Building a Customer Value Model in Mobile Communication Business

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Abstract — **Communication services are currently confronted with large changes due to the price erosion of services and entering new service providers. The gap is filled with different services that are hoped to be successful in the near future. The problem, however, is that firms do not necessarily know what their customers value. One solution to the problem is building a customer value model. This paper applies the Delphi method to formulating the customer value model which is implemented by using the Analytic Hierarchy Process. The result is a model for understanding customer value preferences which includes the relative value preferences of the value elements and their attributes, the preference profiles for deeper segmentation of customers, and finally the performance analysis of the case systems.**

Keywords — **customer value, mobile services, business model, Delphi.**

I. INTRODUCTION

A. Background of the study

Mobile communication services can be understood as services and products that enable the information and communication transfer between persons. These kinds of services are currently confronted with large changes due to the price erosion of services and entering new service providers. These new services are often based on Internet technologies such as Voice over IP (VoIP) applications. The gap is filled with different services that are hoped to be successful in the near future. The problem, however, is that firms do not necessarily know what their customers value. This leads to creating services with no users and to even greater problems. On the other hand some of the current business models in communication services are not vital in situations where customers value services above low prices. For example, service operators have adjusted their business to allow low prices by cutting R&D operations down and downsizing the staff. If customers' preferences drift towards services, the operator cannot provide these, firstly because of the ignorance of the changed situation and secondly because of the lack of capability to provide new services. It can be assumed that in the changed situation some other party has the capability to act.

One solution to these problems is building a customer value model with the Customer Value Audit (CVA) [1]

process. The aim of the CVA process is to integrate the customer with the R&D process of the firm. Integrating the customer into the process generates value to the customer, but the real challenge is how the firms can benefit from this as well.

B. Scope of research

The objective and research problem of this study is to build a model for analyzing the customer's values that drive and explain the changes in the business model and on entire value network levels. The overall framework is presented in Figure 1.
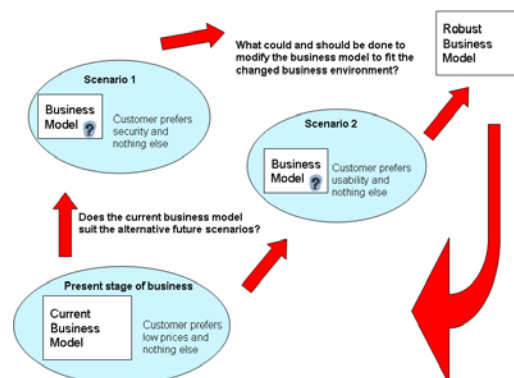

Figure 1. The research framework.

In the framework, the hypothesis is that the dynamics between present and future business model scenarios are driven by the development of different customer profiles. Further, these profiles or segments are comprised of the combination of various customer value attributes. To reveal the real preferences of the customer of mobile services, a case of two mobile communication service systems was established. The following characters of these communication systems were taken into the analysis: voice service, contact information management, status service, file transfer, call screening, and SMS/instant messages.

The aim of the empirical part of the paper is to rate customer values in communication systems and to analyze what communication system best realizes the desirable values. We use the Delphi method to formulate the customer value model. The Delphi is implemented by using the Analytic Hierarchy Process (AHP). The value

evaluation is made by using the pair-wise comparison technique, where each attribute is compared to another to find out the preference order. As a result we provide a model for understanding customer value preferences and their connection to the value creation in networks.

II. CUSTOMER VALUE ANALYSIS

A. Creating value in networks

From the value network perspective, the concept of value creating system has been added in the strategic management literature to illustrate the entire set of activities and companies linked to produce value for both the end-customers and the actors in the system. According to Normann and Ramirez [2], "the focus of strategic analysis is not the company or even the industry but the value-creating system itself, within which different economic actors − suppliers, business partners, allies, customers − work together to produce value." By this definition, customer preferences are an important element in the value network of actors, since the value is captured from customers [3]. In consequence from the value networks standpoint, customer requirements and preferences are essential in order to understand the changes in value network structures.

