a large and varied number of drivers of customer value are discussed in academic literature, this study recommends a sharply reduced number of key factors which are supportive to customer value and trust to managers of car dealerships and vehicle manufacturers, if they are focusing on the creation of car servicing loyalty. These comprise convenience, interactivity, safety and reliability. Basically, all connected remote services functions can be attributed to these four key factors, which managers should focus on, if they want to improve the effectiveness of their connected remote services offerings.

[454] Heskett, J. L. et al. (1994), "Putting the Service-Profit Chain to Work," *Harvard Business Review* 72, no. 2.

CONCLUSIONS

Based on the research conducted, the author has reached the following main conclusions:

1. The topic of customer value creation through service innovation and its impact on customer loyalty is according to scientists, managers and international experts undeniably important and therefore, might increase in relevance for research, but also for business management practice.

2. Scientists' perceptions regarding success factors for creating customer value by using ICT-based service innovation still vary, although the topic has been investigated for quite some time. Therefore, approaches which combine different attributes of such services with key factors are needed. Depending on the research's purpose, this must be considered for future studies.

3. Intentional customer loyalty is the predecessor of the subsequent factual behaviour of the customers. Related research in the automotive industry has shown that there is a significant correlation between intentional and factual loyalty. Therefore, influencing a customer's intentional car servicing loyalty pays off for car dealerships in the long-term.

4. The analysis of the automotive after-sales business shows that the attractive older vehicle segment is moving away from authorized dealerships towards independent car service providers. Traditional customer retention management measures have been insufficient to prevent or reserve this process. This underpins the necessity for new approaches to supplement current customer retention management strategies.

5. Regarding the drivers of reuse intention of connected remote services as ICT-based service innovation, previous studies discuss a wide range of different factors and even include some controversial opinions. However, there is also a common sense of the factors supportive to reuse intention, which leads to the conclusion that similar concepts are being discussed all around the world and provide starting points for future studies.

6. This study recommends a sharply reduced number of key factors of connected remote services supportive to customer value and trust to managers of car dealerships and vehicle manufacturers, comprising convenience, interactivity, safety and reliability. In conclusion, all functions of connected remote services can be attributed to these four key factors, which managers should focus on.

7. Customer value and trust are outcomes of connected remote services usage, contributing to CRS reuse intention and car servicing loyalty to a great extent and thus, currently have a substantial potential for car dealerships' customer retention management.

8. Customers of premium and volume brands perceive connected remote services in the same way, leading to mainly similar effects. Thus, connected remote services, as an effective measure for customer retention management, require top management attention and awareness, regardless of the brand segment.
9. Customers of premium brands use connected remote services more frequently than customers of volume brands. At the same time, comparison of the two brand segments showed stronger effects for the premium brand segment throughout the model. Thus, it is concluded that there is a tendency that use frequency and brand segment lead to higher CRS reuse intention and car servicing loyalty.
10. As an instrument for customer retention management, connected remote services can grow in importance for car dealerships' service departments. The management of customer communication can be improved by achieving scale-effects, addressing the whole customer base of active connected remote services users.
11. Higher perceptions of enjoyment do not lead to increased connected remote services reuse intention. It can be concluded that hedonic aspects are not relevant. Thus, managers need to focus on utilitarian facets.
12. Connected remote services do not only appeal to innovative customers, which emphasises that connected remote services have the potential of appealing to a car dealership's entire customer base.

The main hypothesis of the thesis was confirmed. The more certain key factors of connected remote services contribute to customer value, the higher is the effect on car servicing loyalty.

13. Different key factors of connected remote services such as convenience, interactivity, safety and reliability show positive correlations with customer value outcomes, such as connected remote services reuse intention and car servicing loyalty. Thus, the main assumption of the thesis is considered valid.
14. The key factor comfort was thought to be important in the qualitative study but did not show significant results in the empirical evaluation. This leads to the conclusion that customers perceive connected remote services partially in terms of value creation, and that the background to this requires further empirical investigation.

The first research question, "Which key factors form a general profile of connected remote services?" was successfully answered.

15. Five key factors supportive to customer value and trust were identified from the qualitative study on connected remote services. Specifically, these are convenience, interactivity, comfort, safety and reliability. The identified key factors of convenience, comfort and safety showed similarities to concepts from international research. The key factors interactivity and reliability have not yet been addressed in the existing literature and thus supplement those research findings.

16. These key factors were evaluated using statistical methods applied to the empirical data gained from the study. In this process, the key factor comfort was removed, as the empirical evaluation had revealed that it could not be confirmed as a key factor. Thus, the remaining key factors can be made accessible for car dealerships and car manufacturers' customer retention management.

The second research question, "Are there certain key factors of connected remote services that contribute more to customer value than others?" was successfully answered. In addition, proposition 1 was substantiated by this research.

