December 2005

Mobile Couponing - Measuring Consumers, Acceptance and Preferences with a Limit Conjoint Approach

Claas Mueller-Lankenau
European Research Center for Information Systems (ERCIS), University of Münster

Kai Wehmeyer
European Research Center for Information Systems (ERCIS), University of Münster

Follow this and additional works at: http://aisel.aisnet.org/bled2005

Mobile Couponing –
Measuring Consumers' Acceptance and
Preferences with a Limit Conjoint Approach

Kai Wehmeyer, Claas Müller-Lankenau

European Research Center for Information Systems (ERCIS), University of Münster, Germany
kai.wehmeyer@wi-ios.de, claas.mueller-lankenau@wi-ios.de

Abstract

Coupons are an established promotional tool in marketing and sales. The increasing adoption of mobile telephony and ongoing diffusion of mobile phones have spurred first attempts in mobile couponing. Since consumer preferences and information on service choice behaviour can be of significant value in development processes of innovative products or services such as mobile couponing, we applied a limit conjoint analysis in order to gather first evidence regarding consumer preferences for mobile couponing service attributes. Of the four service attributes included in the conjoint experiment, the configuration channel was found to have the greatest relative importance, followed by the type of coupons, the possibility to personalize or filter the offered coupons, and the location-awareness of the couponing service. Limit card ranks indicated that more than 80% of the n=125 subjects would accept at least one of the described mobile couponing services.

1.   Research Challenge

The design of mobile services is at the center of interest of companies pushing into the wireless channel as well as of researchers trying to understand success and acceptance of emerging mobile applications. The broad adoption of wireless communication technology prepared the ground for all kinds of services delivered to a consumer's mobile device. At the same time the medium gains in attractiveness as a marketing and advertising channel [3,2,6,8,31,32,41,43,16].

The specific promotional tool *mobile couponing* is the merger of classical couponing and mobile communications. It has been part of mobile and location-based service visions ever since the advent of the m-commerce discussion [32,41,7,43,53] and has already been subject to several pilot studies and niche campaigns but not reached the mass market yet.

The design of a mobile couponing service remains challenging and laden with uncertainty regarding consumers' overall acceptance and design preferences.

The task of preference elicitation for entirely new services imposes a number of methodological and contextual problems. Consumers have greater uncertainty regarding

the usefulness of the service as analogies for comparison are difficult to find and there may be changes in behavior and routines associated with the new service that are hard to predict for them. Furthermore, consumers are forced to assess purported benefits without personal experience [28].

Our research seizes the challenge of preference elicitation for innovative mobile services. This study aims at gathering first insights into consumers' preferences for mobile couponing. Methodologically, this study is based on the conjoint measurement technique which has been primarily used in design processes of tangible and well established product categories [61,22]. However, it has also proven to be valuable for assessing and evaluating innovative services like mobile couponing [34]. In consideration of this issue, we applied a limit conjoint analysis in order to gather first evidence regarding consumer preferences for mobile couponing service attributes and their overall acceptance. Limit conjoint analysis is a modification of traditional conjoint analysis and similarly applied.

Some further questions regarding design issues of a mobile couponing service also motivated this research. Especially the aspect of a service's location-sensitiveness is of interest here. What value do consumers attribute to this feature and how does it relate to other service features?

We will start out with an introduction of couponing and its mobile counterpart as promotional tools in marketing. Chapter 3 briefly explains limit conjoint analysis as a variety of the classical conjoint analysis before elaborating on the research design and data collection procedure. In chapter 4 the results are presented. Subsequently, the results will be discussed in chapter 5, followed by directions for further research, limitations of our study, and some concluding remarks.

2. Mobile Couponing

2.1 Couponing

Coupons are an established promotional tool in marketing and sales [10,51]. They are expected to positively influence the achievement of several marketing activities like customer retention building, awareness creation, easing shifts in pricing strategy or simply generating sales in the short term. The amount of coupons in circulation in the US has risen over the decades from 16.4 billion in 1970 to 268 billion by 1996 [4,51]. Coupons are furthermore highly accepted among consumers. Slater reports on a 1996 Procter & Gamble experiment in which coupons were completely eliminated in three test markets in upstate New York, USA. Although Procter & Gamble significantly reduced the list prices of its products in turn, consumers were outraged and even organized boycotts, public hearings and petition drives [56,51]. This anecdote shows that coupons generally have a high potential regarding customer acceptance and can become an integral part of consumers' shopping habits. While the US is probably the world's most developed couponing market, couponing is also well accepted and of increasing significance in other countries like the UK, France or Germany.

The major recent development in couponing is a shift in distribution channels of coupons [39,46,54]. The Internet and more recently the wireless communication channel have been tackled by couponing marketers [39,18,46]. These channels add to the traditional couponing media and are the center of hopeful direct marketing experts' expectations.

Table 1: Selection of couponing media (adapted from [44,9])

mass media	newspaper	manufacturers' coupons included in their rip-off page newspaper advertisements
	sunday supplement	syndicated or independent magazine sections circulated with Sunday papers
	free-standing inserts	reprinted sheets containing multiple coupons and advertising copy, generally printed on heavier stock, inserted in the Sunday paper
	magazine on-page	manufacturers' coupon printed on page as a part of the advertisement
	magazine pop-up	tip-in coupon, generally of heavier stock, bound into magazine separately, normally facing an on-page advertisement
	internet website	coupon placed on manufacturers' or retailers' websites for print-out or online redemption
direct media	direct mail	coupons sent by mail to individual customer households, oftentimes in a cooperative program
	direct e-mail	coupons included in a personalized e-mail sent to individual customers
	SMS/ MMS	coupons sent to individual customers' mobile device by text or picture messaging
POS	in/ on package	coupons inserted or imprinted on product packages, redeemable on a subsequent purchase
	coupon dispenser	coupons issued by an automatic dispenser in the store or at the check-out
	receipt	coupons imprinted on the receipt after purchase, redeemable on a subsequent purchase
	personnel	promotion personnel hands out coupons to customers in store

Besides the channel of distribution, coupons can be classified on the basis of several characteristics such as the issuing party, timing of distribution, point of redemption, product class type, type of discount, and duration of validity [44,9].

2.2 The Emergence and Development of Mobile and Location-Based Services

Mobile and location-based services (LBS) have become a major topic in academia and practice [49,7,43]. LBS can be applied for diverse purposes such as safety, navigation and tracking, transactions, and information services. Key applications will be or are already: emergency services, fleet management, location-sensitive billing, asset tracking, or location-aware advertising [7,64]. Much more applications of LBS are imaginable and ideas and developments are likely to proliferate over the next years. A popular scenario for LBS is tourism where people are in a more or less unknown environment and the potential demand for location-specific information is very high [12,34]. A second area of use is also gaining relevance: mobile marketing [32,21,53,16]. Especially advertising and customer relationship management activities push into the wireless channel [32,33,16,57].

The flip-side of mobile commerce's huge potential is the difficulty of developing adequate services that meet consumers' needs and reach acceptance rates that constitute a critical mass of users in adequate time [32,21]. Media characteristics and the substantial social and psychological embeddedness of mobile device usage render the task of mobile service development into a challenge. Mobile devices are likely to be perceived as some kind of personal accessories which are highly integrated into users daily routines and social life [19,20,52]. Mobile service designers need to be aware of these potentially very special and symbolically laden patterns of mobile device usage.