A concept that is often related to value networks, and especially describing the firms in them, is business model which is briefly a description of how the firm does business [4]. According to Cartwright and Oliver [5], a business model describes "how and where the firm engages in business, who its customers are, and often, who its major competitors are. Typically, the firm will also describe the major activities that it performs in the course of its business" [5].

The value in the network is ultimately brought in by the customer who purchases the product or service because it has elements that the customer considers valuable. The business model of a firm is in a central role in capturing this value. This is why identifying the elements of value and changes in the preferences of customers are critical for business. The efficiency and flexibility of the business model are essential for maintaining the competitive advantage.

B. Analyzing customer value

The aim of the customer value analysis is to integrate the customer with the R&D process of the firm. Although the idea is originally presented in a business-to-business environment, the basic idea can be transferred to the consumer markets as well [6]. One main view of the connection between the customer and the firm is the study of the customer need assessment [see e.g. 7; 8; 9]. In this view the aim is mainly to recognize the unrecognized needs of customers. The customer need refers to what customer ultimately wants. Customer value, on the other hand refers to what customer wants with certain limitations like money. Another approach for integrating the customer into the firm's processes is the customer value view [1; 6; 10-12].

This view is also linked to the value creation of firms which makes it more suitable for this research.

Integrating the customer with the R&D process certainly generates value to the customer, but to capture the value generated, firms have to reconfigure their business models accordingly [6]. Building a customer value model helps the firm to recognize the customer values and to modify the business model suitable for capturing them.

The customer value model is a data-based representation of the worth (in monetary terms) of the product or service to the customer [10]. Although the value in the customer value model should be addressed in monetary terms, we approach the concept of value from a wider point of view. We use the value definition of Flint and Woodruff [11] who argue that value is either received value or desired value. Received value is the value that the customer actually gets from a certain service. According to Flint and Woodruff [11], the desired value is "the bundle of product attributes and resulting consequences, both positive and negative, and monetary and non-monetary, that the customer wants to happen." We concentrate on the analysis of the customer-desired value. Flint and Woodruff [12] also point out that the concept of customer-desired value should not be mixed with the concept of personal value: personal values are abstract core beliefs that guide human behavior. Where personal values are generic and fairly stable, customer-desired value is more tied to a service or a product and it faces more changes [12]. The value of some service to the customer is a subjective matter [13], and it depends on the customer's user profile, namely, the way he or she likes to use the service, or is used to using it. In a group of people with similar user profiles, the value of the service is quite comparable.

We use the CVA as a tool for developing a customer value model. The CVA process has three phases: start-up, survey, and strategy formulation [1]. We have modified the process to fit the study of customer desired value in communication services.

III. CREATING A CUSTOMER VALUE MODEL

A. Establishing the case study

Customer studies are usually implemented as surveys, and there are some drawbacks with such an approach. Firstly, the issues of value are profound, and reliable answers require deep thought into which surveys usually do not force respondents. Answers can be unreliable since it is easy to make judgments without reflection. Secondly, it may be hard to get differences in the answers because respondents do not have to pay attention to the consistency of their judgments relative to the other questions in the instrument. We have approached the problem of the customer value study with a model that forces the subject to think. The pair-wise comparison has a built-in feature of choice making. When favoring one attribute of the pair, it means that the other one is not favored. For example, in this study within the pair *security vs. prices*, preferring security means that customer accepts higher prices. This represents

the sacrifice side of the value; when favoring one attribute you have to give up some other attribute. This makes it a more appropriate method for a customer preference analysis than the traditional survey.

To formulate and test the customer value model in practice, we have conducted a case study in mobile communication services. The case systems are specified as Skype Mobile and Smart Phone. Smart Phone is an ordinary phone with high quality data transfer and other advanced features, and it uses the mobile telecommunication network as an access network. The limitation is that this phone does not have a Wireless Local Area Network (WLAN) connection. Skype Mobile is a phone with above-mentioned features and the WLAN connection. This phone also has Skype application integrated into the operation system. Basically, the Skype Mobile can be any kind of VoIP application integrated into the mobile terminal.

