This book introduces the concept of m-commerce, the m-commerce value chain, mobile services, and their characteristics after an exploratory research phase. Expert interviews yielded insights into m-commerce. Among those interviewees were executives and researchers from nine countries. The findings from literature review were combined with those of the expert interviews for a more detailed view of the unexplored field of mobile services.

The research model was developed based on a thorough analysis of literature. Theoretic building blocks for the model development were service quality and diffusion of innovations theory.

An online survey was carried out to collect data for the model test. 502 m-parking users completed the questionnaire and were included in the analysis.

The estimation of the model used the software package Mplus. The tool was convenient and flexible for SEM, multiple group analysis, and latent class analysis.

The survey lead to a number of interesting results. The hypothesized causal relationships were supported to a great extent. Before focusing on the implications for industry and researchers the main results are summarized and discussed. Among those methodological findings are the quality of performance measures, binominal data as measures for SEM, theory guided formulation of alternative models, different segments within the sample, and the quality of a-priory criteria for segmentation as opposed to latent class analysis.

- **Performance only measures are well suited as measurement instrument**

The literature review for the measurement instrument pointed toward performance and expectations oriented measures. However, empirical evidence showed that performance measures had equal or more explanatory power and, moreover, a lower degree of complexity for the interviewees. This suggests that performance evaluation is preferred over the expectations measure (Cronin and Taylor, 1992; Cronin and Taylor, 1994). The analyses of the data showed that performance measures perform well when measuring service quality.
• **Binary data are not inferior to other scales in the model test**

The analysis of the measurement model showed that the four point Likert scale is not significantly better than the one with binominal variables. Therefore, it was decided to continue the analysis with binominal variables.

• **The alternative models**

Guided by theory, alternative models were defined. The explanatory power of those and the quality of the measurement model can be considered as satisfying.

The results indicate that trust and value have the most influence on the users' loyalty. Value is primarily determined by the quality of a service and the sacrifice. Trust in the service also has an effect on the perceived quality of the service. The modification of the measurement model and the structural model proved successful since often more parsimonious models lead to good results. Furthermore, this more parsimonious model allowed for using advanced statistical techniques.

The data fit the model well, however, the perceptions of customers, may differ in the sample, therefore, those differences were explored.

• **Customer groups differ in their perceptions of the mobile services**

The results show that there are differences among user groups with regard to their perceptions of mobile services. A significant relationship between group membership and duration of service use leads to the suggestion that concepts like loyalty and value change over time. A limitation is that the constructs are measured at one point in time. A longitudinal analysis would give a dynamic perspective. There is literature suggesting a dynamic perspective of loyalty (see chapter 0 for Oliver's dynamic loyalty perspective). Trying to put such dynamic constructs in a static statistical tool has problems. Such tools, broadly used in research, only allow for snapshots in time, and as a result, important relationships may be overlooked or remain undetected. In a model allowing for different phases (introduction, maturity, decline) the strength of the paths and even the differences in the measurement model could be assessed. These claims, however, are in contrast to the methods available for researchers. To account for dynamic effects a longitudinal study, potentially over a couple of years, would be necessary. In addition, an extension of the model would increase complexity and further hamper data collection and model estimation. Researchers have to make trade-offs between the explanatory power of their models and the complexity of reality.
• A-priori criteria in multiple group analysis only partly lead to satisfying results as opposed to latent class analysis

Three a-priori criteria for detecting groups in the sample, chosen based on theory and expert views, were innovativeness, experience, and age. All of those were found to be significant moderators in other surveys. The results of the multiple group analyses show that only innovativeness is a significant grouping variable. The others did not arrive with significant group differences.

Latent class analyses supported these findings. Out of the three hypothesized moderators only innovativeness proved to be significant in the chi-square test. However, the power of latent class analysis is to find specific groups and flag the cases according to their group membership. As a result, it is possible to carry out further analyses with all the variables. The discovery of groups with such a high degree of variation and internal consistency would not have been possible by solely relying on a-priory criteria. However, it is the researchers’ task to find descriptive variables that best characterize the classes found through the analysis. This may be challenging if not enough data is collected or if, besides from the measurement and structural model, the other variables do not differ between the classes.

The classes identified and the fact that the differences between the classes are essential leads to implications for industry. These are discussed later in this chapter. First, implications for future research are discussed.

10.1 Implications for Future Research

There is potential for future research in a number of areas. First, the merit of replication of this study is discussed. Second, potential research avenues lie in model extensions and refinement. Further methodology driven potentials in the area of linearity and non-linearity of relationships between constructs are highlighted. Finally, this section presents trends in marketing research and advanced methods to gain customer data.