17. According to the correlation analysis, the key factors convenience, safety and interactivity contribute most highly to customer value. Comfort and reliability were shown not to be relevant. Therefore, it is rather the aspects of the vehicle's daily ease of use that are of high relevance.

18. A similar conclusion can be drawn regarding the effects on trust. The key factors reliability, interactivity and safety show the highest impact on the creation of trust, whereas the influences of convenience and comfort are not significant. These perceptions are shared through all customer groups.

19. Additionally, as assessed by the partial least squares analysis, customer perceived trust positively mediates the effects of certain key factors on customer value. This substantiates the conclusion that customers, who use connected remote services, perceive increased trust in the service provider.

The third research question, "To what extent do key factors of connected remote services explain and determine measurable consequences of customer value?" was successfully answered. These findings also support propositions 2, 3 and 4.

20. Car dealers face the challenge of retaining their customer base's loyalty, especially in the field of car servicing loyalty. This thesis shows a correlation between perceived benefits created by certain key factors of connected remote services, leading to customer value. The consequences of this increased customer value are twofold. First, customers intend to reuse connected remote services. Secondly, this reuse intention together with customer value positively influences car servicing loyalty. In conclusion this means that there is a positive effect from usage and car dealerships should encourage their customers to make use of connected remote services.

21. Trust generated by the usage of connected remote services has another positive effect on connected remote services reuse intention. This impact was observed as direct impact as well as indirect impact mediated by customer value. This finding underlines the importance of trust building aspects of connected remote services and is to be considered by managers.

22. Evaluation of the empirical results shows that for customers of premium brands the interrelation between trust and connected remote services reuse intention has a significantly stronger correlation than for customers of volume brands. It can be therefore concluded that especially in the premium segment, the key factors of connected remote services that build trust are of high relevance. Thus, this should be considered, especially by managers of premium brand car dealerships.

23. Further, the idea of actively managing and implementing the customer value strategies of connected remote services to achieve important outcomes, provides a consulting area in which scientists could support managers. Since this service is interrelated with so many innovative ideas, both disciplines could contribute to a common understanding of how to improve connected remote services in practice.

SUGGESTIONS

Based on the research conducted, the author makes the following suggestions:

To practitioners and managers of car dealerships

- **Recognize the importance of connected remote services and embed them into the customer retention management strategy for the after-sales business.** Customers benefit from connected remote services. These benefits – convenience benefits, interactivity benefits, safety benefits and reliability benefits – to different extents were shown to be relevant for all the car brands investigated. Managers need to be aware of the importance of these benefits to their customer base. Furthermore, these benefits are not only important to customers but in turn pay off, given their positive impact on car servicing loyalty (i.e. positive word of mouth and commitment) which is valued by car dealerships.
- **Build strategies to facilitate and increase the customer value of connected remote services.** A dealer organization might change its marketing management by focusing customer communication around connected remote services, so that customers only need to deal with one point of contact. This may help the dealership to increase efficiency; it may also stimulate the growth of customer relationships. Moreover, connected remote services support those dealerships which pursue strategies for tracking individual customer's preferences, in order to offer individually designed services on a recurring basis.
- **Quantify the value of connected remote services to customers.** Although customers are likely to welcome value from service innovation in general terms and believe the benefits to be important, they may not always be aware of their existence prior to using a specific service innovation. Moreover, customers aren't aware of the benefits, if they have not quantified their value. Similarly, the dealership could help customers, particularly those who place more importance on convenience, interactivity, safety and reliability, to quantify the value of connected remote services.
- **Promote the benefits of connected remote services to the customer base.** Car dealerships should strategically promote these benefits, as reasons to start using connected remote services. If customers understood the actual convenience, interactivity, safety and reliability-related types of benefits better, they might be more inclined to reuse con-

nected remote services and thus willing to stay in a relationship with the current dealership and its car service. In turn, this pays off in terms of the lifetime value of a dealership's customers.

- **Encourage the customers to use connected remote services more frequently.** The results have shown that it can be assumed that higher frequency of use positively stimulates the outcomes of connected remote services. It is recommended that car dealerships promote the regular use of connected remote services, e.g. by offering a bonus system for frequent users.
- **Train sales and after-sales employees on connected remote services' functions and benefits.** Connected remote services are not only new to the customers; they are also new to a car dealership's personnel. Therefore, it is important to train the relevant staff, such as sales and after-sales employees, not only regarding the functions and technical aspects. It is also important to convey the knowledge about the benefits and trust building aspects. This will lead to higher use rates and activate the potential of connected remote services for the car dealership.
- **Differentiate from the competition based on customer value of connected remote services.** The results of this thesis imply that a dealership's car servicing organization may be able to focus on these benefits as a means of differentiating itself from the competition. Especially the benefits resulting from interactivity may be particularly useful as a differentiation strategy, because they can be difficult for other dealerships to replicate (at least in the short term). Being connected to the customer and at the same time having real-time information about the vehicle status, enables the dealership to offer necessary services immediately, as soon as the need for it arises.
- **Use connected remote services as a communication channel to the customers.** More than just being a supplementary communication channel, connected remote services have the potential to become the customers' preferred way of interacting with their car dealership. It already provides the possibility today for customer interaction regarding dealership's specific offerings, such as advertising seasonal after-sales services, e.g. special offers for winter check-ups or tyre changing or invitations to new vehicle launch presentations, if applied to a sales example. Gradually all areas of service, which have come under pressure from the independent after-market during recent decades, can become subjects for a customer retention management strategy using connected remote services as a competitive advantage.