Companies try hard to define technically feasible business models which create value to the customer as well as willingness to pay for it. Kalakota and Robinson state that the creation of location-based mobile services generally does not differ from the creation of traditional services. What is essential is the focus on consumers' needs and preferences [35] which, however, might change rather quickly over time in the mobile business [32].

Yet, mobile service developers face quite specific problems like the mentioned social and psychological peculiarities of mobile device use. Although mobile services other than voice and data transfer have already entered the market, the perceived innovativeness and newness [28] of mobile services and particularly LBS are still very high in the eyes of the consumers. Thus, the lack of customer experience as well as governmental regulation [14] and the fast moving market for mobile devices raise uncertainty and business risk for service providers. At present, it is still hard to forecast aspects like user adoption, speed of diffusion or potentially successful service designs [15,28,34].

2.3 Mobile Couponing

The fusion of traditional couponing and the possibilities of mobile communication created the idea of mobile couponing which is, frankly speaking, not more than the deliverance of coupons to consumers' mobile devices (see Table 1). It is an application of mobile marketing which is defined by Kalakota and Robinson as "…the distribution of any type of message or promotion that adds value to the customer while enhancing revenue for the firm." [32]. Couponing is a mobile promotion and advertising measure and ergo part of a company's direct marketing strategy.

Coupon delivery to mobile devices does not necessarily have to involve location-awareness. The wireless channel can as well be reduced to its core functionality: data transfer between two parties regardless of their geographical position. But mobile couponing was one of the first and most popular visionary application scenarios of LBS. Still practically no compilation of the LBS-discussion misses the reference to this use of mobile technology [32,41,7,43,53]. However, mobile couponing is not a vision anymore. Dickinson reports of a location-aware mobile couponing pilot conducted 2000 by Subway and advertising agency GoZing in Los Angeles, USA [17]. Despite this and other promising campaigns [42] mobile couponing has not developed to be a mass market application for direct marketers. Technical, societal, and regulatory barriers certainly hindered its take-off.

Mobile couponing is already on the agenda of progressive advertising agencies and direct marketers and significant efforts from companies to exploit its potential can be observed. Concerning the consumers' side, a survey conducted by Anckar and D'Inckau revealed a moderate but manifest interest of consumers in receiving personalized shopping offers via the mobile channel [2].

3. Method

To answer the questions on consumers' perceptions of mobile couponing, an experiment was designed in which the method of limit conjoint analysis was applied. This section starts out with an introduction of limit conjoint analysis, a modification of the traditional conjoint approach. We will then elaborate in detail on the chosen experimental design and eventually report on the data collection.

3.1 Limit Conjoint Analysis

Conjoint analysis is a method for the identification of consumer preferences in multiattribute decision making. It was introduced as a method of mathematical psychology in 1964 [37] and later applied to marketing research [23,30]. Although the analytical hierarchy process (AHP) [47] is the most recognized method of preference elicitation and the self-explicated approach [50] is the easiest method to apply, only conjoint analysis [24] allows exposing consumers to complete packages of potential products for evaluation. Other approaches directly revert to utility values and importance ratios and thereby increase the cognitive load of dealing with the different forms of uncertainty in more abstract terms [28].

In short, traditional conjoint analysis is a decompositional method. Subjects rank a number of stimuli that represent products or services with predefined attributes and their also predefined levels. This data collection technique engages the respondent in a quite realistic rating task which can resemble a real scenario of product choice. The 'holistic' ranking can then be mathematically decomposed, delivering utility values (part worths) for each attribute level and each subject. The underlying model is additive so that a low part worth of one attribute can be compensated by higher part worths of others. The researcher gets information about consumers' preferences for specific attributes as well as their relative importance for utility perceptions of the whole product or service [24,62].

The work of Green and colleagues [24,25,13,22] display a multitude of variations and application scenarios of conjoint analysis giving insight into the method's flexibility. The ongoing methodological developments and an extensive commercial use indicate conjoint analysis' potential suitability in new and innovative contexts [61]. Traditionally, conjoint analysis has been used in new product and service development processes as a valuable source of consumer acceptance estimates and as basis for potential market share predictions and segmentation efforts [61,60,40].

One of the most criticized shortcomings of traditional conjoint analysis is the fact that subjects do not have the possibility to express a rejection of one or more of the stimuli which are presented to them in the experimental setting [63]. Subjects merely reveal their preferences but not their actual choice behaviour. In a conjoint setting, every stimulus creates a positive utility and is of value to the customer. This leads to a lack of information on the actual acceptance of the product or service of interest. The missing choice element of conjoint analysis lead to a more sophisticated approach to overcome this problem: choice-based conjoint approaches [36]. However, these techniques do not build upon the classical conjoint model and therefore do not allow the estimation of part worths on an individual level. Louviere and Woodworth stress the fact that choice-based conjoint cannot replace other conjoint analysis methods but should be considered complementary to them [36]. Further attempts to enhance the choice-based model [1] could not reach up to the particular benefit (individual part worths) of traditional conjoint analysis [58].

With the so called limit conjoint analysis, Voeth proposes a simple modification of the traditional conjoint analysis that integrates the aspect of choice into the well-known ranking task of subjects [58,59]. The simulation of choice is achieved by adding an extra card to the set of stimuli. This 'limit card' comes into play after subjects have completed the usual ranking. It denotes the threshold of acceptance within the ranking by dividing the stimuli in two groups: those stimuli that would actually be accepted or bought in a realistic setting and those which are not considered interesting and would not be chosen in a real-life scenario. The subjects place the limit card right behind the rank of the last stimulus which they would accept (see Figure 1) [58].
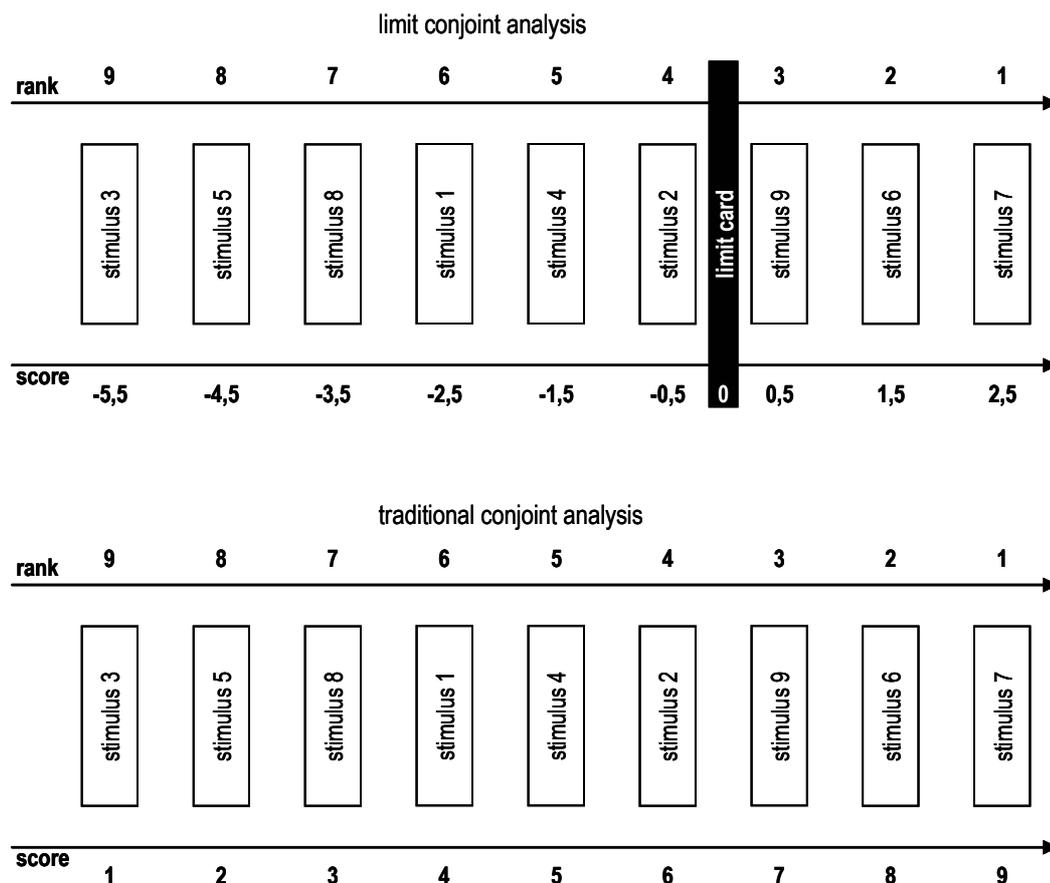
limit conjoint analysis