We use the AHP decision model where each quality attribute is pair-wise compared with each other to find their relative importance order. The selection of the customer segment is the start point of building a customer value model [10]. We have selected the consumer segment and formed a customer panel of lead users and advanced users of mobile services. According to von Hippel [14], lead users are people who "face needs that will be general in a marketplace, but they face them months or years before the bulk of that marketplace encounters them, and … are positioned to benefit significantly by obtaining a solution to those needs." Advanced users are users that are experts on the subject of mobile services through their personal interests or their work.

The customer value model can be opened and analyzed by defining the single attributes of value elements that can be technical, economic, service or social in nature [10]. Garvin [15] has presented eight dimensions of product quality, which are performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. The studies of service quality were furthermore applied to address the special features of services. For example, Parasuraman et al. [16] have modified and added some intangible attributes in the assessment of services quality. These attributes include tangibility, reliability, responsiveness, assurance, and empathy among others. We have combined and modified these categories to fit the case of assessing services of mobile communication systems. The list of the modified value elements and their attributes is presented in Table 1.

TABLE 1
ATTRIBUTES AND THEIR EXPLANATIONS

Availability of services:

1. Coverage of the network
   The network can be used everywhere or just at some hotspots.

2. Reachability
   Call receivers' reachability. Relevant issues are e.g. is the device always on and is it in the network area. Networks available GPRS, UMTS, WLAN, etc.

3. Terminal updating
   Easiness to take new services in use. Availability of device and software updates.

4. Size of network user base
   Size of the device or software user base. Possible contacts.

5. Potential new services
   Possible new services. The innovativeness of services.

Features and their usability:

6. Using the voice service
   Ordinary call. Making the call, speaking, and ending the call.

7. Using the conference call
   Telephone call among several people at the same time. Making the call, speaking, and ending the call.

8. Management of contact information
   Numbers, names, addresses, etc.

9. Using the status services
   Status affects the device's signaling features. E.g. "in meeting" or "not available" have different signal tones. Can also be visible to caller e.g. Skype.

10. File transfer
    Sending and receiving photos, text documents, etc.

11. Using the SMS/MMS/instant messages
    Writing, sending and receiving messages.

Security:

12. Information security
    Protection against eavesdropping. Anonymity. Personal data protection.

13. Call screening
    The easiness of defining from whom or which number calls can come.

14. Trusting the service provider
    Assurance of the service. Confidentiality of the customer data. Stability of the terms of contract.

15. Independency of the service provider
    Possibility to change the subscriber connection and use services provided by other service providers.

Costs:

16. Initial set-up
    Affordability of initial set-up. Purchasing the devices and software, setting up the connections.

17. Local calls
    Affordability of local calls.

18. International calls
    Affordability of long-distance calls.

19. Conference calls
    Affordability of conference calls.

20. File transfer
    Affordability of data transfer.

21. SMS (MMS)/ instant messages
    Affordability of messaging.

The *Availability of services* represents the service and *Features and their usability* the technical value element. The social element is taken into account in the *Security* category and the economy element in the *Costs* category. The attributes that illustrate the product quality dimensions are modified to fit the case services.

B. Methodology and process

We used the Delphi method to formulate the customer value model by structuring communication between groups of people who can provide valuable contributions in order to resolve a complex problem [17]. With the Delphi

technique, participants state their opinions in an anonymous questionnaire [18]. The characteristics of a Delphi study are iteration, anonymity, controlled feedback, and group statistical response [19].

The Delphi iteration rounds were implemented by using the AHP tool. The fundamental principle of the AHP is to decompose a decision problem into a hierarchy of parts. According to Saaty [20], by structuring a system into clusters and subdividing clusters into smaller pieces, it is possible to form a complete picture of the whole system. The hierarchy is formulated by starting from the goal of the decision making and proceeding to objectives and covering objectives. In making the judgments, the elements of the problem are looked at in isolation, one element compared against another with respect to a parent element. A pair-wise comparison is used throughout the hierarchy to derive the priorities of the elements. Finally, the performance of each alternative is evaluated with respect to objectives. One advantage of the AHP is that it provides a rational way to conduct expert opinions by taking into account the inconsistency of judgment. It also harmonizes the comparison between tangible and intangible measures by allowing the usage of the verbal linguistic scale in the assessment.