To managers of vehicle manufacturers

In addition to suggestions for car dealerships, the findings of this research also provide further implications for managers of vehicle manufacturers. From the perspective of a vehicle manufacturer, the practical implications of the results can be used as a framework for the development and enhancement of connected remote services. Thus, the following suggestions, derived from the findings of this study, are given:

- **Develop and provide connected remote services to the customer base.** The results of this thesis should encourage vehicle manufacturers which haven't yet introduced connected remote services, to take the step of designing and rolling-out own versions of connected remote services to their customer base, in all relevant markets. This will prevent dealers of these vehicle manufacturers from falling behind those which already successfully provide connected remote services.
- **Concentrate on the enhancement of functions related to the key factors of connected remote services.** The results of this thesis provide important insights regarding the effects of the different key factors and the functions attributed to them. This enables the management of vehicle manufacturers to deliberately allocate budgets and resources for the further enhancement of existing and the development of further functions.
- **Give special attention to interactivity.** This study demonstrated that this key factor supplements existing drivers of customer value to a great extent. Interactivity was shown to positively influence customer value and trust. Thus, enhancement of this attribute will contribute towards two results, which again highly affect car servicing loyalty, directly and indirectly.
- **The improvement of comfort functions can be ignored.** However, this only applies to the aspects of creating customer value and trust. Comfort may still be relevant to the improvement of other outputs related to connected remote services, e.g. satisfaction.

To scientists on customer value, customer loyalty and service innovation

This study represents an initial attempt at understanding the value customers receive from using connected remote services. The consistency of the findings across the two studies in this mixed method approach, employing qualitative and quantitative methods, is encouraging in terms of defining key factors of connected remote services from the customer's point of view.

- The core of customer value is formed by benefits, perceived by customers during the use of a service. Scientists regard the management of appropriate benefits desired for certain consequences of customer value as a promising topic, particularly when it relates to ICT-based service innovation. Consequently, more research is encouraged here.
- To investigate the impact of customer value from connected remote services on different types of customer loyalty related to the automotive trade business, such as brand loyalty and dealership sales loyalty.
- To examine the impact of connected remote services on customer value in the commercial vehicle sector under consideration of the specific particularities of this market segment.
- To research the importance of connected remote services as drivers for car servicing loyalty, in comparison to the other influencing factors revealed by previous research, such as service quality, service satisfaction, price interest, competence of the service employees etc.
- To transfer the findings presented in this thesis to other countries and to evaluate them in an international and multicultural setting.
- To further investigate the influence of comfort, which was not empirically confirmed in the current study, but still must be seen as a direction for further research regarding the consequences of connected remote services use.
- To work on more suggestions for managers regarding the use of technology driven innovation (service and product) in the customer retention management strategy of car dealerships by further investigating the consequences of innovation from the customer's perspective.

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APPENDIX

A Concepts of customer benefits and sacrifices within customer value research.[455]

Author	Value concept	Dimensions	Consequences	Measurement	Findings
Sheth, Newman and Gross (1991)	Customer's choice is a function of multiple, independent consumption values, which contribute in different ratios.	- Functional value; - Social value; - Emotional value; - Epistemic value; - Conditional value.	- Customer behaviour.	- Use or not use choice; - Product type choice; - Brand choice.	Emotional value and conditional value with the highest relevance within customer choice situations.
Bolton and Drew (1991)	Based on Zeithaml's (1988) definition of perceived product value, the approach is transferred to perceived service value.	- Quality; - Sacrifices; - Customer characteristics; - Expectations; - Disconfirmation; - Performance.	- Behavioural intention; - Behaviour.	Based on service quality concept of Parasuraman, Zeithaml and Berry (1988) with focus on: - Reliability; - Responsiveness; - Assurance; - Empathy.	Perceived service value is a more comprehensive measure of customers' overall assessment of a service than service quality.
Gwinner, Gremler and Bitner (1998)	Relational benefits "as those benefits customers receive from long-term relationships above and beyond the core service performance."	- Confidence benefits; - Social benefits; - Special treatment benefits.	- Loyalty; - Word-of-mouth; - Continue in relationship; - Satisfaction.	- Confidence benefits; - Social benefits; - Special treatment benefits.	Confidence benefits are the most important to customers. Social benefits are the second-most essential benefits.
Lapierre (2000)	Customer value is defined as the difference between the benefits and the sacrifices (e.g., monetary, non-monetary costs) perceived by customers concerning their expectations.	- Benefits (product-related, service-related, relationship-related); - Sacrifices (price, time, conflict).	- Satisfaction; - Behavioural intention.		Product, service, and relationship value highly correlate. Price as a value driver is not significant when it is associated with a service.
Sweeney and Soutar (2001)	Based on the concept of Sheth et al. (1991), excluding the aspects of epistemic value and conditional value.	- Emotional value; - Social value; - Functional value; (price/value for money); - Functional value (performance/quality).	- Repurchase intention; - Recommendation intention; - Satisfaction.	- Quality value; - Emotional value; - Price value; - Social value.	Emotional value and quality (functional value) with the highest contribution on repurchase and recommendation intentions.