rank	9	8	7	6	5	4		3	2	1
	stimulus 3	stimulus 5	stimulus 8	stimulus 1	stimulus 4	stimulus 2	limit card	stimulus 9	stimulus 6	stimulus 7
score	-5,5	-4,5	-3,5	-2,5	-1,5	-0,5	0	0,5	1,5	2,5

traditional conjoint analysis

rank	9	8	7	6	5	4	3	2	1
	stimulus 3	stimulus 5	stimulus 8	stimulus 1	stimulus 4	stimulus 2	stimulus 9	stimulus 6	stimulus 7
score	1	2	3	4	5	6	7	8	9

Figure 1: Use of the limit card in a limit conjoint analysis

The scores corresponding with the ranks of the stimuli are rescaled with a simple linear transformation so that the limit card has always a score of zero. It becomes clear that the limit card can be interpreted as the zero-point of a subject's individual utility perception. All of the accepted stimuli (7, 6, 9) have a positive score the refused stimuli (2, 4, 1, 8, 5, 3) have a negative score (see Figure 1). The scores are the input of conjoint analysis. The rescaling has no effects on the part worths and the relative importances of attributes but changes the constant basic utility; usually into a negative value. If the calculated part worths of a stimulus' attribute levels and the constant basic utility add up to a value bigger than zero, one can assume that the stimulus would be accepted and deliver benefit to the subject [58]. The introduction of the limit card renders further information richness into the results of a conjoint analysis. Limit card positions and the modified basic utility values imply new possibilities to estimate market shares of new products and simulate test markets [58].

Limit conjoint analysis was chosen for this research approach because it can reveal potential users' preferences for certain attributes of mobile couponing services as well as some kind of overall acceptance of the idea of delivering coupons (and thus: advertising) to personal mobile devices.

3.2   Research Design

Green and Srinivasan [24,25] proposed a six-step-approach for the conduct of conjoint analyses (Table 2). This approach has been widely adopted and partly adapted by

researchers as it reflects numerous possibilities of designs and corresponding methods of estimation [26].

Table 2: Seven-step-approach with alternative methods (based on Green & Srinivasan's six-step-approach 1990)

	step	selected alternative methods
0	selection of attributes and attribute levels	Depends on research aims and objects
1	selection of a model of preference	vector model, ideal-point model, part-worth-function model, mixed model
2	data collection method	full-profile, two-factor method, adaptive conjoint analysis
3	stimulus set construction	fractional factorial design, random sampling, reduced design (orthogonal/non-orthogonal)
4	stimulus presentation	verbal description (multi-cue stimulus card), visual representation, real products, multimedia/computer based
5	measurement scales for the dependent variable	paired comparison (ordinal), ranking (ordinal), rating (metric), constant sum (metric)
6	estimation method	MONANOVA (ordinal), PREFMAP (ordinal), multiple regression (metric), OLS regression (metric)

We followed an extended version of the six step approach in which we introduced an extra step preceding the traditional six steps. This step is concerned with the selection of attributes and attributes' levels. In the subsequent description of the experiment, we will emphasize this step as it is most relevant as regards stimuli content.

The identification of suitable attributes and attribute levels (step 0) which describe relevant parts of a mobile couponing service can be done with the help of preliminary research methods. Green and Srinivasan name a number of approaches such as focus group discussions, expert interviews, and questionnaires they consider suitable [24]. A three-step approach was chosen for this experiment. First, in order to collect as many relevant attributes of a mobile couponing service as possible, an expert group discussion with a representative of a mobile telecommunications provider and two experienced academic researchers in the field of mobile communications and service design was conducted. The results were matched and combined with findings from a literature analysis on mobile advertising and services [3,12,38,2,6,8,31,32,41,48,7,29,43,64,16]. Table 3 displays a consolidated list of the identified mobile couponing service attributes.

Table 3: List of mobile couponing service attributes derived from expert group interview and literature review

attributes
configuration channel
number of coupons delivered (e. g. per week)
couponing service provider
personalization/ filter of coupon content
location-awareness
time of coupon delivery
promotion type of coupons
technical format of coupons (e. g. SMS, MMS, E-Mail)
pricing scheme of couponing service

Traditional and limit conjoint analysis have a restriction regarding the number of attributes that can be included in the stimuli design. This stems from the fact that the ranking task needs to be accomplishable for participants in the experiment. Too large a number of attributes would lead to a high number of stimuli that have to be ranked. Thus, the amount of attributes was reduced to four which represent important characteristics of a mobile couponing service and are of high relevance to the consumers. In order to filter out the four attributes with the highest perceived relevance from the list in Table 3, we designed a questionnaire. The cover page of the questionnaire contained a short introduction into couponing and the idea of mobile coupon delivery. Subjects were asked to rate on a five-point Likert-scale how important they perceive each attribute of mobile couponing. The attributes were presented with short descriptions in one item each. The questionnaire was presented to a sample of n=21 subjects; mostly male (80% =17) IS students. The results are displayed in Table 4.

Table 4: Results of the pre-questionnaire

Attributes	n	minimum	maximum	mean	std. deviation
personalization/ filter	21	2,00	5,00	4,1429	,91026
configuration channel	21	2,00	5,00	3,9048	,83095
location-awareness	21	1,00	5,00	3,8095	1,12335
pricing scheme of couponing service	21	1,00	5,00	3,8095	1,20909
promotion type of coupons	21	1,00	5,00	3,7619	1,09109
couponing service provider	21	1,00	5,00	3,5714	1,16496
number of coupons delivered	21	1,00	5,00	3,4286	1,12122
technical format of coupons	21	1,00	5,00	3,4286	1,20712
time of coupon delivery	21	1,00	5,00	2,9524	1,16087
valid n	21				

The results of the questionnaire deliver *personalization/ filter*, *configuration channel*, *location-awareness*, and *pricing scheme of couponing service* as the four most important

attributes of mobile couponing according to the respondents. These findings were discussed and we decided not to use the attribute *pricing scheme of couponing service* in the experimental design because this would narrow the focus to services like rebate clubs. Couponing is generally not considered a service to pay for, since it is perceived as advertising and not as an actual service itself. Furthermore, although *pricing scheme* was not rated the most important, with its exclusion we avoided possible dominance of this attribute which could have been caused by extreme attribute levels (e. g. free vs. pay-per-coupon). Ergo, *promotion type of coupons* was chosen as fourth attribute to be included in the stimuli design. In the following, the selected attributes will be briefly described.