For the first Delphi round, the model was formed into an anonymous web-based questionnaire where the attributes were placed as pairs so that every attribute was compared to another (see Appendix 1). This evaluation was performed by conducting a customer panel where experts made judgments of their relative preferences of the value attributes. The functionality of the AHP also allowed direct ratings to be made.

The final part of the case study addressed the fit between the value attributes and the selected two communication systems. The aim of this second Delphi round was analyze what communication system best realizes the desirable values. The model was also based on the AHP tool where a group of experts rated the attributes' realization in the case services. The group analyzed and discussed each attribute and decided which system best realized the attribute. The assessment was made on a scale from 1 to 9. Figure 2

presents the AHP model used in comparing the relative importance of the value elements and their attributes.
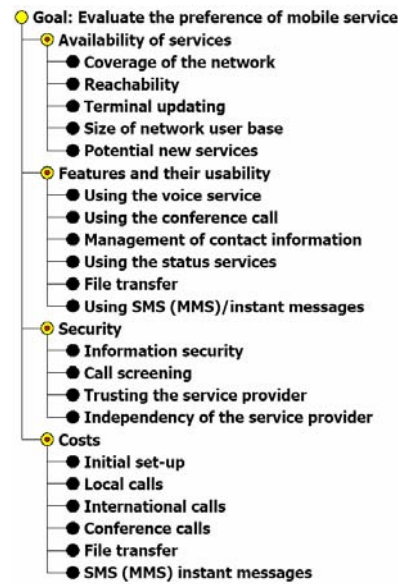

Figure 2. The AHP model of customer value elements.

C. Customer panel data

The model was tested in an expert customer panel consisting of 14 users of communication systems and ICT researchers. The aim was to analyze how different options perform with different attributes.

Table 2 presents the value preferences of the customer expert panelists after AHP supported comparisons of the value attributes. The value preferences in the model present the relative weights of each attribute in the above hierarchy. The values of each of the panelists (p2–p14) have been illustrated in the table. P1 shows the combined values of group judgments. The combined value was calculated by using the mathematical algorithms in the Expert Choice AHP software.

TABLE 2
RELATIVE VALUE PREFERENCES OF ATTRIBUTES IN THE MODEL.

