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Customer Centric Development of Radically New Products - A European Case

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ABSTRACT

Due to a significant cost advantage, mobile multicasting technology bears the potential to achieve extensive diffusion of mobile rich media applications. As weak performance of previous mobile data services suggests, past developments have focused on technology and missed customer preferences. Mobile multicasting represents a radical innovation. Currently, little research on consumer behavior exists regarding such services. The paper addresses this gap by presenting results of qualitative and quantitative surveys conducted in Switzerland and Israel. It provides a continuous customer integration approach that applies established methods of market research to the creation of mobile services. Means-end chain analysis reveals consumers' cognitive reasoning and conjoint analysis drills down to the importance of service attributes. Desire for self confidence and social integration are identified key motivators for consumption of mobile media. Services should aim for technological perfection and deliver actual and entertaining content. Interestingly, consumers appreciate reduced but tailored contents and price appears not to be a superseding criterion.

Keywords

Customer Centric Product Development, Adaptive Conjoint Analysis, Means-End Chain Analysis, Mobile Multicasting, Mobile Rich Media

INTRODUCTION

After its first years of existence, the still emerging mobile telecommunication industry is undergoing a period of fundamental change. Since previously high growth rates of voice revenues started to decrease, the industry is looking for additional sources of revenue, i.e. mobile data services. However, the development of marketable services proves to be far more challenging than the one of stable, high quality voice services.

Immature technologies are often blamed to be the reason for bad performances. Undoubtedly, the technological development is dynamic and in fact, we argue that the intense focus on technology push has been one key factor of the misfortune with mobile data services, as it detracts innovators from customer needs. Furthermore, since vertical integration within the mobile telecommunication industry is low, product development is often organized in co-operative forms or in innovation networks (Arundel and Bordoy, 2002; Hagedoorn and Duysters, 2002). Coping with the complexity of innovation network management additionally detaches actors from actual customer needs and their implications for mobile service development.

Based on this, we see a need for a thorough understanding of the consumer behaviour side of mobile data services. Numerous studies have addressed issues of adoption and diffusion of mobile data services and applications with the aim to identify diffusion barriers (Lee, Kim and Chung, 2002; Pedersen and Ling, 2003; Pousttchi and Schurig, 2004). However, such research seldom results in operational recommendations for companies on how to align their services with customer needs. Important questions, e.g. how many users are willing to pay, remain unanswered. We chose to focus on a more specific range of services that exploit the investments in larger bandwidths for data services and to develop a thorough understanding of the relations between service characteristics and fulfilment of customer needs and desires.

With mobile multicasting a set of rich media services can be delivered economically on today's GPRS technology. Since mobile multicasting services are based on a new technology and address a new market, they are termed a radical innovation (Veryzer, 1998). Thus, customer preferences can hardly be drawn from existing resources and must be originally generated. By participating in the "mobile multicasting service development and field trial project" MCAST, we were able to conduct the necessary market research. Within a new product development process, customer integration is best realized after a first internal clarification of product ideas and possibilities and subsequently after the technical engineering phase before market introduction (Gruner and Homburg, 2000). For this purpose, we integrated qualitative and quantitative methods to explore and formally describe customer needs. In the early stage we aimed to decrease uncertainty by conducting focus groups. While

focus groups may provide a broad set of customer wants and desires only limited insights can be gained with regard to underlying customer motivations. Therefore, we complemented the results by conducting individual laddering interviews following the means-end chain framework (Gutman, 1982). With both methods we were able to obtain a complete set of service characteristics as demanded by consumers. In addition, we were able to evaluate relative importance by analyzing underlying motivations. In the later stage of development, we conducted a prototype-based adaptive conjoint analysis to quantify relative importance and the preferred levels of service characteristics.

We claim three major contributions to extant research. First, our results provide information on what consumers expect of rich media mobile services and for which reasons they expect certain service characteristics. Second, our results quantify the relative importance of service attributes, e.g. price versus context dependency. Third, we provide a methodology on how customer needs for break-through mobile service innovations can be obtained. This allows to obtain results that can be easily communicated within single companies or across innovation networks. This, in turn enables a customer centric development of radical innovations.

The paper briefly compares the multicasting technology to current technology standards. The subsequent chapters will then portray deployed market research methodologies and discuss the obtained results with their implications on mobile service development. The concluding chapter will summarize key findings.