Personalization/ filter refers to the possibility for consumers to express preferences concerning the content or underlying objects (products, services) of coupons. Personalization, in a narrow definition, is the modification of a product or service according to the customers' individual needs and preferences [45]. The provision of personalized content is often considered a crucial part of mobile services unique value proposition [48,43,34]. Two levels of this attribute reflect this aspect: *yes, product based* (for preferences regarding product type or ranges), and *yes, dealer/ manufacturer based* (for preferences regarding brands, stores, chains, and manufacturers). The third level covers the option of no possible personalization of coupon content (*no*).

Configuration channel refers to the channel via which consumers can sign in, sign out, and partly configure the mobile couponing service. Aspects of convenience, usability and technology acceptance are considered important for this attribute. Three levels were chosen, which all reflect possible or prevalent channels for electronic and mobile service configuration: *Internet/ WWW* (configuration via browser and personal computer), *mobile/ WAP* (configuration via mobile device and WAP browser), *SMS* (configuration via text messaging).

Location-awareness refers to the location-sensitiveness of mobile couponing. As mentioned before, mobile couponing has often been described as potential LBS application [17,32,43]. With location-awareness, coupons would be sent to consumers depending on their actual geographical position. Coupons could be sent to shoppers who are presently inside a store or walking by. The value for marketers is obvious. Consumers can be addressed exactly in time when purchase decisions are made [32]. Cross- and up-selling potential seems enormous. However, a mobile couponing service could also work without location-sensitiveness. Mobile devices would then be more like a storage device for electronic coupons that is always handy. For these reasons two levels of this attribute were included in the stimuli design: *yes* (geographical position is considered in coupon delivery logic), and *no* (geographical position is not considered in coupon delivery logic).

Finally, *promotion type of coupons* refers to a service attribute that is actually not mobile-specific but describes something like face-value [44] of the core service: the coupon itself. Couponing literature suggests that the coupon content and its monetary value highly affect coupon redemption rates [44,4,55]. Monetary value of the coupons is not an adequate attribute for conjoint experiments, since there is a clear the-more-the-better relationship which would render the results worthless. Therefore we distinguished between promotion or rebate types that are offered on the coupon. The three levels used are: *cash rebate* (e. g. 10% off, 30c off), *rebate in kind* (e. g. buy-one-get-one-free), *bonus points* (points of a loyalty scheme or something comparable which can be redeemed for awards afterwards).

Table 5 summarizes the attributes and their levels included in the stimuli design.

Table 5: Attributes and levels selected for stimuli design

m-couponing service attributes	levels
configuration channel	Internet/ WWW
	mobile/ WAP
	SMS
personalization/ filter	yes, product based
	yes, dealer/ manufacturer based
	no
location-awareness	yes
	no
promotion type of coupons	cash rebate
	rebate in kind
	bonus points

As presented in Table 2, step 1 requires the selection of a preference model used for the estimation of part worths. All attribute levels are discrete (part-worth-function model) as there are no ex-ante assumptions on correlations between attribute levels and ranks to be made (e. g. linear the-more-the-better relationship).

The data collection method (step 2) is full profile which means that subjects are presented stimuli that include all four attributes each with one of their levels. This is the traditional conjoint approach of data collection [24].
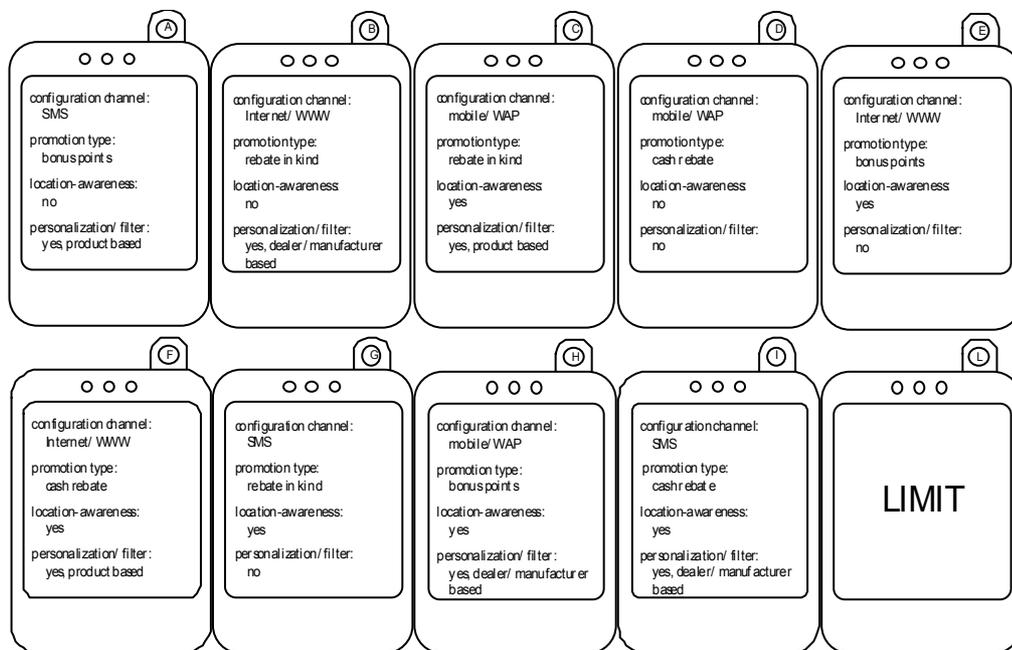

Figure 2: Reduced orthogonal design and limit card

Stimulus set construction (step 3) was accomplished with SPSS 13.0. The number of stimuli was reduced from a 3 x 2 x 3 x 3 = 54 full design to a nine-stimuli reduced

orthogonal design. Stimuli are presented to subjects as verbally described multi-cue stimulus cards (step 4). A complete set of cards is displayed in Figure 2.

The measurement scale for the dependent variable (step 5) is ordinal. Subjects rank the stimuli. Yet, for conjoint analysis this ordinal data is used as metric data. Inter-rank distances are always assumed to be even. This assumption is not violated by the linear transformation of scores for the purpose of conducting a limit conjoint analysis as it is displayed in Figure 1. The interpretation of ranking results as interval scaled is a common procedure in conjoint experiments [24]. This determines the choice of the estimation method (step 6). The estimation itself is conducted with the help of SPSS 13.0. As usual, the estimation was done with an OLS regression [24].

3.3　Data Collection

Data collection was carried out in February 2005 by conducting an experiment in which a total of 125 information systems and business students participated. The sample consisted of a total of 113 male (90.4%) and 12 female (9.6%) students. The mean of the respondents' ages was 22.1 years. Participation was voluntary and no incentives were granted.