	combined, p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14
Availability of services	**0,176**	**0,436**	**0,153**	**0,158**	**0,134**	**0,120**	**0,559**	**0,279**	**0,068**	**0,119**	**0,077**	**0,054**	**0,183**	**0,084**
Coverage of the network	0,256	0,411	0,322	0,213	0,294	0,219	0,211	0,099	0,572	0,101	0,195	0,234	0,082	0,167
Reachability	0,395	0,319	0,243	0,475	0,142	0,544	0,604	0,569	0,170	0,160	0,161	0,538	0,507	0,460
Terminal updating	0,127	0,036	0,090	0,193	0,142	0,069	0,104	0,052	0,031	0,347	0,215	0,100	0,292	0,060
Size of network user base	0,123	0,141	0,289	0,035	0,142	0,035	0,053	0,246	0,148	0,045	0,377	0,044	0,032	0,277
Potential new services	0,099	0,092	0,055	0,084	0,280	0,134	0,028	0,035	0,078	0,347	0,052	0,084	0,087	0,036
Features and their usability	**0,224**	**0,282**	**0,121**	**0,107**	**0,232**	**0,208**	**0,163**	**0,082**	**0,390**	**0,399**	**0,215**	**0,124**	**0,183**	**0,195**
Using the voice service	0,426	0,419	0,336	0,257	0,266	0,457	0,585	0,461	0,382	0,212	0,416	0,449	0,424	0,479
Using the conference call	0,052	0,043	0,073	0,044	0,056	0,049	0,020	0,021	0,052	0,038	0,078	0,109	0,094	0,025
Management of contact information	0,144	0,260	0,117	0,242	0,144	0,111	0,139	0,116	0,083	0,215	0,149	0,079	0,097	0,098
Using the status services	0,047	0,114	0,028	0,040	0,067	0,046	0,021	0,053	0,024	0,027	0,051	0,031	0,044	0,062
File transfer	0,124	0,084	0,161	0,203	0,201	0,049	0,057	0,262	0,210	0,421	0,027	0,217	0,100	0,024
Using SMS (MMS) /instant messages	0,207	0,080	0,286	0,214	0,266	0,289	0,178	0,087	0,249	0,087	0,278	0,115	0,241	0,313
Security	**0,205**	**0,102**	**0,291**	**0,526**	**0,402**	**0,069**	**0,065**	**0,091**	**0,390**	**0,194**	**0,052**	**0,517**	**0,317**	**0,037**
Information security	0,370	0,522	0,275	0,469	0,357	0,193	0,427	0,565	0,552	0,514	0,128	0,388	0,341	0,065
Call srceening	0,119	0,078	0,037	0,053	0,172	0,156	0,172	0,047	0,053	0,189	0,335	0,071	0,047	0,325
Trusting the service provider	0,278	0,200	0,202	0,357	0,235	0,550	0,277	0,288	0,210	0,090	0,075	0,355	0,318	0,301
Independency of the service provider	0,233	0,200	0,486	0,121	0,235	0,101	0,123	0,101	0,194	0,206	0,462	0,185	0,294	0,310
Costs	**0,396**	**0,180**	**0,435**	**0,210**	**0,232**	**0,602**	**0,212**	**0,547**	**0,152**	**0,287**	**0,656**	**0,305**	**0,317**	**0,684**
Initial set-up	0,125	0,399	0,040	0,067	0,168	0,187	0,335	0,061	0,124	0,049	0,115	0,042	0,185	0,081
Local calls	0,387	0,286	0,295	0,361	0,181	0,371	0,392	0,517	0,249	0,222	0,441	0,485	0,240	0,573
International calls	0,072	0,112	0,066	0,108	0,100	0,062	0,052	0,080	0,055	0,032	0,026	0,030	0,168	0,046
Conference calls	0,040	0,035	0,035	0,044	0,042	0,039	0,019	0,023	0,028	0,026	0,044	0,063	0,052	0,028
File transfer	0,149	0,078	0,282	0,185	0,184	0,031	0,137	0,174	0,240	0,530	0,065	0,226	0,177	0,019
SMS (MMS)/instant messages	0,227	0,090	0,282	0,236	0,325	0,310	0,066	0,145	0,303	0,140	0,309	0,153	0,177	0,253

The data was gathered by conducting a pair-wise comparison between each cluster, for instance, the availability of services, and between single items of the value attributes inside the cluster, for instance, the coverage of the network. The panelists were asked to compare the relative importance of each attribute with respect to case mobile services. After the assessment, the AHP model was used to calculate the weighted preferences for each cluster of service attributes and the single items of the attributes.

IV. TESTING THE MODEL

A. Reliability

Inconsistency indicates the illogicality of the respondent (reliability), and it is automatically calculated by the used Expert Choice software. The inconsistency ratio for judgments ranges from 0 (= consistent) to 1 (= random). In normal conditions, good inconsistency is under 0.1; however, when the assessment is conducted as a survey, we accept a higher inconsistency ratio in the study. The study revealed that comparing the attributes is difficult even for an expert. The security element was the most difficult to piece together. The reason can be the ambiguous nature of the subject. Inconsistency was also the reason for eliminating one answer. Figure 3 shows the combined inconsistencies of the value elements.
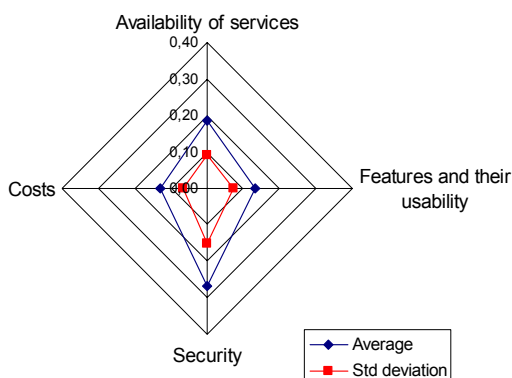

Figure 3. Inconsistencies in the assessment.

