Abstract

Mobile service providers can use service bundling to offer attractive services to customers. Customers may find bundles convenient compared to single services and there may be a price discount involved. This paper examines what kind of service bundle may be attractive to users in the car navigation system market. We hypothesize that customers are more likely to acquire enhanced services than supplementary services and that bundle price has a positive effect on the intent to purchase. We used a conjoint analysis to assess which combination of services and price level is the most attractive to users. It turned out that enhanced services, i.e. services that reinforce the functionality of the core navigation service, are more relevant than supplementary services. However, the relative importance of price discounts is almost similar to the importance of bundle composition, implying that a customer may appreciate a careful composition of a bundle above a simple price discount.

Keywords: mobile services, service bundles, business models, navigation services, pricing, conjoint analysis

Authors

Harry Bouwman (H.Bouwman@tbm.tudelft.nl) is an Associate Professor at Delft University of Technology, Faculty of Technology, Policy and Management, Section Information and Communication Technology. He received his master degree in political science from the Free University of Amsterdam and his PhD from the Catholic University of Nijmegen. He is author and editor of several books in the field of multimedia, ICT and telecommunications. His research interest includes business architectures, business IT alignment, strategy and business models, service design and 4G mobile telecommunications.

Timber Haaker (timber.haaker@telin.nl) is a researcher at the Telematica Instituut. Timber has a background in applied mathematics. He received his PhD in mathematical analysis. After his PhD he worked as an investment consultant. Following this he joined the Research department of KPN, the incumbent Dutch Telecom.
service with real-time value-added information services for users of PDAs, mobile phones and standalone navigation systems. In addition, TomTom has recently started offering value-added services (like map updates, real-time weather, traffic and safety camera information services) under the name TomTom PLUS Services. Its services are aimed at the mass consumer market. TomTom makes money by selling (updates on) navigation software (fixed price), standalone navigation services (fixed price), and value-added (subscription-based) services. The company’s main costs are product and service development, and marketing. The navigation technology that is used combines GPS, localization and map technology, together with GPRS and/or UMTS networks.

Companies like TomTom have been important drivers in turning personal navigation into a mainstream consumer service. Until recently built-in and dedicated hand-held navigation systems dominated the consumer market, but more and more software becomes available for smart-phones or PDA’s as navigators, as the above-mentioned example illustrates. With broadband wireless networks becoming increasingly available, off-board personal navigation is emerging. Off-board navigation systems receive navigation information via real-time data transfers over a wireless network and provide up-to-the-minute routing directions (Schlesinger 2003). Navigation systems are rapidly becoming a commodity with falling retail prices and profits. To attract and retain customers providers have to differentiate by combining the core navigation service with additional functionalities.

In this paper we start from service bundling theory and investigate what kind of services will provide added value to core navigation in relation to bundle pricing. In the next section we discuss the service bundle literature, after which we address the research approach and the design, and subsequently present our main findings. In the final section we discuss the results and draw conclusions.

SERVICE BUNDLES AND PRICING

Product bundling – the sale of two or more separate products or services in one package for a special price – has a long history (Guiltinan 1987, Shapiro and Varian 1999, Stremersch and Tellis 2002). Before we take a closer look at product bundling, we have to determine the various types of products. Kotler (1999) distinguishes three product levels: core product, actual product and augmented product. The core products include the core benefit or service. The actual product includes packaging, brand name, quality level, design and features. The augmented products includes installation, delivery and credit, warranty and after sales services. Bundling core products with other functional complementary products is a common and widespread practice. The best-known example is Microsoft Office, which combines a word processor, a spreadsheet, a database and a presentation tool.