Previous research has shown that preference measurement for innovative products and services can be improved by combining other methods with conjoint analysis. One possible cognitive tool is mental simulation. Hoeffler [28] found that subjects which were told to mentally simulate the use of an innovative product in different situations developed a more accurate estimate of the products utility. In order to embrace the already discussed contextual embeddedness of mobile services and findings from previous research, we developed a simple experimental scenario that was verified in preceding discussions during lectures as well as in the expert group discussion. Preceding discussions did not involve the 125 students who served as respondents in the experiment.

Before the cards were handed out, the context of the experiment was explained to participants with an introductory presentation on couponing. In the presentation, all attributes and attribute levels were also introduced and explained in order to ensure that participants clearly understand the profiles of the different stimuli. Subjects were asked to imagine situations in which they would decide on the actual usage of mobile couponing. The presentation ended with a thorough explanation of the task the participants were asked to perform (i.e. ranking of cards according to their preferences). A special focus was put on an explanation of where and when the limit card should be placed. It was explicitly made clear what the placement of the limit card indicates and that it could be placed at any position, which means on the first, last, or any intermediate rank.

Since some of the attribute levels such as the configuration channel could cause participants to expect hidden costs (e.g. through using WAP or sending an SMS to a certain address) and lead to uncontrolled effects on the experiment results, participants were furthermore asked to assume that no costs would occur for any of the stimuli.

4.　Results

No missing data or inconsistencies were found in the ranking results. SPSS delivered the aggregated part worths for each attribute level as displayed in Figure 3. A hypothetical mobile couponing service that can be personalized by product type, is not location-sensitive, provides cash rebate coupons, and can be configured over the Internet would maximize the perceived utility of the average subject. The absolute part worths clearly depict which of the attribute levels are perceived to be beneficial to overall utility and which are negatively laden. The overall basic utility has a value of -1.174, which denotes

that the service on average has a negative perceived utility which needs to be compensated by positive part worths of attribute levels. The interpretative value of these results is assessed below.
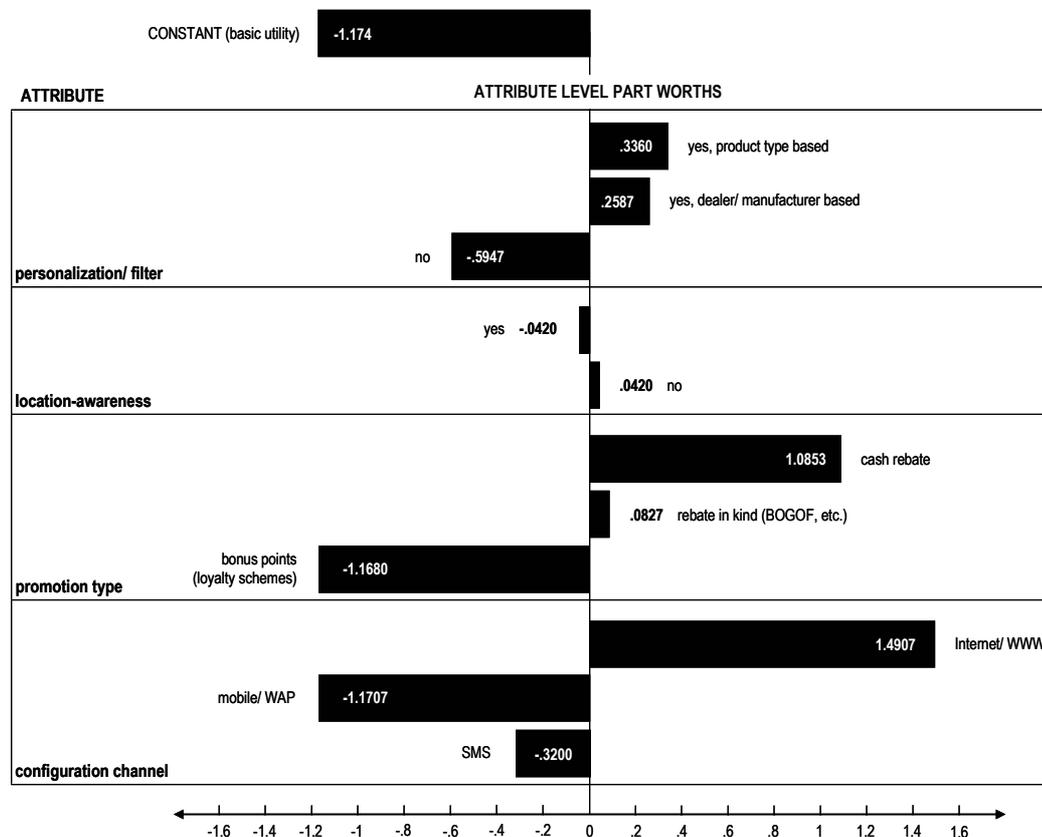

Figure 3: Estimated part worth summary

Part worth statistics are summarized in Table 6. The figures reveal the extent to which individual preferences differ regarding each attribute level. Mean values equal the values visualized in the part worth summary which is presented above (Figure 3). Standard deviations reveal that individuals' preferences for attribute levels of the configuration channel attribute vary relatively strong (1.166 to 1.462). The different attribute levels for the personalization attribute show the lowest standard deviation values (.724 to .879). The standard deviations of the attributes' part worths can be seen as an indicator for a salient heterogeneity in the test group which could be further analyzed later on by conducting an additional cluster analysis with the z-values of the individual conjoint analyses [27].

		N	Minimum	Maximum	Mean	Std. Deviation
constant (basic utility)		125	-4,92	4,58	-1,1740	2,15794
personalization/ filter	yes, product type based	125	-2,00	3,00	,3360	,72401
personalization/ filter	yes, dealer/ manufacturer based	125	-3,00	2,67	,2587	,78158
personalization/ filter	no	125	-3,00	3,00	-,5947	,87946
location-awareness	yes	125	-2,25	2,25	-,0420	,90793
location-awareness	no	125	-2,25	2,25	,0420	,90793
configuration channel	Internet/ WWW	125	-2,00	3,00	1,4907	1,31818
configuration channel	mobile/ WAP	125	-3,00	3,00	-1,1707	1,46195
configuration channel	SMS	125	-3,00	2,00	-,3200	1,16582
promotion type	cash rebate	125	-1,00	3,00	1,0853	,97817
promotion type	rebate in kind	125	-3,00	2,67	,0827	1,00862
promotion type	bonus points	125	-3,00	1,67	-1,1680	1,21418
Valid N (listwise)		125				

Table 6: Part worth statistics

A further aggregation of individual part worths renders values of the attributes' perceived averaged importance to the overall utility evaluation. The values depicted in Figure 3 already give an insight into perceived importance which is calculated by the division of an attributes' part worth value span with the sum of all attributes' spans. The experimental results are displayed as percentage values in Figure 4.
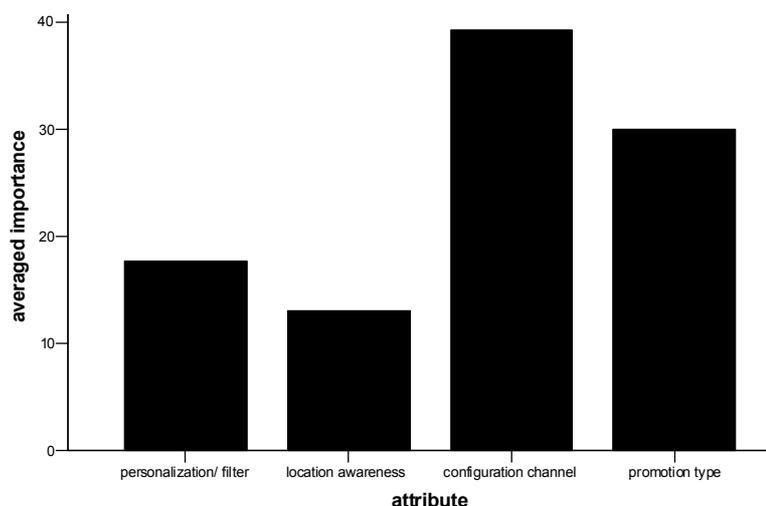