MOBILE MULTICASTING

MCAST's multicasting technology enables cellular operators to use shared channel resources for broadcasting video and any other data over 2.5G and 3G networks. MCAST also yields a seamless roaming to WLAN networks. Therefore, MCAST aims at supporting cellular operators to establish affordable flat-fee services for end users and increase operators' revenues per channel resource, allowing economic delivery of media to an unlimited number of mobile cellular and WLAN devices.

Current Technology Constraints

Currently, rich media content can be delivered over cellular networks using unicasting (one-to-one) technology. This has two major shortcomings: high delivery cost and limited cell capacity. Delivery cost is high as unicasting is based on one-to-one communication, where each mobile terminal accesses a content server for on-demand content. When users view rich media content, their mobile terminals consume an excessive amount of bandwidth. This results in very high by-the-minute or by-the-packet charges. Due to limited cell capacity, unicasting of rich media can only support a limited number of subscribers at any given time. As the number of online users increases, additional bandwidth is required, and cell capacity simply runs out. Current technology performance, therefore, allows only poor service levels and implies lost revenues.

Challenge, Solution and Opportunity

Multicasting technology is based on a one-to-many broadcast concept. It enables the delivery of identical content simultaneously to an unlimited number of subscribers. This allows services to scale to almost any number of users while having a manageable and limited impact on available bandwidth per cell. For the end user, multicasting represents a convenient way of accessing rich media content. In this sense, from a user as well as business model perspective, multicasting is believed to be a successful bearer for rich media content over 2.5G and 3G cellular networks.

Since there is currently no competing or ready-to-market technology that can provide multicasting services over 2.5G or 3G cellular networks, the MCAST research project moves on the forefront of technological development (Heitmann, Lenz and Zimmermann, 2003; Northstream, 2002) and it will contribute to the ongoing standardization process of multicasting in the 3rd Generation Partnership Project (3GPP). Alternative technologies like DVB lack the personalization features and others like unicasting have a cost disadvantage. With its technological characteristics, multicasting is particularly suitable for rich media content (e.g. video, audio, gaming). Major market research institutions forecast the market potential of video services to nearly double that of audio services (e.g. Durchlacher/ EQVITEC Partners, 2001) and a take up in 2005/06 (e.g. Forrester Research, 2003; Frost & Sullivan, 2003; Ovum Research, 2002). Based on this, our research focuses primarily on the delivery of video clips to mobile handsets.

EARLY STAGE IDENTIFICATION OF CUSTOMER REQUIREMENTS

The qualitative part of customer integration employs focus groups to determine critical customer requirements as well as individual in-depth interviews to understand the cognitive structures of decisions and the social motivation for requirements.

Focus groups: Background & Methodology

The focus group research was structured according to a theoretical concept for comprehensive and customer-driven product and service design: The OIL product design concept (Schmid, 2002). According to this, an evaluation of product expectations has to consider the levels of organizational design, interaction design and logic design.

The organizational design level supplies the structural basis for the product design task. It answers the question of WHO and WHAT is involved in the product use. Thus, in the case of a customer-oriented design of MCAST services, user groups and content categories must be determined. The interaction design concentrates on the processes and interactions between the relevant elements defined in the organizational level. It thus answers the question of HOW the product will be integrated in everyday life, its tasks and preoccupations. The logic design examines WHY users use a specific innovation. Based on this understanding of the decision process, the product's language and communication strategy can be designed.

Focus Group: Results

In total seven focus groups were conducted, three in Switzerland and four in Israel. Participants were selected from two mobile operators' customer databases according to a screener questionnaire to find high-volume customers with strong interest in innovative services. Each group consisted of five to eight participants, discussions lasted 60 to 90 minutes. The identified issues relate to (1) relevance and entertainment qualities of content, (2) speed, visual quality and reliability of technology and (3) customizability of the service. We spare a detailed discussion of the focus group results and provide an exemplary overview of key requirements mentioned in two of the groups in Table 1.