B. Customer value preferences

Although the test group was technologically oriented, it valued the affordable cost above the other elements. Security was ranked second, even though, standard deviation was quite high implicating different opinions of the test group on this subject. The average preference weights of value elements are shown in Figure 4.

The average preferences of four main value elements were distributed rather evenly between the elements. Not surprisingly, costs were preferred significantly higher than other elements in the model. This implies the important trend of low-cost services. However, remarkable business potential was related to the relative high level of preference in all the explored value elements. For example, security as a service seems to provide a lot of potential. It should be noted that the prices of mobile services have dropped

significantly in Finland in recent years, which has perhaps increased the relative importance of other value elements.
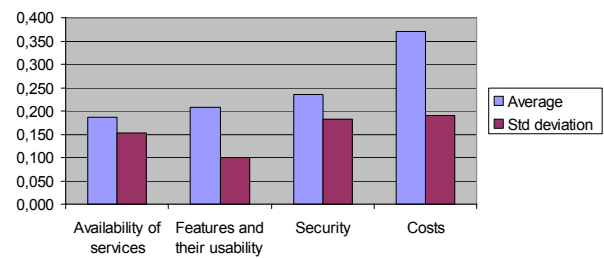

Figure 4. Average preferences and standard deviations of the elements.

Inside the availability of services element the reachability and coverage of the network attributes were preferred. From the business perspective this means that seamless interoperability between networks and applications is critical in order to provide services. On the other hand, the potential new services attribute was not preferred. This can imply that it is hard to imagine the potential of possible new services.

In the features and their usability element, voice services and messaging dominated with over a 60-percent share of the total. This means that the usability and interoperability of these features should be improved. The file transfer had quite high standard deviation. This implies that the preferences are different in different user groups, and there are potential new customer segments that prefer file transfer.

The security element is quite interesting because it was ranked second after costs in the total model. This makes security a very attractive service component. It has the highest inconsistency (illogicality) within the test group, and this could mean insufficient knowledge among customers about the subject. To get benefits from this element some additional marketing and service packaging is needed.

The costs element revealed that the comparison between initial costs and the costs of usage is difficult. This allows firms to benefit from asymmetric information at customers' expense. The inconvenient preference of low costs can be turned into an advantage by bundling the services to create additional value for customers. A harder way is cutting the costs of service production, which is reality in many firms.

C. Customer profiles

Although the sample was small and no statistical evidence could be shown, the study brought up three profiles. These are security, low cost and service profile. It is also reasonable to assume that there is at least a usability profile, but because the customer panel has a technical background the usability issues were not raised.

The results indicate that there are similar preference combinations among different persons, and the customers can be profiled based on the CVA process. The answers tend to form similar patterns according to the similar preferences of the respondents. An example of the profiles is shown in Figure 5. It illustrates the security profile.
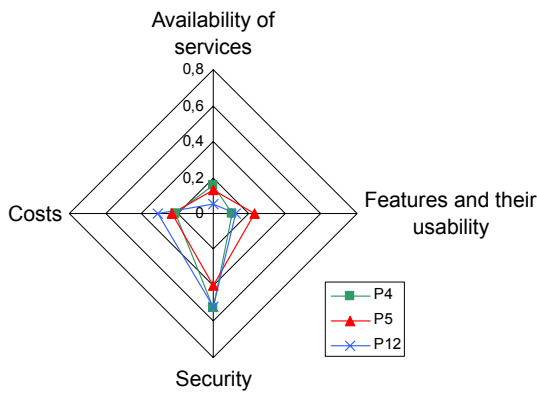
Figure 5. Security profile.

The profiles are based on the relative preference weights of the panelist. If the panelist prefers one quality over others it shows as a peak in the diagram. When similar answers are combined, it forms a group of similar preference combinations. For example, in the security profile security is preferred significantly over other elements of value. The explanation can be the higher awareness of the issue based on, for example, the technical background of these three panelists. The reason can also be the experiences they have gained using the services. Also, the real reasons for the preference patterns in the low cost and service profiles are connected to the usage history and knowledge of the panelists.