Figure 4: Relative importance of service attributes

The explorative character of the experiment complicates a testing of external validity [25]. The correlation between empirical ranks of stimuli given and the ranks estimated by the conjoint analysis (Kendall's τ) as well as the correlation between the metric overall utilities of stimuli and empirical ranks (Pearson's R) are measures for the 'goodness of fit' and *internal validity* [24,5]. A low number of degrees of freedom also influenced the resulting values of 1 for both R^2 and Kendall's τ. Hence, they have a reduced explanatory power. However, the overall goodness of fit can assumed to be excellent, not at least because the experimental design was kept rather simple.

Limit card positions and the modified basic utility values imply new possibilities to estimate market shares of new products and simulate test markets.

An analysis of frequencies of limit card ranks provides information about the general acceptance of the service or product which is the object of a limit conjoint analysis. Frequencies of limit card ranks for the experiment we conducted can be found in Figure 5. Of the 125 subjects, 14 completely rejected mobile couponing services, which equals a share of 11.2%. They placed the limit card before the stimulus they ranked as most favourable (rank 0 of the limit card). 4 of the participants (3.2%) seem very open to and interested in mobile couponing services and stated that they would accept services with characteristics of any stimulus. The average rank of the limit card is 3.312.
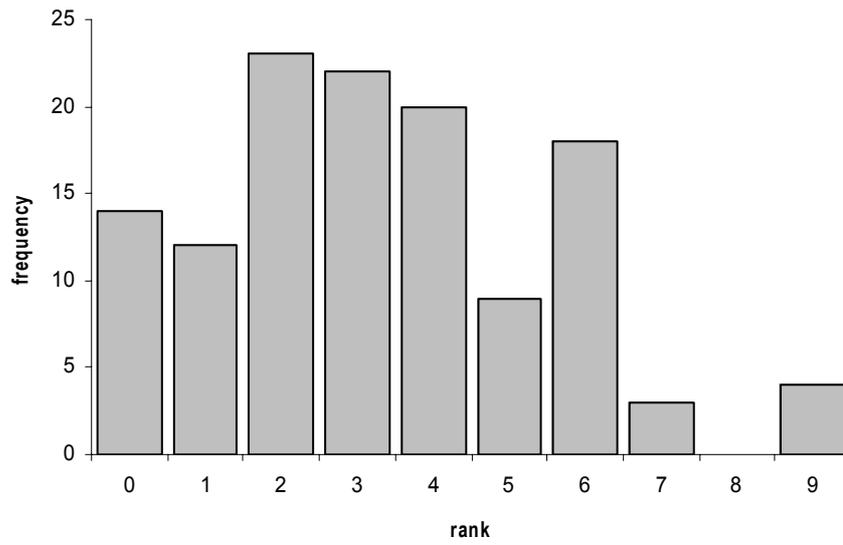

Figure 5: Frequencies of limit card ranks

The analysis of the limit card rank reveals that while 88.8 % of the subjects would be willing to subscribe to a mobile couponing service, the profile or parameter values of the service have a significant impact on the acceptance of the service. On an individual level the limit conjoint results allow the researcher to test for specific stimulus acceptance. If the stimulus' attribute levels generate an overall utility that compensates a possibly negative basic utility that was calculated for a subject, one could assume that it would be accepted in a scenario of choice.

5.   Discussion

5.1   Consumers' Acceptance and Preferences of Mobile Couponing

The mobile couponing service has a basic utility of -1.174, which has to be compensated by positive part worths of the considered service attributes if the service is to be accepted by consumers following the logic of limit conjoint analysis. Hereby, the *configuration channel* is of considerable importance. With any other configuration channel than the Internet, no positive overall utility could be achieved, no matter which other attribute levels are chosen for the other attributes considered. The mobile device seems to be considered an inadequate device for configuration activities that require the entering of data. The Internet in contrast, which in the scenario presented to the subjects is used via PC, seems to be considered a more adequate configuration channel since it represents an

interface that consists of a larger screen and keyboard. This finding is in line with other scenarios for mobile commerce in which roles are split between PCs and the Internet and the mobile device: the mobile device is used as a receiving device, while extensive configuration activities are preferably carried out using a PC.

The *promotion type* represents the attribute with the second largest relative importance. The subjects attribute the highest value to cash rebates, while they are almost indifferent to rebates in kind such as buy-on-get-on-free models. Loyalty schemes in which bonus points can be collected and redeemed at some point in future are rejected and show the second highest negative part worth of all attribute levels. Choosing this alternative would also lead to negative utility value independent of the attribute levels of the other attributes.

The part worths of the attribute levels of the *personalization* attribute shows that consumers value the opportunity to control which kind of coupons are sent to their mobile device. While both dealer-based as well as product-based options have positive part worths, the no-personalization option has a negative part worth. It can be assumed that consumers also want to reduce the amount of messages sent to their mobile device and make sure that they only receive coupons they perceive as useful. Other coupons in contrast could be considered annoying or spam, which could result in service rejection. Our respondents seem to transfer experience with other types of advertising messages like e-mail spam or print advertising clutter into the so far almost untouched wireless channel. This insight might also be of interest for other mobile services offered.

The very low relative importance of *location-awareness* within our sample is another very interesting finding of this research. While location-awareness and location-based services are generally considered one of the most interesting opportunities mobile commerce has to offer, location-awareness seems to have very little impact on the overall perceived utility of a mobile couponing service. Furthermore, the no-location-awareness option even has a slightly positive part worth, while the location-awareness option has a slightly negative part worth. This might be a hint to privacy concerns associated with location aware services, which was one of the points mentioned in an informal discussion of results in which some of the participants took part after the experiment. Especially the results for this attribute thus provide interesting opportunities for further research which are discussed below.

The analysis of the frequencies of limit card ranks reveals what the negative basic utility and the part worth summary suggest on a more aggregate level. The subjects were generally rather critical regarding mobile couponing services, and rejected in average almost two thirds of the presented stimuli. This certainly differs on an individual level but reveals the importance of the extra information the introduction of a limit card adds to a traditional conjoint analysis. While in a traditional conjoint analysis, it might easily have been expected that most of the stimuli would have been accepted, the limit card gives more realistic insights into the market potential of mobile couponing services.

5.2 Directions for Further Research

The results of the limit conjoint analysis indicate several possible directions for further research. Firstly, the sample could be extended to increase information richness of the data. On the basis of the existing data, a cluster analysis could be carried out using z-standardized values of the part worths on an individual level [27]. By this, segments could be identified within our sample of n=125 which better explain the results on an aggregate level. The standard deviations of individual part worths in Table 6 indicate that there is a salient heterogeneity in our sample that could render interpretable cluster analysis results.