Table continued next page

[455] Author's table based on sources mentioned in the table.

Patterson and Smith (2001)	Based on the approach by Gwinner et al. (1998) the concept is examined within several service sectors in the Southeast Asian market.	- Confidence benefits; - Social benefits; - Special treatment benefits; - Attractiveness of alternatives; - Switching costs.	- Satisfaction; - Repurchase intention.	- Confidence benefits; - Social benefits; - Special treatment benefits.	Confidence benefits, social benefits and special treatment benefits were confirmed as customer motivating forces to maintain relationships with suppliers and extended by attractiveness of alternatives and switching costs.
Liang and Wang (2004)	Perceived benefits determine whether a customer remains with, or defects from, a supplier.	- Functional benefits; - Symbolic benefits; - Experimental benefits.	- Satisfaction; - Trust/ Commitment; - Loyalty.	- Functional benefits; - Symbolic benefits; - Experimental benefits.	Attributes affect functional, symbolic, and experiential benefits; trust and commitment positively influence repurchase intention.
Gao, Sirgy and Bird (2005)	Customer value is an assessment of the worthiness of an offering, made at the time of decision-making, based on what is received (benefits) vs. what is expended (costs).	- Relational benefits; - Relational sacrifices; - Episodic benefits; - Episodic sacrifices.	- Value of the offering; - Satisfaction; - Perceived fairness.	- Relational benefits (confidence; stability, relationship, goodwill); - Relational sacrifices (time, cost).	Relational benefits and costs influence perceived value. Benefits and costs to be considered at transactional and relational levels.

B Calculation of impact factors for predefined attributes of connected remote services.[456]

No.	Attribute	Number of respondents	Standardized importance	Impact factor
1	Vehicle status	15	3.89	70%
2	Vehicle localization	16	3.59	61%
3	Breakdown call	17	4.39	79%
4	Emergency call	17	4.78	86%
5	Remote air conditioning	15	3.86	59%
6	Tele-diagnosis	15	4.25	69%
7	Concierge service	14	2.76	47%
8	Service appointment	15	3.71	63%
9	Locking and unlocking	15	3.65	62%
10	Online theft alarm system	15	4.19	67%

[456] Author's table based on qualitative survey results.

C Implication matrix based on results of means-end chain analysis.[457]

Code	Convenience	Interactivity	Comfort	Safety	Reliability	Mobility	Service Quality	Customer value	Trust	Well-being
Vehicle status	6.02	7.02			2.04	0.01			0.07	
Vehicle localization	5.06	9.01	1.04	0.03				0.07		
Breakdown call	3.05	3.01	3.02	3.04	2.04	1		0.05		0.01
Emergency call	5	3	0.01	7.07	1			0.03	0.05	0.03
Remote air conditioning	1		11					0.05		0.02
Tele diagnosis	7.02	8	0.01		0.07	1	2	0.09	0.01	
Concierge service	9.01		0.05		2			0.04		
Service appointment	2.06	12	0.01		0.04		1	0.07	0.02	
Locking and unlocking	6	2		5.03				0.03	0.06	
Online Theft alarm	3	3		8.05	0.02				0.06	
Convenience	-	2	5.05	9.01	10			17.06	1.09	0.02
Interactivity	14	-	1.02	10.03	8.03	2		3.11	5.06	
Comfort	3	1	-		0.03			8		2
Safety			3	-	2			7	14	4.01
Reliability	4		1		-			6	7	
Mobility						-				
Service Quality					3		-	0.01	0.01	
Customer value								-		
Trust				2					-	
Well-being										-

The first figure in a cell constitutes the number of direct links, and the second figure the number of indirect links.

[457] Author's table based on survey results using the implication matrix method of Gutman, J. (1991), "Exploring the nature of linkages between consequences and values," *Journal of Business Research* 22, no. 2: p. 146.