Companies use bundling to pursue price discrimination (Adams and Yellen 1976), increase sales (Zhu and McQuarrie 2003), promote customer lock-in and create entry barriers in oligopoly-like market circumstances (Benett and Robson 2001). Although bundling strategies have been around for quite some time, little is as yet known about what constitutes a successful bundle. Spiller and Zelner (1997) assume that companies tend to bundle their products in response to some kind of technological or regulatory shock. Such a shock is argued to make products complementary in new ways, the result being that there is additional demand for each of the products that did not previously exist. The interdependency between products is critical in cases where products depend directly on each other with regard to their use; as is the case in many computer, information and telecommunication services. The use of software is impossible without hardware and vice versa. The bundling of information goods, such as software, is omnipresent in today’s business environment, and it is a well-known phenomenon in the telecommunication industry. Packages in which telephony services are combined with wireless and Internet services are common. In Europe, bundling mobile services with ‘an almost for free’ handset is everyday practice, the objective being simple: to increase revenue, lower churn rates and improve margins.

Some studies on service bundling focus primarily on bundling services with auxiliary or support services (Simons and Bouwman 2004), and less on complementary services that are equal to the core service, which is what we are interested in here. Normann (2001) discusses (un) bundling in a development towards a need-oriented matching between activities of customers and suppliers. Mourdoukoutas and Mourdoukoutas (2004) place bundling in a semi-global context where commodity products are bundled with local services to achieve local product differentiation. Chiasson (1999) presents a model for designing bundles. He argues that bundling requires a formal process to structure the economic and strategic value of a bundle and deliver it to the market. Issues he discusses are the strategic purpose of a service bundle, in terms of market and product strategy, and the functional objectives, in relation to channels, marketing, support systems, billing and telecommunication network requirements. If a bundle is to be marketed quickly and has to be profitable and consistent, trade-off decisions in the design stage are crucially important, for instance with regard to the bundle composition (Bouwman et al. 2005).

Bundle composition refers to the services and products that are included in the bundle. Services not only have an intrinsic value, for example, expressed by their core benefit, but also a relative value that depends
on their role within the bundle. Services or products may be mutually reinforcing (e.g., communication and presence information), complementary (e.g., mobile phone and subscription), unrelated (e.g., ring tone and weather information service) or competing (e.g., ring tone service A and B). Guiltinan (1987) argues that services are often interdependent in terms of demand, and Harlam et al. (1995) suggest that people are more likely to purchase bundles that are composed of complements than bundles containing similar or unrelated products. In the case of service bundles in the navigation domain add-ons that build on the initial core, like integrated traffic information, may enhance the perceived value of the initial service. We will call these enhanced services: enhanced services are directly related to the core service. Unrelated supplementary services extend the initial benefits in new directions, i.e. location-based advertising in combination with navigation services. Related to the arguments presented by Guiltinan (1987) and Harlam et al. (1995) we hypothesize that:

**Hypothesis 1**: People are more likely to buy enhanced services than supplementary services.

In addition to bundle composition, pricing is also an important issue. The price of a bundle is usually lower than that of the sum of its individual components. However, bundling does not necessarily result in lower price offerings when customers would purchase that product anyway. Price discrimination is an important issue when discussing bundle pricing. We hypothesize that:

**Hypothesis 2**: Bundle price discount has a positive effect on the likelihood that users will purchase.

Consumer theory relates preferences, indifference curves and budget constraints to consumer demand curves (Green 1976). Budget considerations may, therefore, be an important constraint in people’s evaluation of service bundles. Given that the size of a bundle is closely related to its price, the number of services included in the bundle may have a negative impact on a user’s intent to purchase. Focusing on a limited number of services in a bundling strategy may be smarter than combining a large number of fairly heterogeneous enhanced and supplementary services. We hypothesize that:

**Hypothesis 3**: Bundle size has a negative effect on the likelihood that users will purchase.

Of course there are intermediating factors that may influence the relationship between the composition, size and discount level of a bundle, and purchase intent, as we outlined above. A great deal may depend on the type of trip (business or pleasure), someone’s personal characteristics (like attitude toward technology), and what type of traveller they are (number of times they travel per week, different destinations).

**RESEARCH APPROACH**

Traditional research methods, like surveys or experiments, are not really suitable for capturing the kind of complexity that plays a role in a user’s decision whether or not to purchase a certain service bundle at a given price. Generally speaking, the external validity of survey studies on the adoption and use of service bundles for a specific price proved limited. Experimental studies are also of limited value because their aim is not to project results onto a broader population, and because they address a limited set of variables. Qualitative research, although it offers a wealth of information, has little predictive value. If we are to investigate the complex decision-making processes surrounding future service bundles, we need to use an alternative research method.