	Group 1	Group 2
Content	Good Editing of Content	Availability/Quality of content
	Up-to-date Content	Up-to-date Content
	Local Content	Width of Content
	Fun	Independence of Content
Technology	Reliability of the Service	Battery Consumption
	Saving Functionality	Screen Size
	Picture Quality / Resolution	Size of Device
	Sound Quality	Rapid and Secure Transmission
Service	Personalization	Any time and any where
	No Advertisement	No Advertisement
	Forwarding	Forwarding
	Easy to Operate	International Roaming
	Price	Price
	Customizability of Content	Customizability of Content

Table 1. Exemplary Focus Group Results - Key Requirements

The focus groups generated a full range of customer requirements; however, so far little is known about the genesis of customer requirements nor about the relative weight of the single items. Both aspects are subject to investigation in the subsequent stages.

COGNITIVE MOTIVATION ANALYSIS

To complement the qualitative focus group analysis, individual laddering interviews have been conducted following the means-end chain (MEC) methodology (Gutman, 1982). Its objective is to get an insight into the cognitive structure of end users' adoption decisions and thereby describe underlying reasons and motivations to use the service, as well as to identify undetected preferences.

In-Depth MEC Interviews: Background & Methodology

Since the emergence of the expectancy value model (Rosenberg, 1956), it is assumed that the attitude of an individual towards an object is determined by the individual's cognitive structure. The MEC concept is partitioning this cognitive structure in three layers, i.e. service attributes, needs and values (Gutman, 1982). With the aid of interviews, data is collected to map these levels. Content analysis is employed as a basis for the quantitative evaluation and graphical representation of the results.

In the market research and service design literature, the qualitative MEC analysis has been increasingly an object of scientific debate (e.g. Aschmoneit and Heitmann, 2002; Grunert and Grunert, 1995; Herrmann, 1996a; b; Wansink, 2000). The

underlying model for most of the work is the one of Gutman (1982). It is based on two assumptions: (1) Values, defined as desirable end states of existence, are dominant in the formation of selection structures and (2) people deal with the variety of services by forming classes to reduce decision complexity.

For the formation of classes, consumers consult perceived and anticipated consequences of their actions or decisions. They associate positive consequences, namely benefits, with certain decisions, like the choice to use an application (Reynolds and Gutman, 1988). Personal values allocate a positive or negative valence to these consequences (Rokeach, 1973). Thus, a correlation between the concrete and abstract characteristics of a service, the functional and psychological consequences as well as the instrumental and target values is assumed (Gutman, 1997). Since consumers form classes to simplify their decision-making process, relatively few values are connected to a larger number of consequences and attributes. In this hierarchy, the importance of values determines the importance of consequences and attributes (Rosenberg, 1956).

Values represent beliefs about oneself and the reception of oneself by others. They are understood as universal, object- and situation-independent convictions about desirable end states of life (Gutman, 1982; Schwartz, 1994). Moreover, values determine the personality and are believed to be relatively resistant against changes in the environment compared to attributes (Herrmann, 1996a). The MEC framework is used to reveal the connections between time-stable values and product attributes directly relevant to decision making. In a dynamic environment, like the mobile media industry, a general and time-stable understanding of cognitive structures of user decisions is substantial.

To obtain such results, the laddering technique with individual in-depth interviews is employed (Reynolds and Gutman, 1988). Research has shown that, on average, after 10 to 15 interviews the number of additionally obtained consumer needs is decreasing radically (Griffin and Hauser, 1993). The technique reveals links between attributes, consequences and values. This is done by first determining important service attributes. With aid of a demonstration device (Nokia 3650 handset) with two available video clips, end users were asked for the distinguishing characteristics of the mobile multicasting service. They were then asked for the characteristics they would appreciate most, compared to other offerings such as television. Basing on the obtained attributes, e.g. the immediacy of information reception, users were questioned on why these characteristics would be important to them, e.g. always feeling well informed. Finally, respondents were asked to reason their answer once more, this time mentioning values associated with these consequences, e.g. self confidence. This process was repeated for each attribute, thus revealing a complete cognitive structure. Interviews were conducted and coded by multiple interviewers to avoid biased results. The mentioned interactions between the obtained constructs were counted and entered into an implication matrix (not shown), a quantitative, tabular summary of the laddering interviews (see Reynolds and Gutman, 1988). This matrix provides the basis for the graphical representation in form of a hierarchical value map (HVM), which displays the chains between values, benefits and attributes and their strengths (Herrmann, 1996a).

Since laddering measures the reasoning of consumers and not individual preferences, research regards the results as representative across end-user groups (Reynolds and Whitlark, 1995). Even though the results have been obtained from a small number of participants, they represent important points for understanding end users' perceptions.