D Results of pre-test by using the method of item-sort task for the validation of operationalization of connected remote services key factors.[458]

According to Götz and Liehr-Gobbers, the p_{sa}-index describes the proportion of substantive agreement, measuring the ratio of matches (n_c) to total participants (N):

$$p_{sa} = \frac{n_c}{N}.$$

Values are in the range of 0 and 1, where high values are an indicator of a high level of substantive agreement. The substantive validity coefficient c_w captures the relevance of an indicator, measuring the degree of association with the intended factor in comparison to any other factor. Here, n_0 describes the number of incorrect associations:

$$c_w = n_c - n_0 / N.$$

Values are in the range of -1 and 1, where high values are an indicator of a high level of substantive validity towards the intended factor. Values close to -1 are an indicator of a high attribution of the indicator towards another factor.[459]

Indicator	**Intended association**	**N**	**n_c**	**n_0**	**p_{sa}**	**c_w**
COV_1	Convenience	11	9	2	0.82	0.64
COV_2		11	7	4	0.64	0.27
COV_3		11	9	2	0.82	0.64
COV_4		11	10	1	0.91	0.82
INT_1	Interactivity	11	8	3	0.73	0.45
INT_2		11	9	2	0.82	0.64
INT_3		11	7	4	0.64	0.27
INT_4		11	8	3	0.73	0.45
CFT_1	Comfort	11	7	4	0.64	0.27
CFT_2		11	8	3	0.73	0.45
CFT_3		11	5	6	0.45	-0.09
CFT_4		11	9	2	0.82	0.64
STY_1	Safety	11	9	2	0.82	0.64
STY_2		11	10	1	0.91	0.82
STY_3		11	9	2	0.82	0.64
STY_4		11	10	1	0.91	0.82
REL_1	Reliability	11	9	2	0.82	0.64
REL_2		11	8	3	0.73	0.45
REL_3		11	9	2	0.82	0.64

[458] Author's table based on evaluation of item-sort task results.

[459] Krafft, M., Götz, O., and Liehr-Gobbers, K., "Die Validierung von Strukturgleichungsmodellen mit Hilfe des Partial-Least-Squares (PLS)-Ansatzes," in *Handbuch PLS-Pfadmodellierung: Methode, Anwendung, Praxisbeispiele*, eds. Friedhelm Bliemel et al. (Stuttgart: Schäffer-Poeschel, 2005), pp. 76–77.

E Template of questionnaire of main study (German)

Liebe Umfrageteilnehmerin, lieber Umfrageteilnehmer,

vielen Dank für Ihre Unterstützung dieser wissenschaftlichen Studie.

Dieser Fragebogen richtet sich an Nutzer von Connected Remote Services, wie z.B. Audi Connect, BMW Connected Drive, Mercedes Me, Skoda Connect, Opel OnStar, Volkswagen Car-Net, etc.

In der folgenden Befragung geht es darum, wie Sie Connected Remote Services im Alltag bewerten. Connected Remote Services ermöglichen es dem Nutzer sich mit seinem Fahrzeug sowie der bevorzugten Vertragswerkstatt zu vernetzen. Hierdurch kann der Nutzer wichtige Fahrzeugzustandsdaten überwachen und bestimmte Fahrzeugfunktionen via Smartphone-Anwendung oder via PC bedienen. Darüber hinaus kann Ihre Vertragswerkstatt ebenfalls per Ferndiagnose auf Ihr Fahrzeug zugreifen und Sie somit z.B. über anstehende Service-Bedarfe informieren.

Bitte beachten Sie bei der Beantwortung der Fragen, dass es keine "richtigen" oder "falschen" Antworten gibt. Bitte beantworten Sie alle Fragen – auch wenn sie Ihnen ähnlich erscheinen sollten – und versuchen Sie so präzise und spontan wie möglich zu antworten.

Die Beantwortung des Fragebogens dauert ca. 10 Minuten. Selbstverständlich behandeln wir Ihre Angaben anonym, es sind keine Angaben zu Ihrer Person, Ihres Namens und Ihrer Adresse erforderlich.

Herzlichen Dank für Ihre Zeit und Unterstützung.

Adam-Alexander Manowicz

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Fahrzeugmarke und Baujahr

Frage	**Skala**
Welche Fahrzeugmarke nutzen Sie überwiegend?	Audi; BMW; Mercedes-Benz; Opel; Porsche; Volkswagen; Ich fahre eine andere Marke
Welches Baujahr ist Ihr Fahrzeug?	2017; 2016; 2015; 2014; 2013; 2012; 2011; 2010; 2009; 2008; Älter

[Nächste Seite]

Nutzung und Fahrleistung

Wie ist die überwiegende Nutzung Ihres Fahrzeugs?	Überwiegend privat; Überwiegend geschäftlich; Etwa in gleichen Teilen privat und geschäftlich
Wie hoch ist Ihre jährliche Fahrleistung?	0-10.000km; 10.001-20.000km; 20.001-30.000km; > 30.000km

[Nächste Seite]