Furthermore, the limit card data could be used to predict acceptance rates of specific service designs and even simulate a test market (given the limitations of the sample and the methodology). Eventually, the findings on location-awareness call for further research activities. The results of our experiment could be cross-checked with other research results and consumers' perceptions of location-sensitiveness should be elicited in other experimental settings using different research designs and methods.

5.3   Limitations

The analysis was conducted with a voluntary group of students during a thematically related lecture. The deployment of volunteers and the widely spread custom of conducting studies with students lead to hardly predictable distortions in empirical social research [11]. However, despite the lacking representativeness, young and technology-affine people are probably part of a potential mobile couponing service provider's target group, so that an indicative character of the results can be assumed. We are fully aware of general methodological shortcomings, but as conjoint analysis is primarily an exploratory and not a confirmatory approach we did not emphasize the size and representativeness of the test sample. Furthermore, we acknowledge that it is difficult for consumers to evaluate non-tangible, context sensitive services in a laboratory environment. This problem can partly be resolved by the provision of a plausible scenario or mental simulation [28].

Implications for (potential) mobile couponing providers can hardly be derived - primarily due to the non-representative sampling of subjects. The limitations of conjoint measurement as an appropriate research method for leading edge services or technological innovations are known and have to be regarded in the translation of research findings into service providers' strategies. However, the prediction problem regarding customers' service acceptance [28] is mitigated when using a limit conjoint analysis, as discussed above.

The deployment of limit conjoint analysis in similar contexts will prove fertile as consumers' trade-off decisions and relations between attribute levels abound. It is doubtless that limit conjoint research results demand extensive interpretive effort but will compensate with a more realistic model of the consumers' mindsets, their preferences and contingencies of decision-making processes. Furthermore, the derivation of benefit-oriented segmentations might complement or even exceed classic approaches based on socio-demographics or tracked buying behaviour.

6.   Conclusion

This study investigated possible mobile couponing service designs by conducting a limit conjoint analysis. The results give insight into the respondents' mindsets, their preferences for mobile couponing service attributes and their overall acceptance of mobile couponing services in general. The *configuration channel* was found to have the greatest relative importance of the four service attributes which were included in the research design, followed by the coupon *promotion type*, the possibility to *personalize or filter* the offered coupons, and the *location-awareness* of the couponing service. Especially, the low importance and an even slightly negative utility of location-sensitiveness of a mobile couponing service was a surprising result of this study. It is assumed that privacy concerns lead the subjects to this refusal of this characteristic which is generally claimed to essentially generate the unique value propositions of emerging mobile services.

The inclusion of limit cards in the conjoint experiment delivered further data regarding the overall acceptance of mobile couponing services within the sample. Only 11.2% of the subjects completely rejected the whole set of stimuli indicating a surprisingly high rate of acceptance for a service that is commonly understood as advertising with all its persuasive aspects.

References

1. Allenby, G. M.; and Ginter, J. L. Using Extremes to Design Products and Segment Markets. *Journal of Marketing Research*, 32, 4 (1995), 392-403.

2. Anckar, B.; and D'Incau, D. Value Creation in Mobile Commerce: Findings from a Consumer Survey. *Journal of Information Technology Theory and Application*, 4, 1 (2002), 43-64.

3. Andersson, A.; and Nilsson, J. *Wireless Advertising Effectiveness: Evaluation of an SMS Advertising Trial (Thesis)*. Stockholm: Stockholm School of Economics, 2000.

4. Babakus, E.; Tat, P.; and Cunningham, W. A. Coupon Redemption: A Motivational Perspective. *Journal of Consumer Marketing*, 5, 2 (1988), 37-43.

5. Backhaus, K.; Erichson, B.; Plinke, W.; and Weiber, R. *Multivariate Analysemethoden*. Berlin: Springer, 2003.

6. Barnes, S. J. Wireless digital advertising: nature and implications. *International Journal of Advertising*, 21, 3 (2002), 399-420.

7. Barnes, S. J. Location-Based Services: The State of the Art. *E-Service Journal*, 2, 3 (2003), 59-70.

8. Barwise, P.; and Strong, C. Permission-based mobile advertising. *Journal of Interactive Marketing*, 16, 1 (2002), 14-24.

9. Becker, J.; Vering, O.; and Winkelmann, A. *Couponing & Coupon-Clearing in Deutschland - Grundlagen und Konzepte*. Münster, 2003.

10. Blattberg, R. C.; and Neslin, S. A. *Sales Promotions: Concepts, Methods and Strategies*. Englewood Cliffs: Prentice Hall, 1990.

11. Bortz, J.; and Döring, N. Forschungsmethoden und Evaluation. In. Berlin, Heidelberg, New York: Springer, 2002.

12. Boston.Consulting.Group *Mobile Commerce - Winning the on-air consumer*, http://www.bcg.com/publications/publications_search_results.jsp?PUBID=587.

13. Carroll, J. D.; and Green, P. E. Psychometric Methods in Marketing Research: Part I, Conjoint Analysis. *Journal of Marketing Research*, 32, 4 (1995), 385-391.

14. Casal, C. R. Location and personal information for direct marketing. *info*, 5, 2 (2003), 45-50.

15. Dao, D.; Rizos, C.; and Wang, J. Location-Based Services: Technical and Business Issues. *GPS Solutions*, 6, 3 (2002), 169-178.

16. Dickinger, A.; Haghirian, P.; Murphy, J.; and Scharl, A. An Investigation and Conceptual Model of SMS Marketing. *Proceedings of the 37th Hawaii International Conference on System Sciences*, Hawaii, January 05-08, 2004.

17. Dickinson, W. C. Subway takes direct-mail marketing mobile, wireless with GoZing. *Nation's Restaurant News*, 34, 47 (2000), 16-48.

18. Fortin, D. R. Clipping Coupons in Cyberspace: A Proposed Model of Behavior for Deal-Prone Consumers. *Psychology & Marketing*, 17, 6 (2000), 515-534.

19. Fortunati, L. The Mobile Phone: An Identity on the Move. *Personal and Ubiquitous Computing*, 5 (2001), 85-98.

20. Fortunati, L. The Mobile Phone: Towards New Categories and Social Relations. *Information Communication & Society*, 5, 4 (2002), 513-528.

21. Gilbert, A. L.; and Kendall, J. D. A Marketing Model for Mobile Wireless Services. *Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS-37)*, Hawaii, USA.

22. Green, P. E.; Krieger, A. M.; and Wind, Y. Thirty Years of Conjoint Analysis: Reflections and Prospects. *Interfaces*, 31, 3 (2001), S56-S73.

23. Green, P. E.; and Rao, V. R. Conjoint Measurement for Quantifying Judgmental Data. *Journal of Marketing Research*, 8, 3 (1971), 355-363.

24. Green, P. E.; and Srinivasan, V. Conjoint Analysis in Consumer Research: Issues and Outlook. *Journal of Consumer Research*, 5, 2 (1978), 103-123.

25. Green, P. E.; and Srinivasan, V. Conjoint analysis in marketing: New developments with implications for research and practice. *Journal of Marketing*, 54, 4 (1990), 3-19.