In-depth MEC Interviews: Results

30 innovators and early adopters were selected in Switzerland. The sample consisted of students and employees of companies offering financial and consulting services between the ages 20 to 40. Interviews lasted between 30 minutes and one hour.

Obtained constructs are listed in Table 2. Within this chapter, we focus on the discussion of the results based on the HVM (see Figure 1). The HVM summarizes service characteristics at the bottom, service benefits at the middle and associated personal values at the top layer. For MCAST, two key paths of end-user reasoning (marked by the thick lines) can be identified. One relates to (1) information and self confidence and the other is associated with (2) social integration.

(1) Information and Self Confidence: Getting informed and deriving a personal opinion are among the main benefits associated with the reception of rich media content on a mobile device. In this line of thought, end users seek news content, enabling them to feel well informed any time. Three characteristics led to this benefit, viz the immediacy, the usefulness of the content and the "any-time-and-any-place" characteristic. A service that follows this reasoning should not only provide up-to-date information, but also ensure the relevance of information. The appraisal of usefulness of content indicates that people who are interested in informing themselves do not want to watch any kind of video clip provided. They are looking for specific information based on their current context, background and interests and therefore appreciate personalization functionalities. However, personalization can only partly satisfy the requirement for interesting content. An additional feature users suggested, may be a link to background information, e.g. unicasting clips. During the interviews, end users have been very much aware of the limited time they would be willing to spend watching or selecting video clips on a mobile device. Therefore, even though variety is requested, information needs to be short, condensed and immediately accessible.

Service Characteristics	Service Benefits	Values
Any Time and Any Place	Feeling Ahead	Self Confidence
Width of Information	Feeling Informed	Social Integration
Trendy	Satisfaction of Personal Interests	Status
Depth of Information	Support for Social Interaction	
Immediacy	Personalized Needs	
Multimedia	Personal Opinion	
Additional Services	Time Saving	
Entertainment		
Usefulness of Content		
Reliability		
Time-Dependent Information		
Commercials		
Independence of Information		
Personalization		
Length of Content		
Transmission Time		
Usability		

Table 2. Important characteristics mentioned by MEC-interviewees

(2) Social Integration: Consumers feel MCAST may support them in achieving social integration by providing a basis for social interaction and the development of a personal opinion. While the latter element greatly depends on the reliability of the service and the independence of information, the support for social interaction also depends on entertainment characteristics. Some users were impressed when first seeing the MCAST demonstration and perceived it to be entertaining, based more on image and sound quality than available content. They felt the need to show the device and the service to their friends. However, this effect is expected to wear off after a short period of time. On the other hand, particularly entertaining video clips, e.g. about new movie releases, are also seen as a basis for social interaction. This line of thought represents a strong cognitive chain towards the value of social integration. Users who argued in this direction expected exciting (short) video clips which can be shown to others or can be used for further conversation.
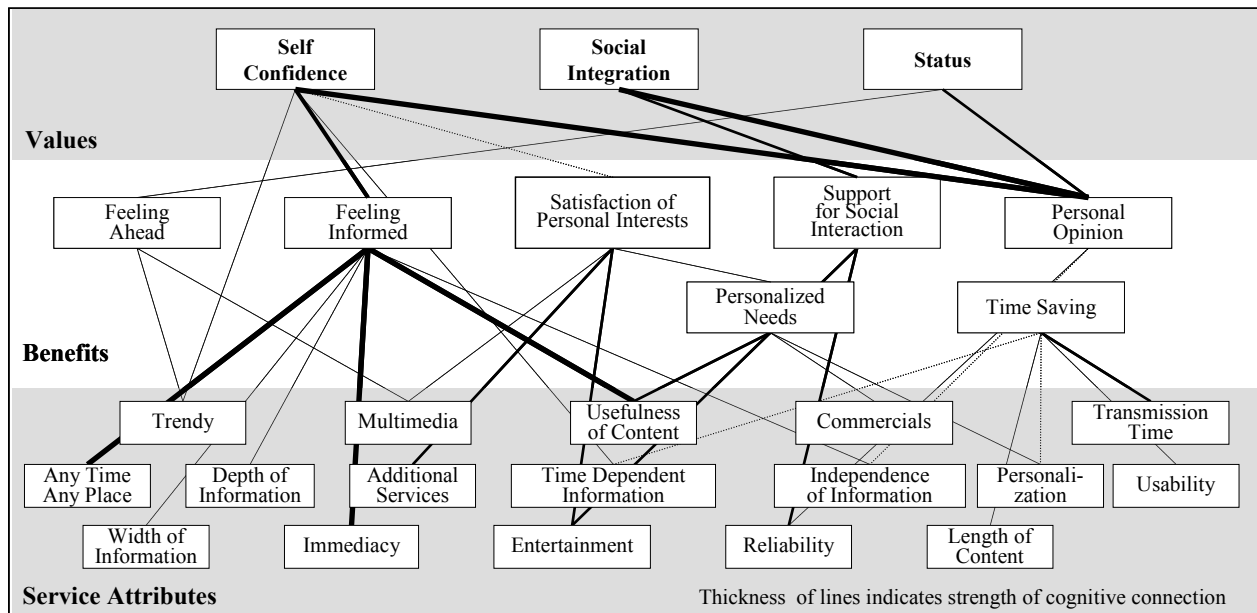