Nutzung Connected Remote Services

Frage	Skala
Welche Connected Remote Services Anwendung nutzen Sie? Bitte wählen Sie aus einer der angegebenen Optionen aus oder geben Sie unter Sonstige. den Namen der von Ihnen genutzten Connected Remote Service Anwendung an.	Audi Connect; BMW Connected Drive; Mercedes Me; Opel OnStar; Skoda Connect; Volkswagen Car-Net; Sonstige [manuelle Eingabe]; Ich nutze keine Connected Remote Services
Wie häufig haben Sie in den letzten 12 Monaten Ihre Connected Remote Service-Anwendung genutzt?	Nie; Selten; Regelmäßig; Oft

[Nächste Seite]

Im Folgenden geht es darum, wie Sie einzelne Funktionen von [CRS] wahrgenommen haben. Bitte vergegenwärtigen Sie sich hierzu noch einmal Situationen in denen Sie [CRS] in den letzten 12 Monaten genutzt haben.

Geben Sie bitte an, inwieweit Sie den einzelnen Aussagen zustimmen.

Fragen zu Erfahrungen mit Funktionen von Connected Remote Services

ID	Frage	Skala
COV_1	Durch die Nutzung von [CRS] spare ich Zeit, um wichtige Fahrzeuginformationen abzurufen.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
COV_2	[CRS] ermöglicht mir die bequeme Routenplanung per App.	
COV_3	[CRS] erleichtert die Nutzung bestimmter Funktionen.	
COV_4	[CRS] erleichtert die Vereinbarung eines Service-Termins.	
INT_1	Ich fühle mich mit dem Fahrzeug verbunden, weil ich über [CRS] das Fahrzeug jederzeit lokalisieren kann.	
INT_2	Ich fühle mich mit dem Fahrzeug verbunden, weil ich den Fahrzeugstatus jederzeit über [CRS] abrufen kann.	
INT_3	Ich fühle mich mit dem [Marke] Händler verbunden, weil ich Vorschläge zur Service-Terminvereinbarung über [CRS] erhalten kann.	
INT_4	Die Überwachung der Fahrzeugdaten über die Telediagnose erleichtert der Werkstatt die Vorbereitung einer anstehenden Wartung.	
CFT_1	Ich empfinde es als komfortabel, wenn ich die Fahrzeugtemperatur über [CRS] voreinstellen kann.	
CFT_2	Ich empfinde es als komfortabel, Terminvorschläge für einen anstehenden Service über [CRS] zu erhalten.	
CFT_3	Die automatische Notruffunktion reduziert in einer Notsituation meinen Stress.	
STY_1	Die automatische Notruffunktion von [CRS] vereinfacht den Rettungsprozess im Falle eines Unfalls oder einer Panne.	
STY_2	Immer überprüfen zu können. ob die Fahrzeugtüren verriegelt sind, gibt mir ein Gefühl von Sicherheit.	
STY_3	Es gibt mir ein Gefühl von Sicherheit, sofort über [CRS] informiert zu werden. falls mein Fahrzeug gestohlen wird.	
STY_4	[CRS] hilft Sicherheitsrisiken zu vermeiden.	
REL_1	Warnmeldungen bzgl. niedrigem Reifendruck, abgefahrenen Bremsen oder zum Batteriestatus erhöhen die Sicherheit.	
REL_2	Fahrzeugpannen können durch die Überwachungsfunktionen von [CRS] vermieden werden.	
REL_3	Die Überwachungsfunktion von [CRS] erhöht die Zuverlässigkeit des Fahrzeugs.	

[Nächste Seite]

Im Folgenden geht es um Ihre Bewertung von [CRS] insgesamt.
Bitte bewerten Sie inwieweit Sie den einzelnen Aussagen zustimmen.

Gesamtbewertung der Connected Remote Services Anwendung

ID	Frage	Skala
CRS_1	[CRS] erleichtert die Bedienung bestimmter Fahrzeugfunktionen.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
CRS_2	Durch die Nutzung von [CRS] fühle ich mich mit dem Fahrzeug und mit meinem [Marke] Händler verbunden.	
CRS_3	Die Nutzung von [CRS] erhöht den Komfort.	
CRS_4	Die Nutzung von [CRS] gibt mir ein Gefühl von Sicherheit.	
CRS_5	Durch [CRS] erhöht sich die Zuverlässigkeit des Fahrzeugs.	

[Nächste Seite]

Bitte bewerten Sie inwieweit Sie den einzelnen Aussagen zustimmen.

ID	Frage	Skala
VAL_1	[CRS] bietet mir ein gutes Preis-/Leistungsverhältnis.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
VAL_2	[CRS] ist gut gemacht.	
VAL_3	Die [CRS] Anwendung ist von hoher Qualität.	
VAL_4	Insgesamt bietet mir [CRS] einen Mehrwert.	
TRU_1	Ich mich auf [CRS] verlassen.	
TRU_2	Ich kann [CRS] vertrauen.	
TRU_3	Ich kann mich auf meinen [Marke] Händler als Anbieter von [CRS] verlassen.	