26. Gustafsson, A.; Herrmann, A.; and Huber, F. Conjoint Analysis as an Instrument of Market Research Practice. In Gustafsson, A.; Herrmann, A.; Huber, F. (eds.), *Conjoint Measurement: methods and applications*. Berlin, Heidelberg, New York: Springer, 2000, 5-45.

27. Hagerty, M. R. Improving the Predictive Power of Conjoint Analysis: The Use of Factor Analysis and Cluster Analysis. *Journal of Marketing Research*, 22, 2 (1985), 168-184.

28. Hoeffler, S. Measuring Preferences for Really New Products. *Journal of Marketing Research*, 40, 4 (2003), 406-420.

29. Hung, S.-Y.; Ku, C.-Y.; and Chang, C.-M. Critical factors of WAP services adoption: an empirical study. *Electronic Commerce Research and Applications*, 2, 1 (2003), 42-60.

30. Johnson, R. M. Trade-Off Analysis of Consumer Values. *Journal of Marketing Research*, 11, 2 (1974), 121-127.

31. Jones, A. Wireless marketing: the linking value of text messaging. *International Journal of Advertising & Marketing to Children*, 3, 2 (2002), 39-44.

32. Kalakota, R.; and Robinson, M. *M-business: the race to mobility*. New York: McGraw-Hill, 2002.

33. Kavassalis, P.; Spyropoulou, N.; Drossos, D.; Mitrokostas, E.; Gikas, G.; and Hatzistamatiou, A. Mobile Permission Marketing: Framing the Market Inquiry. *International Journal of Electronic Commerce*, 8, 1 (2003), 55-79.

34. Köhne, F.; Totz, C.; and Wehmeyer, K. Consumer preferences for location-based service attributes: a conjoint analysis. *International Journal of Management and Decision Making*, 6, 1 (2005), 16-32.

35. Leonard, D. The Limitations of Listening. *Harvard Business Review*, 80, 1 (2002), 93.

36. Louviere, J. J.; and Woodworth, G. Design and Analysis of Simulated Consumer Choice or Allocation Experiments: An Approach Based on Aggregate Data. *Journal of Marketing Research*, 20, 4 (1983), 350-367.

37. Luce, R. D.; and Tukey, J. W. Simultaneous conjoint measurement: A new type of fundamental measurement. *Journal of Mathematical Psychology*, 1, 1 (1964), 1-27.

38. Luo, H.; and Shankaranarayanan, N. K. A Conditional E-Coupon Service for Location-Aware Mobile Commerce. *Proceedings of the IFIP Conference on Towards The E-Society: E-Commerce, E-Business, E-Government*, Zurich, Switzerland, October 03-05, 2001, 587-602.

39. Machlis, S. Web coupons clipping costs for big retailers. *Computerworld*, 32, 27 (1998), 79.

40. Marzocchi, G. L.; Brasini, S.; and Rimessi, M. New Product Development in the Software Industry: The Role of Conjoint Analysis. In Gustafsson, A.; Herrmann, A.; Huber, F. (eds.), *Conjoint Measurement: methods and applications*. Berlin, Heidelberg, New York: Springer, 2000, 135-160.

41. Mort, G. S.; and Drennan, J. Mobile digital technology: Emerging issues for marketing. *Journal of Database Marketing*, 10, 1 (2002), 9-23.

42. Pearse, J. Sainsbury's rolls out mobile couponing with TV campaign. *New Media Age*, 12/2/2004 (2004), 4.

43. Rao, B.; and Minakakis, L. Evolution of Mobile Location-based Services. *Communications of the ACM*, 46, 12 (2003), 61-65.

44. Reibstein, D. J.; and Traver, P. A. Factos Affecting Coupon Redemption Rates. *Journal of Marketing*, 46, 3 (1982), 102-113.

45. Riemer, K.; and Totz, C. The many faces of personalization - an integrative overview of mass customization and personalization. In Tseng, M. M.; Piller, F. T. (eds.), *The Customer Centric Enterprise:Advances in Mass Customization and Personalization*. Berlin, Heidelberg, New York: Springer, 2003, 35-50.

46. Rubach, E. Can coupons really cut it? *Precision Marketing*, 15, 1 (2002), 12.

47. Saaty, T. L. How To Make a Decision: The Analytic Hierarchy Process. *Interfaces*, 24, 6 (1994), 19-43.

48. Sadeh, N. *M-Commerce: technologies, services, and business models*. New York: Wiley, 2002.

49. Samsioe, J.; and Samsioe, A. Introduction to Location Based Services - Markets and Technologies. In Reichwald, R. (ed.) *Mobile Kommunikation*. Wiesbaden: Gabler, 2002, 417-437.

50. Sattler, H.; and Hensel-Börner, S. A Comparison of Conjoint Measurement with Self-Explicated Approaches. In Gustafsson, A.; Herrmann, A.; Huber, F. (eds.), *Conjoint Measurement: Methods and Applications*. Berlin: Springer, 2000, 121-133.

51. Slater, J. Is couponing an effective promotional strategy? An examination of the Procter & Gamble zero-coupon test. *Journal of Marketing Communications*, 7, 1 (2001), 3-9.

52. Sommer, R. Personal space in a digital age. In Bechtel, R. B. (ed.) *Handbook of Environmental Psychology*. New York: Wiley, 2002, 647-660.

53. Stafford, T. F.; and Gillenson, M. L. Mobile Commerce: What It Is and What It Could Be. *Communications of the ACM*, 46, 12 (2003), 33-34.

54. Suri, R.; Swaminathan, S.; and Monroe, K. B. Price Communcations in online and Print Coupons: An Empirical Investigation. *Journal of Interactive Marketing*, 18, 4 (2004), 74-86.

55. Tat, P.; Cunningham, W. A.; and Babakus, E. Consumer Perceptions of Rebates. *Journal of Advertising Research*, 28, 4 (1988), 45-50.

56. Tenser, J. Procter & Gamble ends three-city test of zero couponing. *Supermarket News*, 47, 21 April (1997), 1.

57. Tsang, M. M.; Ho, S.-C.; and Liang, T.-P. Consumer Attitudes Toward Mobile Advertising: An Empirical Study. *International Journal of Electronic Commerce*, 8, 3 (2004), 65-78.

58. Voeth, M. Limit Conjoint Analysis - a modification of the traditional Conjoint Analysis. *Proceedings of the 27th EMAC Conference*, Stockholm, Sweden, 20-23 May, 315-331.

59. Voeth, M.; and Hahn, C. Limit Conjoint-Analyse. *Marketing ZFP*, 20, 2 (1998), 119-132.

60. Vriens, M.; Wedel, M.; and Wilms, T. Metric conjoint segmentation methods: A Monte Carlo comparison. *Journal of Marketing Research*, 33, 1 (1996), 73-85.

61. Wittink, D. R.; and Cattin, P. Commercial Use of Conjoint Analysis: An Update. *Journal of Marketing*, 53, 3 (1989), 91-96.

62. Wyner, G. A. Uses and Limitations of Conjoint Analysis - Part I. *Marketing Research*, 4, 2 (1992), 42-44.

63. Wyner, G. A. Uses and Limitations of Conjoint Analysis - Part II. *Marketing Research*, 4, 3 (1992), 46-47.

64. Yuan, Y.; and Zhang, J. J. Towards an appropriate business model for m-commerce. *International Journal of Mobile Communications*, 1, 1/2 (2003), 35-56.