Figure 1. Hierarchical Value Map (HVM)

The other key line in the path, including personal opinion benefits, is quite similar to the information-oriented path towards self confidence. To avoid embarrassments, end users request a reliable service, which provides information on issues relevant to their peer group. Reliability in this context means to receive information no later than friends using the same or other

channels. In addition, consumers were afraid of being influenced by subjective coverage. Therefore, a selection of multiple content providers would be beneficial.

LATER STAGE CUSTOMER REQUIREMENT ANALYSIS

Adaptive Conjoint Analysis (ACA): Background & Methodology

The preceding analyses show that customers consider a wide range of characteristics when evaluating a mobile multicasting service. As reported in tables 1 and 2, more than 20 attributes were mentioned. This number bears still too much complexity for service design as well as the generation of a targeted marketing strategy. Therefore, we have decided to determine the prioritization of characteristics by employing an adaptive conjoint analysis (ACA), a sophisticated customer research approach (Green, Krieger and Wind, 2001; Hauser and Rao, 2002; Wittink and Cattin, 1989). This method allows to identify the relevance of service attributes and their levels, i.e. it reveals the relative importance of different service attributes. The generated database allows to run price sensitivity analysis for different product scenarios and an estimation of purchase probabilities (Johnson, 1991). Compared to other types of conjoint analyses, the ACA enables a dynamic adoption of a questionnaire according to given answers to preceding questions. This allows to generate robust results also for complex product offerings with a high number of attributes (Huber, Wittink, Johnson and Miller, 1992; Orme, 1995) and ensures suitability for web-based survey design (Dahan, Hauser, Simester and Toubia, 2002; Foytick, 1999).

Before implementing the ACA, the attributes under investigation have been reduced in an additional iteration step to 13 attributes. The objective of this step was not only to fulfil the conjoint requirements (of attribute independence, relevance, objective exclusiveness), but also to select attributes in conjunction with technological capabilities and business model relevance. Accordingly defined attribute levels are shown in an attribute-level matrix (Table. 3).

Attribute	Level 1	Level 2	Level 3
Length of Content	Max. 30 seconds	Max. 1 minute	Max 2 minutes
Number of Clips per Day	5	10	15
Premium Content	Available	Not Available	
Subscription Fee (€)	3	6	9
Forwarding	Via MMS	Not Possible	
Ensured Transmission	Retransmissions	Clips Lost	
Supplemental Internet Service	All Clips Online	Missed Clips Online	No Clips Online
Advertisements	Yes	No	
Notification on Missed Clips	No	Per SMS	Per MMS
Number of Content Categories	5	10	15
Number of Clips in MCAST	3	5	7
International Roaming	Available	Not Available	
Location Based Content	Available	Not Available	

Table 3. Attribute-Level Matrix

The ACA was programmed using SSI web of Sawtooth Software. The ACA-questionnaire was hosted online and complemented by supplementary questions on general mobile usage behaviour. In total, 125 individuals have been invited from an academic data base. Participants were required to be heavy users of mobile services. They were informed about the multicasting service by use of an animated prototype and in-depth information provided with an interactive CD-Rom. Participants were then asked to answer the online survey. After data was cleaned to ensure data robustness, 103 data sets were used for analysis.