[Nächste Seite]

Bitte beantworten Sie auch die folgenden Fragen vor dem Hintergrund Ihrer Erfahrungen mit [CRS].
Bitte bewerten Sie inwieweit Sie den einzelnen Aussagen zustimmen.

Wiedernutzungsabsicht von CRS

ID	Frage	Skala
REU_1	Ich beabsichtige [CRS] weiter zu nutzen.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
REU_2	Ich beabsichtige [CRS] in den nächsten 6 Monaten zu nutzen.	
REU_3	In den nächsten 6 Monaten beabsichtige ich [CRS] regelmäßig zu nutzen.	

Kundendienstloyalität

ID	Frage	Skala
CSL_1	Ich beabsichtige, meine nächste Wartung oder Reparatur wieder beim gleichen [Marke] Händler durchführen zu lassen.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
CSL_2	Ich beabsichtige, zukünftige Wartungen oder Reparaturen beim gleichen [Marke] Händler durchführen zu lassen.	
CSL_3	Ich würde den Kundendienst von meinem derzeitigen [Marke] Händler meinen Freunden und Bekannten weiterempfehlen.	
CSL_4	Ich werde bei der derzeitigen [Marke] Händler treu bleiben, auch wenn mir Freunde und Bekannte einen anderen Händler empfehlen.	

[Nächste Seite]

Im Folgenden geht es um Ihre Einstellung zur Marke/Anbieter von [CRS] und zu Innovationen allgemein.
Bitte bewerten Sie inwieweit Sie den einzelnen Aussagen zustimmen.

Freude und Innovativität

ID	Frage	Skala
JOY_1	Ich genieße es [CRS] zu nutzen.	- Stimme gar nicht zu - Stimme eher nicht zu - Teils-teils - Stimme eher zu - Stimme voll zu
JOY_2	Ich empfinde die Nutzung von [CRS] angenehm und faszinierend.	
JOY_3	Es macht mir Spaß [CRS] zu nutzen.	
INO_1	Innovationen zu nutzen bereitet mir persönliches Vergnügen.	
INO_2	Wenn ein neues zeitsparendes Produkt auf den Markt kommt, werde ich es gerne nutzen.	
INO_3	Innovationen machen das Leben spannend und aufregender.	

[Nächste Seite]

Bitte beantworten Sie zum Schluss noch die folgenden Fragen.

Demografische Fragen

Frage	Skala
Welches ist Ihr Geschlecht?	- Männlich - Weiblich
Wie alt sind Sie?	17-24 Jahre; 25-34 Jahre; 35-44 Jahre; 45-54 Jahre; 55-64 Jahre; 65 Jahre oder älter

[Nächste Seite]

Vielen Dank für Ihre Teilnahme!
Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken.
Ihre Antworten wurden gespeichert. Sie können das Browser-Fenster nun schließen.

F Template of questionnaire of main study (English)

Dear participant,

Thank you very much for participating in this scientific study.

This questionnaire addresses users of "connected remote services", such as Audi Connect, BMW Connected Drive, Mercedes Me, Skoda Connect, Opel OnStar, Volkswagen Car-Net, etc.

This questionnaire is concerned about your rating of connected remote services in your everyday life. Connected remote services connect users with their vehicles and preferred authorized dealers/maintenance and repair shops, enabling the users to query relevant data regarding vehicle status and to control specific vehicle functions via smart phone-application or PC. Further, the authorized dealer/maintenance and repair shop can perform remote diagnosis over the air and, e.g., inform the user about upcoming service requirements.

When answering the questions, please consider that there are no "correct" or "false" answers. Please answer all questions, although some of them might appear to be similar. Please try to be as precise and spontaneous as possible.

The questionnaire takes about 10 minutes. Of course, all gathered data will be kept anonymously. It is not necessary to provide any personal information, such as name or address.

Thank you very much for your support.

Adam-Alexander Manowicz

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Vehicle brand and model Year

Question	Scale
What automobile brand do you drive mainly?	Audi; BMW; Mercedes-Benz; Opel; Porsche; Volkswagen; I drive another brand
Which model year is your automobile?	2017; 2016; 2015; 2014; 2013; 2012; 2011; 2010; 2009; 2008; Older

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Usage and mileage

Question	Scale
How do you use your automobile?	Mainly private; Mainly for business; About in equal parts private and business
What is your mileage per year?	0-10.000km; 10.001-20.000km; 20.001-30.000km; >30.000km

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Usage of connected remote services

Question	Scale
Which connected remote service application do you use? Please select one of the options or specify the name of the connected remote service application you are using under “Other”.	Audi Connect; BMW Connected Drive; Mercedes Me; Opel OnStar; Skoda Connect; Volkswagen CarNet; Other [manual input]; I do not use connected remote services
How often have you used your connected remote service application in the last 12 months?	Never; Rare; Regularly; Often

[Next page]

The following is about how you have perceived individual functions of [CRS]. Please recall the situations in which you have used [CRS] in the last 12 months. Please indicate to what extent you agree with the individual statements.