• Replication of the study in different industries and regions

A replication of this study including different services and validating the measurement instrument would be worthwhile. The path estimates may differ according to the type of service. It even was different for various groups of customers as the latent class analysis showed. Different services could include fun-oriented ones – such as ring tone and music download – to efficiency-driven ones like mobile ticketing.
Given a strong theoretic development, future research in this field should develop and test hypotheses related to mobile services. In addition to conceptual work that investigates evolving mobile technologies, the role of culture merits investigation. There is a growing field of research drawing upon culture as an influencing factor in the adoption of technology (Bayarmaa and Boalch, 1997; Ford, Connelly et al., 2003; Loch, Straub et al., 2003; Norris, 2001). It would be interesting to compare the results of the survey across countries to find if the diffusion rates are driven and influenced by cultural backgrounds or the development of the mobile communication industry in a specific country. In Japan mobile services are very common and provided via the i-mode platform and in Scandinavia mobile Java games are popular. Both services, yet, are not that well accepted in the German speaking countries.

Furthermore, as innovativeness was a useful grouping variable, cultural background must be reconsidered. In Japan, a country with a collectivistic background, individual services such as wallpapers to personalize the mobile phone are common. This may lead to the suggestion that Hofstede’s (1980) dimensions are not fully applicable with technological innovations. Furthermore, when replicated, the wording and applicability of the measurement instrument must be considered and adapted.

- **Model extensions and refinements**

Despite thorough literature review, the operationalization of constructs was not without problems. An attempt to reduce skewness of the data by reconsidering the anchors of the scales is valuable. It would be possible to just measure the perceptions of dissatisfaction with anchors of very bad to bad instead of the anchors very good to very bad. They usually lead to a majority of the answers in the areas very good and good. Another approach would be to dichotomize the data and split right after the very good statement to have two groups nearly equal in size instead of the same answer-content (positive vs. negative answer), as it was done in this survey.

Furthermore, there are potential constructs worth investigating and including in a future survey, such as variety seeking and pricing.

Finally, the models presented only show a potential relationship between the constructs. Often literature contradicted with regard to the direction of paths. Therefore, the researcher had to decide which to choose. Thus, alternative nested and non-nested models could be formulated and tested. Those may lead to equally good or even better results.
• Linearity and non-linearity of relationships between constructs

A third area of interest for future research lies in methodology development. Research on satisfaction has shown that the relationship between attribute level performance and overall satisfaction is non-linear. Matzler et al. (2004) argued for the existence of different types of asymmetric relationships (basic factors, excitement factors) as well as linear factors (performance factors). Mittal et al. (1998) argue for a stronger impact of negative attribute performance on overall satisfaction and the results also indicate that a re-examination of the consequent behaviors of satisfaction is necessary. Klein and Muthén (2004) developed a statistically efficient and practicable estimation method for structural equation models with multiple latent-non linear effects that outperform other available approaches with respect to efficiency. Multiple interaction and quadratic effects can be estimated with Klein's Quasi-ML method.

• Future trends in consumer research – or – learning to better listen to the customer

For innovative services, such as mobile services, the input of customers for new service development is essential. The following paragraphs present innovative methods to explicitly and implicitly collect data about the customer. The mobile medium and mobile services in general lend themselves to new methods for consumer research.

Dahan and Hauser (2002) investigate the capabilities of communication and information technologies for rapid and inexpensive consumer input at the stages of the new product development process. The authors explore six Web-based methods of consumer input. The suggested Information Pump allows consumers to interact with each other in an early stage of product development, the Fast Polyhedral Adaptive Conjoint Estimation allows screening larger numbers of product features, in User Design consumers can design their own products, Virtual Concept Testing provides a platform where product development teams can actually build a product. Finally, a stock-market simulation called Securities Trading of Concepts identifies winning concepts. Compared to traditional market research techniques, new media tools are more cost-efficient and accurate, and allow listening to the customer and product developers at different stages of the innovation process (Dahan and Hauser, 2002).

A similar approach provides toolkits for customers to co-create their preferred product. By shifting innovation tasks from the manufacturer to the consumer (von Hippel, 1986), new product development can benefit from creative users and meet increasingly heterogeneous needs more effectively (von Hippel, 1999).
These two approaches are effective, but depend on the customers' willingness to provide information. At the same time, customers voluntarily post valuable comments and product information on the Internet, but companies lack the ability to detect, analyze and use this source of information. Brohman et al. (2003) introduce the concept of net-based customer service systems (NCSS), which operate either directly via a Web browser, PDA or cell phone, or indirectly via a service representative or agent. Data-mining tools support NCSS in analyzing data for market segmentation, profiling customers and matching services. Most companies only store data on past transactions. Few companies have achieved a broader view and lack the capability to collect data across multiple brands and products. Third-party travel firms such as Travelocity and online mass merchandisers like Amazon are very effective at collecting this type of data. Amazon.com’s recommender system collects data related to multiple brands by using adaptive filters to identify up-selling and cross-selling opportunities (Zhang and Im, 2002).

A contribution by Watson (2004) highlights customer-managed interaction (CMI), a new service model on the horizon. This would solve the argument about who owns customer data; in this approach the customers themselves would have total control over information about their purchases and preferences. When applying CMI the customer has full control of the content, mode and timing of data exchange for all vendor and service encounters (Watson, 2004).

These methods of consumer input are innovative, but costly and time consuming. Above that the decision makers are dependent on consumers willingly providing information.