From earlier research (Bouwman 2004, Bouwman and Van de Wijngaert 2002, 2003, Van de Wijngaert 1996, 1999), we know that factorial survey is a valuable alternative, because it integrates the strict factorial design and the attribute concept of orthogonality. It is an approach that is based on experimental research combined with the external validity and richness of detail provided by survey research. This allows us to bridge the gap between the experimental and the real world. ‘Factorial surveys more faithfully capture the complexity of real life and the conditions of real human choices and judgments and at the same time provide the ability to identify clearly the separate influences on the many factors that go into such judgments and choices’ (Rossi and Anderson 1982: 16). It has the more or less unobtrusive character associated with qualitative research, in that it provides respondents with detailed descriptions of daily life practices, taking both abstract context and day-to-day situations in account. As we became more involved in factorial design, vignette studies or policy capturing, we noticed that similar, yet more or less unrelated approaches to marketing and product development research have been around for some time. Conjoint measurement especially has received a great deal of attention in these domains. It would appear that, although policy capturing and conjoint measurement are relatively similar, they developed independently from each other. The basic idea is to present people with contrived hypothetical situations. These situations, scenarios, vignettes or conjoints are developed by combining individual characteristics into a conceptual continuity.

Although one would expect factorial surveys, policy capturing studies and conjoint measurement to be widely used specifically in the domain of new media, information and communication technology, software...
and service development, their use is rather limited. Martocchio et al. (1993), Webster and Trevino (1995), Van de Wijngaert (1996, 1999), Bouwman and Van de Wijngaert (2002, 2003) and Zubey et al. (2002) use these research approaches in discussing media choice models, information needs in relation to media choice, e-commerce channel preferences, and voice over IP. Furthermore, some studies focus on next generation mobile services. Kim (2004), for instance, looks at the next generation mobile services, i.e. mobile Internet services, video telephony and global roaming services, in relation to their price. Bouwman (2004) discusses which 3rd generation mobile entertainment and information services are preferred by mobile telephone users and what the underlying context and situational variables are that influence their choices. Brodt and Heitmann (2004) look at one specific mobile entertainment service, i.e. video clip multicasting services via GPRS. Köhne et al. (2003) used conjoint measurement to establish consumer preferences for location-based mobile tourist services. These approaches are directed more towards the service supply side. When it comes to the more user-oriented studies, Pagani (2004) looks at usefulness, ease of use, price and speed of use, while Kleijnen et al. (2004) discuss perceived risk, relative advantage, compatibility, level of complexity, communicability, critical mass, navigation and payment options.

RESEARCH DESIGN

The research design process follows the standard procedure for conjoint surveys (Green and Srinivasan 1978). The first step concerns attribute selection. The bundles that we examined are each composed of a set of services added on to basic navigation. Each add-on service is considered a bundle attribute with two levels, i.e. either it is included in the bundle or it is not. We selected the potentially valuable add-on services on the basis of current navigation practices, and on the basis of an identification of existing and emerging services surrounding basic navigation. A navigation system typically supports users in going from some current position A (e.g., home) to a destination B via a short and/or fast route. The drive itself and the route that is followed may be labelled C (see Figure 1). The core navigation service and the potential add-on services may be mapped onto either A, B or C. The navigation experience itself (C) is delivered by the core navigation service, which may be enhanced by adding services like traffic information, points of interest, safety alerts etc. Services that take place at or concern locations A and B enhance or complement the navigation experience. Weather forecasts for B, parking information or even parking space reservation are services that are focused on the destination B. Similarly, community (navigation club) services related to navigation, e.g., sharing interesting routes, or creating and uploading routes to the navigation system before the actual drive, focus on the point of departure. Finally, supplementary services like personalization, location-based advertising or entertainment services, for example, an mp3 player integrated with the navigation device, or a multi-media service for the ‘back seat’, may enhance the actual driving from A to B, by trying to make it as pleasant or convenient as possible.