Questions about experiences with connected remote services

ID	Question	Scale
COV_1	[CRS] makes me save time in obtaining information about vehicle status.	Five-point Likert scale ranging from “strongly agree” to “strongly disagree”
COV_2	[CRS] assists me to plan an itinerary more conveniently.	
COV_3	[CRS] simplifies the use of specific functions.	
COV_4	[CRS] makes the service appointment booking process more convenient.	
INT_1	I feel connected to the vehicle because I can locate the vehicle any time via [CRS].	
INT_2	I feel connected to the vehicle because I can monitor its status from anywhere via [CRS].	
INT_3	I feel connected to the [brand] dealership, because I can receive proposals for service appointments due to maintenance or repair needs.	
INT_4	Vehicle monitoring via tele-diagnosis makes it easier for the dealerships’ car service to prepare a pending maintenance.	
CFT_1	I feel thermally comfortable because I can precondition the HVAC system via [CRS].	
CFT_2	Receiving proposals for service appointments via push-notification is comfortable for me.	
CFT_3	Automatic triggering of the breakdown call lowers my stress in emergency situations.	
SFT_1	[CRS] simplifies the rescue process in the event of an accident or vehicle breakdown.	
SFT_2	To always know whether the vehicle is locked makes me feel secure.	
SFT_3	Receiving push notifications in the event of automobile theft makes me feel secure.	
SFT_4	Use of [CRS] helps to prevent safety risks.	
REL_1	Warning messages regarding low tyre pressure, worn brakes, and low battery voltage are important to me.	
REL_2	Vehicle breakdowns can be prevented because of the monitoring functions of CRS.	
REL_3	Vehicle monitoring via [CRS] increases the reliability of the vehicle.	

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Overall evaluation of the connected remote services

ID	Question	Scale
CRS_1	[CRS] simplify the use of certain vehicle functions.	Five-point Likert scale ranging from “strongly agree” to “strongly disagree”
CRS_2	By using [CRS], I feel simultaneously connected to the vehicle and to my [brand] dealership.	
CRS_3	The use of [CRS] increases my comfort.	
CRS_4	[CRS] increase safety.	
CRS_5	[CRS] increase reliability of the vehicle.	

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Please indicate to what extent you agree with the individual statements.

ID	Question	Scale
VAL_1	[CRS] offer value for money.	Five-point Likert scale ranging from “strongly agree” to “strongly disagree”
VAL_2	[CRS] are well made.	
VAL_3	[CRS] have consistent quality.	
VAL_4	Overall, the value of [CRS] to me is high.	
TRU_1	I can rely on [CRS].	
TRU_2	I feel I can trust [CRS].	
TRU_3	I feel I can rely on my [brand] dealership as the provider of the [CRS] application.	

[Next page]

Please also answer the following questions in light of your experience with [CRS].
Please indicate to what extent you agree with the individual statements.

CRS reuse intention

ID	Question	Scale
REU_1	I intend to use [CRS].	Five-point Likert scale ranging from “strongly agree” to “strongly disagree”
REU_2	I intend to use [CRS] for the next six months.	
REU_3	For the next six months, I intend to use [CRS] frequently.	

Car servicing loyalty

ID	Question	Scale
CSL_1	In intend to have my next maintenance or repair service performed at the same [brand] dealership.	Five-point Likert scale ranging from "strongly agree" to "strongly disagree"
CSL_2	I intend to have future maintenances or repair services performed at the same [brand] dealership.	
CSL_4	I would recommend my current [brand] dealership's car servicing to my friends and acquaintances.	
CSL_4	I will stay with my [brand] dealership, even if friends and acquaintances recommend a different dealer for car servicing.	

[Next page]

The following is about your attitude towards the provider of [CRS] and about innovations in general. Please indicate to what extent you agree with the individual statements.

Enjoyment and innovativeness

ID	Question	Scale
JOY_1	I enjoy using [CRS].	Five-point Likert scale ranging from "strongly agree" to "strongly disagree"
JOY_2	I find [CRS] enjoyable and fascinating.	
JOY_3	I have fun using [CRS].	
INO_1	Using novelties gives me a sense of personal enjoyment.	
INO_2	If a new time-saving product is launched, I will use it right away.	
INO_3	Innovations make my life exciting and stimulating.	

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Please answer the following questions.

Demographic issues

Question	Scale
Which is your gender?	- Male - Female
What is your age?	17-24 years; 25-34 years; 35-44 years; 45-54 years; 55-64 years; 65 years or older

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Thank you for your participation!
We would like to thank you for your cooperation.
Your answers have been saved. You can now close the browser window.