Adaptive Conjoint (ACA): Results and Implications

Questions complementary to the actual ACA asked for the general background of participating individuals, including demographics, telecommunication behaviour, etc. Here, people were asked, to rate their preferred rich media content on a seven-point Likert-scale as well as their preferred delivery mode by distributing 100 points among five options (see Figure 2). The first question confirmed the interest in news and location-specific content. The second question proves video content to be the most preferred format, although still pictures came in close on place number two. It is surprising to see that today's cash generating ring-tones are rated rather low. This aspect hints to a substantial revenue potential of video content.
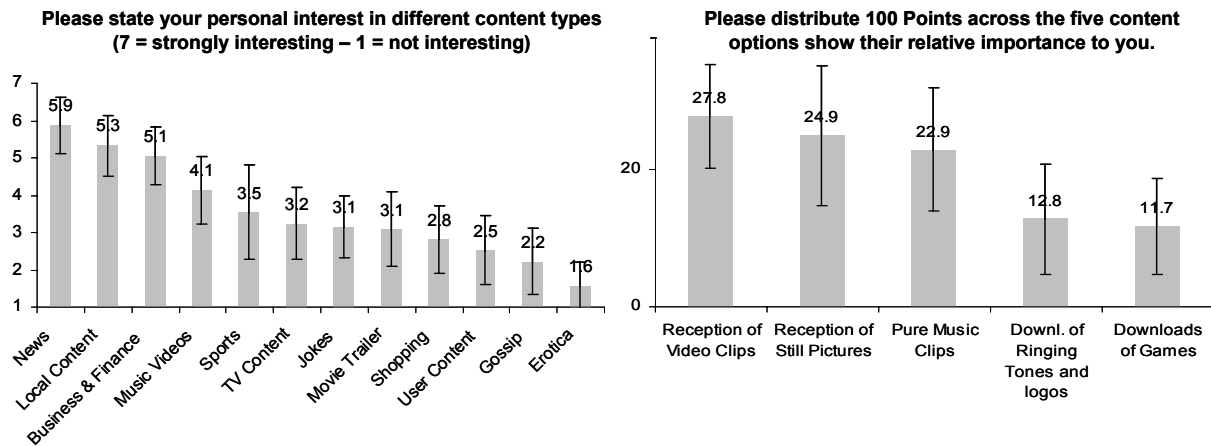
Figure 2. Selected Supplementary Questions

The following section briefly documents the quantitative conjoint results and focuses on the discussion of selected, most critical aspects. The analysis of the conjoint data reveals that five attributes influence almost 50% of the consumer decision. Not surprisingly, price concerns yielded the highest score of 11.7%. However, attribute scores are rather evenly distributed and given an adequate price span and a flat fee pricing model, price appears not an overriding decision criterion for consumers. The items "Ensured transmission", "Supplemental Internet Services" and "Notification on Missed Clips", together impact more than 26% on the consumers' evaluation. This mirrors the concerns of customers about technical reliability. Since, multicasting services are broadcasted to a group of subscribers once and simultaneously, it might happen that a few subscribers do not receive the content due to handset unavailability or interrupted transmission. Users are concerned to lose out on these clips and therefore strongly require the back up through supplemental internet services. The importance of attributes are documented in Figure 3.
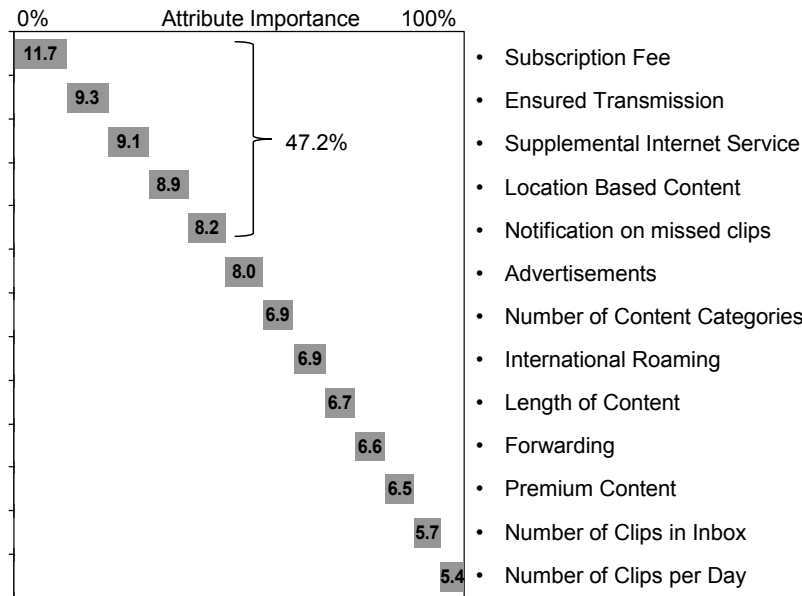