We distinguish nine services that are either included in the bundle or not:

1. Up-to-date service (€3);
2. Travel preparation (€2);
3. Navigation club (€1);
4. Personalization of the services (€2);
5. Traffic information (€2);
6. Safety alerts (€2);
7. Location-based advertising (€1);
8. Audio-books (€2); and
9. Parking assistance (€2).

Enhanced services are all the services directly related to travelling, navigation, parking etc., while personalization, navigation club, location-based advertising and audio books can be considered supplementary services. The Up-to-date service is a support service. We also included a three-level price attribute that describes a bundle price discount on the assumed sum of individual service prices. The assumed prices for the individual services were derived or estimated from current service offerings. The assumed price for each add-on service is low (25% discount), regular or high (25% surcharge). Attributes and levels were discussed with potential respondents on topics as realism and relevance of bundle composition and pricing in face-to-face interviews.

We used a traditional conjoint analysis approach in which respondents rated their purchase intention for specific add-on service bundles on a 7-point scale. Respondents were presented with full profile vignettes
using a web-based survey tool. The vignettes showed the bundle composition, i.e. the add-on services included in the bundle, as well as the bundle price. Each service is assumed to be offered on a subscription basis. The bundle price is calculated from the sum of the assumed subscription prices for the individual services, after which a discount may apply depending on the bundle in question. Figure 2 illustrates how the bundle was presented to the respondents.

In a full profile conjoint analysis all possible vignettes would be presented to the respondents. In total this would be $2^9 \times 3^{15} = 1,536$ (i.e. nine services that are either included or excluded and at three different price levels). By using an orthogonal design we were able to reduce the number of vignettes to 16 and derive reliable estimates for the parameters. In an orthogonal design the attributes, i.e. the add-on services, are evenly distributed among the vignettes. Rating results were analysed with the aid of SPSS. The part worth utilities for individual respondents were calculated using ordinary least squares. The individual part worth utilities were used to classify subjects with a hierarchical cluster analysis.

We also included questions regarding age, gender, income, education and attitude towards mobile services and navigation services (availability of mobile phone, type of network, current use of mobile services, familiarity with navigation services, reason for travelling and familiarity of destination).

The questionnaire was completed by 156 of the 350 people we invited to participate: a response of 44%. These respondents are part of a national panel for web-based survey research in the Netherlands as used by PanelClix (www.panelclix.com). We only asked people to participate in the survey who owned a car and travelled at least 3,000 km a year, because navigation tools like TomTom are mainly bought and used by members of this target group. Of the respondents, 39% were female, 61% were male; 29% were under 30, 33% between 30 and 39, 24% between 40 and 49 years of age and the remaining 14% over 50. Only 11% of the respondents indicated that they never used SMS. Of the respondents 36% pointed out that they occasionally used SMS information services and 33% said that they incidentally used their mobile phone for other services, like downloading ring tones. Of the respondents, 29% indicated that in general they are unfamiliar with the destination they travel to, whereas 71% know their destination well. Of the respondents 31% already used a navigation system. Of the remaining 69%, 72% indicated that they are familiar with the possibilities of navigation systems. It would appear that personal navigation has become a common enough service to allow people to express an opinion, regardless of whether they themselves use the service or not. Furthermore, there was enough heterogeneity in the respondent group to ensure a balanced view on purchase intent for (mobile) navigation services.

We eliminated a further 49 respondents from our population, who all indicated they had no intention under any circumstances to ever consider subscribing to the service bundles with which we presented them, presumably either because they were not interested in the services anyway, or because they considered them too expensive.

RESULTS

Table 1 presents the results of the analysis of the part worth utilities of the various attributes and levels on an aggregated level, as well as an indication of the relative importance of the bundle attributes. The relative
importance is a measure for an attribute’s power to induce a variation of preferences.