Knowing the connecting factors of these answers is the key to form the segments that are connected to the customer values and the firm's business model. The connecting factors can be based on demographic information, among others.

D. Performance of case cervices

To link the value elements back to the firm's R&D process and furthermore to the business model, we tested the performance of the case communication systems Smart Phone and Skype Mobile against the customer values. The performance of the case systems on each attribute was analyzed. The result was that Skype Mobile performed better than Smart Phone in every element except security. The performance of the case services is shown in Figure 6.
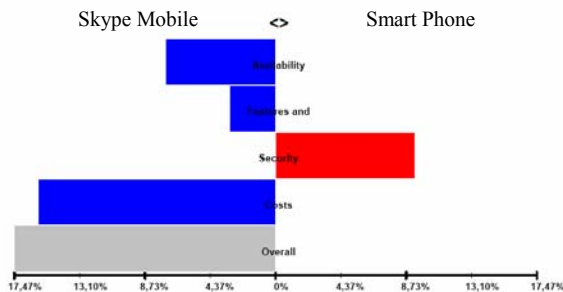
Figure 6. Performance of the case services.

This result has several implications for the firms. First of all, the message from customers is clear: integrating VoIP technology into the mobile phone significantly increases the customer value. However, this has a downside for operators. The current business model designed for delivering voice through traditional telecom networks is out of date when the voice and data traffic switches to the WLAN, which is usually free of charge and not necessarily controlled by the operators. The situation of mobile device manufacturers is easier. To capture the value from customers, they have to integrate the VoIP and WLAN into the mobile phones and adjust the pricing accordingly. No major changes in the business model are needed. This development has recently started with a leading mobile device manufacturer.

Second, the issue of the security element requires some attention. The reason why the Smart Phone performs better here can be found inside the element. Information security and trusting the service provider are the problems with Skype Mobile. The information security of the internet is not as high as in the telecom networks. Also, the service provider of this case example is new and uses technology that is novel and protected.

Third, the features and their usability element is only slightly better in Skype Mobile. This is due to the fact that the devices compared can be externally almost identical; only the software and technology need to be different. This makes most of the features as easy or difficult to use.

E. Summary of the findings

To summarize the findings, we have combined the main results and important issues mentioned in the literature into a conceptual model that includes four levels: customer, product/service, business model, and value network. The model is introduced in Figure 7.

Figure 7. Conceptual model: customer value linked to the value network.

First in the model is the customer level on which finding out the preferences of the customers and also the segmentation of the customers based on preference profiles are essential.

The second level is the product and service level which includes the value elements and attributes connected into the qualities of the product or service. In fact this level

comes first in the research process, but conceptually the product or service combines the business model to the customers. This is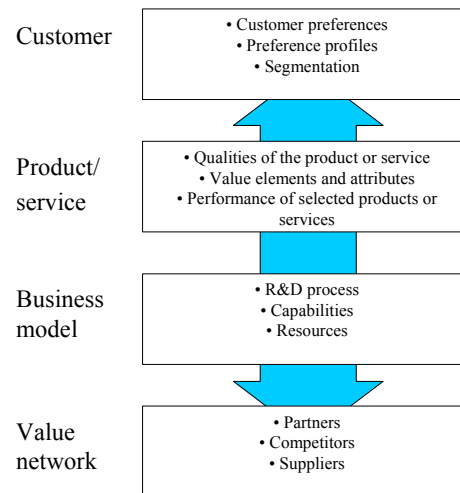 because generally the business of the firm is based on some product or service sold to the customer. This means that the firm's customer, product/service and the business model are tied to each other.

The third level is the business model level. The mechanism inside the firm linking the customer to the strategy of the firm is the R&D process. However, the capabilities and resources are in a central role when applying the acquired customer knowledge.

The fourth level is value network. The impact of customer preferences ultimately reaches the whole value network through the business models. This is due to the fact that firms can acquire capabilities and resources from other actors in the value network and even outside it. Also, the threat of competing offerings can cause changes on the network level.