Shardanand and Maes (1995) introduce a social filtering system that automates "word-of-mouth" recommendations for music. The technology helps navigate the abundance of digital information. Social (collaborative) filtering systems recommend items for the user’s consumption based on similarities of the values assigned by other people and the customer’s own values. Thus, individual recommendations are generated through correlations in the value structure. The Internet is not just a medium to obtain information, it also facilitates communication between customers who want to share their experiences with a particular good or service. Web sites provide virtual opinion platforms where consumers can tap articulations on products, services and companies (Henning-Thurau and Walsh, 2003). As traditional methods of gathering and aggregating this type of information are time consuming and expensive, automated tools may be a welcome alternative.

In the field of mobile services an abundance of Internet platforms exist where customers exchange comments and views. These may be used in the future for implicit collection of customers’ perceptions on services.
10.2 Implications for Industry

Mobile applications are in their early stages and should develop rapidly in the next years. Two complementary factors help fuel this evolution. On the one hand, user acceptance of the services continues to evolve as the devices become simpler and easier to use (Pedersen and Herbjorn, 2003). On the other hand, manufacturers continue to improve and enhance their mobile devices. Usage constraints such as a small display and inconvenient handling should diminish as the technology continues to improve. For special user groups or companies with unique requirements, specially adapted mobile devices are also possible. This accounts for the case explored in this survey. Police men, for instance, are equipped with special PDAs that enable them to check if drivers paid the fee and in case they did not executive authority can directly print a parking ticket.

There are lessons learned for industry that derive from this book. Among those are insights in the importance of the quality - value - loyalty chain, the importance of different segments and targeting them accordingly, and offering mobile services in general. Those main findings with implications for industry are now explained in more detail.

- **Importance of the quality - value - loyalty chain**

The nature of the mobile medium lets users send and receive messages at any time. This is one value proposition of mobile services. It is important that services deliver value since this has a positive impact on the users' satisfaction and usage behavior (Zeithaml, 1988). The results show that the well established causal chain between perceived quality - value - loyalty is supported in this research. The second effect on loyalty is caused by trust. For companies this implies that it is important to offer reliable services to create some degree of loyalty. The value proposition is also important. Customers may be unaware of the value resulting from using a service.

For companies it is important to know which factors it can influence to create a high degree of loyalty among their customers and, hence, reduce churn. Among the factors they can influence is the reliability of the system they provide the service with. This is SMS in the case of m-parking. Since SMS is a best effort service, in other words it is not certain the message arrives if there is to much traffic on the network, providers have to offer some service recovery if messages delivery fails. Furthermore, since fines are heavy if the driver does not pay the parking fee on time, trust in proper service delivery is necessary. Payment is settled via the network operator so, once more, trust into security of the payment process are important.
• Importance of different segments and tailored targeting of those

As learned from the above discussion there are segments that vary with respect to the perceptions and are distinct from each other. Accordingly, it is important to target them differently. Knowledge from companies’ customer relationship tools can do this. Often companies do not fully use the possibilities for customer relationship management or are not aware of their potential.

The Mobile Service Skeptics have a bad quality and value perception and perceive the sacrifice as highest. Companies have to either highlight the advantages of using mobile services for this group or accept that this group is not using many of the services offered. Generally, this class is not innovative and does not use many other mobile services either.

The Undecided Users could be turned into more heavy users by companies. The members of this class are loyal users who trust the service but their perceptions of quality and value of the service are not excellent. This class hast to be convinced of the quality and value of the service. This may even result in more heavy use or even in use of new services. Hence, additional revenue can be generated for companies.

The Cautious Innovators trust the service the least. They have to be convinced that the service works well. In some cases they even may have made bad experience when using the service. Companies should have effective service recovery procedures not to loose an unsatisfied customer. At the same time it is this class that counts the most innovators. Those are important when new services are introduced. They should be in favor of the service provider as they may serve as opinion leaders for less innovative users.

The last class, the Mobile Service Lovers, should be retained by the providers. There might be potential that those buy even more services in the future. They have a high degree of trust in the service providers; therefore, they are loyal and may consume future offers as well.

• Offer of mobile services – competition within the market

Most mobile network operators offer mobile services. For some they are important as their corporate strategy is to be the market leader in innovations and customer orientation. Their aim is to increase average revenue per customer through cross selling mobile services. Some offer packages with flat fees that allow usage of certain services at no additional charge. Others use pay-as-you-go pricing models for services such as m-parking. Most of the services are only provided by one network operator. Mobilkom for instance, offers the Vodafone life! platform as gateway to most mobile services, while t-mobile offers services on t-zones. Such offers, however, are always limited to a specific cus-
tomer group, the company's own customers. Generally, it is important to mention that services that should have sustainable success should be offered independent of the platform or net-provider. This is the case with m-parking. Initially not all providers collaborated but by now it is possible to pay for parking fees via SMS, no matter what network operator one has.

Yet, the customer service offered and the specific pricing model of voice communication is the main basis of decision, which provider to pick. In a couple of years, however, the offer of mobile services may be a further factor considered when deciding on which network provider to pick.