Table 1 shows the average utilities over 106 respondents. Respondents value enhanced services like traffic information, parking assistance and safety alerts positively when included in bundles. The utilities for these three services are positive, which indicates that respondents appreciate these services when compensated for the subscription fees. The four supplementary services all have a negative utility, which implies that their usefulness does not outweigh the costs. This partly supports our first hypothesis: all supplementary services are valued as we hypothesized. However, this is not the case for the enhanced services. Only three out of four of the services are valued as we hypothesized. Note, however, that average utilities for the services are mostly close to zero and variation at individual level is rather high. For each service a substantial percentage of respondents have a positive utility, as follows from the last column in Table 1. For the enhanced services over 50% of respondents has a positive utility, for the complementary services about 35% with the exception of the audio books (20%).

Price is an important component in the perceived utility. As we hypothesized, people prefer low prices to high ones. Table 1 shows that the relative importance of most bundle attributes is close together, near 9%. Bundle price discount can be seen to have the highest impact on perceived utility (15%), followed by the ‘audio book’ service. Given the low utility of audio books, we find that including the audio book service in the bundle for a €2 monthly subscription fee has a relatively strong negative impact on the likelihood that users will purchase.

The third hypothesis was formulated based on our experiences in the pre-testing phase. Test group participants indicated that purchase intent not only depended on bundle composition and bundle pricing as such, but on budget considerations as well. This meant that people would rate larger bundles, typically with higher prices, relatively low because the bundle price exceeds the psychological maximum price that they associate with this type of service. We checked this in our analysis by correlating the (neutral) price of the presented bundles with their estimated perceived utility (corrected for price bundle discount utility). The correlation tuned out to be around −0.3, showing a significant negative budget effect, which means that we can accept this hypothesis.

The next step was to determine preference clusters, which involved composing groups of people with similar part worth utilities for the services. We limited our analysis to three clusters. The cluster analysis was based upon the part worth utilities of the add-on services. The constant and the bundle price discount were not included in the analysis (see Table 2).

Respondents in cluster 1 value enhanced services like travel preparation, traffic information, safety alerts and parking assistance and supplementary services like personalization and location-based advertising. Other services devaluate their bundle. The total utility of the complete bundle is 3.0. When the negatively valued services are excluded from the bundle, total bundle utility increases to 3.4. Respondents in cluster 2 are only
interested in updates of the navigation system. A bundle that includes the assumed basic navigation services and updates, and does not include any of the enhanced and supplementary services is valued by them with 4.7. Respondents in the third cluster predominantly prefer enhanced services like traffic information, parking assistance and safety alerts. They also show an interest in location-based advertising, one of the supplementary services. A bundle containing only these four services has a 5.4 utility rate.

If we take a closer look at the services included in the bundles, we see that none of the clusters is interested in the supplementary navigation clubs (there are no significant differences between the three clusters) or audio book services. Of the other two supplementary services, location-based advertising is relevant to two clusters, while personalization is only relevant to respondents in the first cluster. Three out of the four enhanced services are relevant to two of the clusters. Travel preparation is relevant to one cluster only. None of the services are relevant to all three clusters. There appears to be a natural grouping of services. Updates are only valued by cluster 2 respondents. Traffic information, parking assistance (there are no significant differences between the three clusters), safety alerts, location-based advertising are appreciated by respondents in cluster 1 as well as cluster 3. This reduces the choice from 9 services to 2 service bundles.

**DISCUSSION AND CONCLUSIONS**

In this paper we looked at the bundling of add-on services to existing core navigation services. In a conjoint analysis we used an orthogonal design, implying that only a main effect can be determined. A shortcoming of this approach is that it does not allow us to determine possible interaction effects between attributes. The utility of a certain service may, for example, depend on the presence of another service in the bundle. A limitation of the study is that it was carried out in the Netherlands, which is a small country were destinations are always near (driving times above two hours within the Netherlands are exceptional), and support facilities for car travellers are very good, which may mean that the need for specific enhanced and supplementary services may be lower. On the other hand, navigation systems are broadly accepted on the consumer market, which means that respondents are familiar with them. And although this study focuses on the Netherlands in particular, we believe that our results have a broader validity.