Figure 3. Service Attribute Importance from Adaptive Conjoint Analysis

Taking a closer look at selected attributes and their levels reveals interesting aspects on the willingness to consume mobile data services. As documented in Figure 4, the survey reveals that subscribers prefer a reduced number of (five) clips per day combined with a maximum clip-length of one minute (utilities within attributes are zero-centred). This behaviour might mirror the concern about content relevance but also about technical capacity (e.g. transmission speed and memory capacity) mentioned during the qualitative surveys.
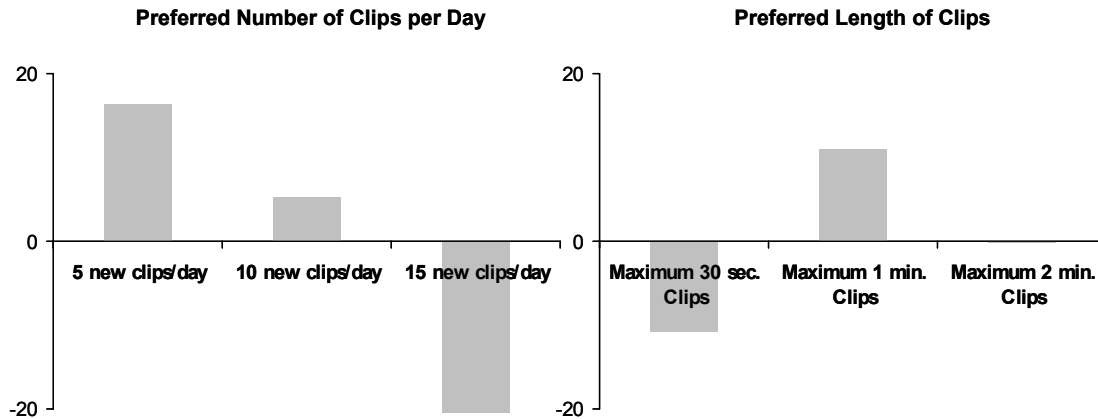
Figure 4. Attribute Levels for Clip Length and Number of Clips per Day

The results of the ACA are in great detail in-line with the qualitative results of the MEC analysis and therefore provide a link of the cognitive reasoning with the product characteristics of future mobile multicasting services. For companies providing these services the results imply a call for command of technology. Furthermore, companies must develop a solution on how to satisfy the need for actual and contextualized, i.e. personalized and localized information when talking of mobile news services. This is especially challenging because personalization activities trade-off the cost advantage of (mass-)broadcasting services. One means to succeed is to carefully address this "dilemma" in the communication strategy in order to manage the market expectations. Generally, the results encourage to follow a quality leader strategy for mobile multicasting services, since the price attribute did not achieve a dominant position and users do appreciate rather a small amount of clips and content delivered to the handset - if it is the right thing for them.

CONCLUSION

By reporting insights in terms of methodology and identified customer preferences regarding mobile rich media services, we address the lack of customer knowledge in marketing practice and research in the mobile media industry. While dealing with the development of a leading-edge multicasting technology, we deployed a set of sophisticated tools for customer integration along the service development process. For customer research science, we show a methodology, on how customer needs for break-through mobile service innovations can be obtained in a way that generates results, which can be easily communicated within single companies and across innovation networks. With the growing importance of cooperative product development, investigations on the latter, i.e. a joint customer integration and its qualities will be an area for future research.

For the management, our quantitative empirical results imply precise insights for superior mobile multicasting service design. Additionally, the identified cognitive reasoning of consumers provides input for general communication and marketing strategies. We show, that most importantly, mobile marketing management needs to master the doubts on technology performance, and that mobile content must be tailored, which complicates the marketing challenge as it trades-off the multicasting cost advantage. For marketing and communication strategy, we have identified that the consumers' desire for self confidence and social interaction should be addressed.

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