V. CONCLUSIONS AND DISCUSSION

The subject of customer value preferences has been the topic of research interest for years in the industrial management literature. The usage of demographic information (e.g. age, sex, income) in the analysis of customer preferences provides several advantages for recognizing and anticipating the customer needs of different user groups. However, the diffusion of mobile service has revealed that customer segmentation can only partially be based on demographic factors. For example, the diffusion of VoIP services cannot solely be explained by the lead-user theory or demographic information. Instead, an in-depth analysis of customer needs may result in advantageous customer segmentation.

The contribution of this paper is a model for analyzing customer value preferences and their realization in different communication systems. With the data of the customer panel, we have built customer preference profiles based on different styles of using the communication systems and therefore different value preferences. We have also found out the critical user values and the different attributes. The customer value audit revealed three major issues of customer preferences in mobile communication systems:

- The affordable costs are valued above other elements even in the technologically oriented test group.
- The security element is the most difficult one to piece together (highest inconsistency).
- The comparison of initial start-up cost to the costs of usage is difficult.

The presented model for assessing the service quality and customer preferences in mobile services was developed through several iteration rounds within a test group of advanced users and researchers. The selected test group was advanced users in the sense that they had the capability to conduct an AHP assessment from the customer value audit perspective. The AHP analysis is often conducted with a small group of experts who are capable of performing subjective pair-wise comparisons of decision criteria. The reliability of the assessment is then automatically calculated by the AHP software. This inconsistency ratio calculates the degree of inconsistency in the judgments. We used the inconsistency ratio to improve the reliability of the study and reveal the areas that are the most difficult to perceive. Only one participant had to be dropped from the expert panel due to unacceptable inconsistency. One clear limitation of the study is, however, that the users were, rather homogeneous in their demographic characteristics limiting the variety of customer profiles.

The framework of the AHP model is based on the grounding theoretical frameworks for measuring service quality [e.g. 15] with characteristics of information service attributes. Additionally, the application of the AHP was developed for constructing a hierarchy and assessing the relative preferences of each value attribute. Customer preferences are commonly derived from surveys of several hundreds or thousands of customers, by relying on that large masses are logical in their judgments. This may work well in several cases providing essential information for marketing and R&D. Large samples are, however, not always a prerequisite. For example, in the studies on the lead user method in developing new product concepts [14], it was found that a small number of lead user experts can provide essential information for development purposes. Similar implications have been found in the literature of expert judgments such as the AHP [see: 20] where several methods and applications have been developed to elicit expert knowledge on the studied phenomena. In this study, the Delphi method implemented with AHP has proven to be a powerful and valid method for evaluating complex customer preferences. It has also provided insight into the formulation of different user profiles in mobile services.

In a normal expert assessment situation, there is generally an opportunity to re-evaluate the assessment based on feedback. In this session this was not allowed due to anonymity and time limit restrictions of the study. It is reasonable to argue that many settled judgments would get better after iteration, since the learning and thus the capability to process information on the subject increases.

The analysis shows that mobile services are valued rather differently even within a small test group of mobile users. This implies that heterogeneous market segments exist already within the present mobile service portfolio. Different value creating attributes such as cost and security transfer are valued differently among different user segments, which allows customer preference profiles to be used for the segmentation of end-users.

Future studies on this area should address the role of the business model in capturing value from customers. The capabilities and resources of the firm should be connected to the customer value elements to produce higher customer value. Also, the relations of the business model and value network as enablers for the value creation and capture should be examined.

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APPENDIX 1

Example of the pair-wise comparison questionnaire.

Coverage of the network	4 3 2 1 0 1 2 3 4 ○ ○ ○ ○ ○ ○ ○ ○ ○	Reachability
Coverage of the network	4 3 2 1 0 1 2 3 4 ○ ○ ○ ○ ○ ○ ○ ○ ○	Terminal updating
Coverage of the network	4 3 2 1 0 1 2 3 4 ○ ○ ○ ○ ○ ○ ○ ○ ○	Size of network user base
Coverage of the network	4 3 2 1 0 1 2 3 4 ○ ○ ○ ○ ○ ○ ○ ○ ○	Potential new services