We hypothesize that customers are more likely to acquire enhanced services than supplementary services and that bundle price has a positive effect on the intent to purchase. With regard to our hypotheses, we may conclude that all three hypotheses are supported, although the support for the first one is not straightforward. Supplementary services are less attractive than

<table>
<thead>
<tr>
<th>Services</th>
<th>Clusters</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Up-to-date service (support)</td>
<td>2</td>
<td>F=3.215, P&lt;.05</td>
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<tr>
<td>2. Travel preparation (enhanced)</td>
<td></td>
<td>F=9.660, P&lt;.001</td>
</tr>
<tr>
<td>3. Navigation club (supplementary)</td>
<td></td>
<td>F=2.680, ns</td>
</tr>
<tr>
<td>4. Personalization (supplementary)</td>
<td></td>
<td>F=13.320, P&lt;.001</td>
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<tr>
<td>5. Traffic information (enhanced)</td>
<td></td>
<td>F=11.726, P&lt;.001</td>
</tr>
<tr>
<td>6. Safety alerts (enhanced)</td>
<td></td>
<td>F=44.402, P&lt;.001</td>
</tr>
<tr>
<td>7. Location-based advertising (supplementary)</td>
<td></td>
<td>F=22.989, P&lt;.001</td>
</tr>
<tr>
<td>8. Audio book (supplementary)</td>
<td></td>
<td>F=33.302, P&lt;.001</td>
</tr>
<tr>
<td>9. Parking assistance (enhanced)</td>
<td></td>
<td>F=2.137, ns</td>
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**Table 2. Cluster statistics**

<table>
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<th>Services</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>mean</td>
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<tr>
<td>sd</td>
<td>0.222</td>
<td>0.447</td>
<td>0.294</td>
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<tr>
<td>mean</td>
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<td>-0.247</td>
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<tr>
<td>sd</td>
<td>0.239</td>
<td>0.275</td>
<td>0.329</td>
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<tr>
<td>mean</td>
<td>-0.045</td>
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<tr>
<td>sd</td>
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<td>mean</td>
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<td>-0.276</td>
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<td>0.259</td>
<td>0.341</td>
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<tr>
<td>Constant</td>
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<td>3.211</td>
<td>3.076</td>
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<tr>
<td>Average bundle utility*</td>
<td>3.159</td>
<td>1.877</td>
<td>2.982</td>
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**Note**: * with all services included
enhanced services, which is as expected. However, not all of the four enhanced services are favoured by the respondents. Our study shows a clear preference for service bundling of add-on services that directly enhance the navigation experience. Typical enhanced services are integrated traffic information and safety alerts. People appear willing to pay for these services, given the fact that we assumed a €2 monthly subscription fee. Supplementary services are clearly much less appreciated. From a marketing point of view one may argue that providers may follow a mixed bundling approach in which the enhanced services are offered as a bundle and the support and supplementary services are offered separately. It is interesting to note that our analysis shows that the inclusion of ‘location-based advertising’ has little impact on the perceived utility of a bundle. A provider may, therefore, benefit from offering an advertising service without actually lowering people’s appreciation of the bundle. As was expected, respondents prefer to pay a lower price to a higher price, which confirms our second hypothesis. However, the relative importance of the considerable price discounts is not much higher than the relative importance of bundle composition, which indicates that a careful composition of a bundle may have a greater positive impact on its perceived value than a simple price discount.

The budget considerations that we encountered in the pre-test phase were confirmed during our analysis. As we expected, there appears to be a psychological price ceiling above which people are reluctant to go. Budget constraints probably play a role in the mental process of rating a bundle, in other words, it is not just a trade-off between bundle composition and price, but also whether one wants to spend a certain budget on a specific type of services. Enhanced services – services that reinforce the functionality of the core navigation service – are more relevant than supplementary services. However, the relative importance of price discounts is almost similar to the importance of bundle composition, implying that a customer may appreciate a careful composition of a bundle above a simple price discount.

With regard to the research approach we used in this study, we feel that it allowed us to carry out research in an unobtrusive way, and to map the preferences of potential users of future mobile services and service bundles.

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