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Paying for convenience: Attractiveness and revenue potential of time-based delivery services

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Paying for convenience

Attractiveness and revenue potential of time-based delivery services

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Abstract

Purpose – The purpose of this paper is to investigate the potential of a new convenience-enhancing service at the interface between retailers and consumers: time-based delivery of parcels. The service allows consumers to choose a preferred time slot for a parcel to be delivered. This convenience-enhancing logistics service may be attractive for consumers, retailers, and logistics service providers. The authors provide insights on consumers' willingness to pay (WTP) for this service and important drivers of its attractiveness.

Design/methodology/approach – This paper measures and analyzes the attractiveness and antecedents, the WTP, and the overall revenue potential of this service based on an empirical analysis. A contingent valuation approach was adopted to measure the WTP and the level of usage.

Findings – Research results suggest that the level of availability at home and the working hours per week are important antecedents of the perceived attractiveness of the service. Furthermore, consumers who perceive this convenience-enhancing service as attractive, represent a market segment that has significant revenue potential.

Research limitations/implications – Based on the analysis, important managerial insights are derived that can guide logistics service providers and retailers in their decision to implement such a novel service.

Originality/value – The paper enhances the scope of convenience services, providing empirical data for a time-based delivery service.

Keywords Parcel delivery services, Customer service management, Convenience-enhancing services, Willingness to pay, Market potential, Antecedents of service attractiveness, Time-based delivery

Paper type Research paper

1. Introduction

Due to the saturation of many markets, companies strive for growth by offering new services in addition to their core products and services (Sawhney *et al.*, 2004; Tuli *et al.*, 2007). Due to the high failure rates of new products and services, companies aim to develop services which adapt to major trends in consumer behavior. Convenience, the amount of effort and time a consumer perceives to save in executing certain activities whilst shopping or consuming, is regarded as an ongoing and increasingly important trend in consumer behavior (Berry *et al.*, 2002; Seiders *et al.*, 2000, 2007). Convenience is a major reason for consumers to intensify a relationship with a service provider (Seiders *et al.*, 2007); while inconvenience is a reason for consumers to discontinue the relationship (Keaveney, 1995; Pan and Zinkhan, 2006). The focus of our research is a new convenience-enhancing service for consumers: time-based delivery of parcels. The service implies that the recipient of a parcel is able to choose a pre-defined time slot,

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for example Thursday between 8 and 9 a.m., within which the parcel will be delivered. The service is not limited to a specific group of goods, but may be purchased for any parcel a consumer receives. Thereby, the logistics service provider is responsible for coordinating the time of delivery with the consumer. By offering such services, logistics service providers attempt to manage the physical interface between the retailer and consumer more effectively in order to enhance the convenience perceived by the consumer and, as a consequence, to increase the attractiveness of the retailer's product and the logistics service provider's service offering. In the following discussion, we highlight the reasons and advantages for implementing this service at the retailer-consumer interface from the viewpoint of the various parties involved.

Consumer perspective

During the past decade, mail order as well as internet have considerably grown in importance as channels for shopping activities (Chiang and Dholakia, 2003; Parasuraman *et al.*, 2005; Wolfinbarger and Gilly, 2003). Chiang and Dholakia (2003) demonstrate in their study that consumers particularly value higher convenience in terms of the lower search costs in online shopping. The overview of Wolfinbarger and Gilly (2003) reveals that most studies investigating satisfaction with online shopping only include online aspects, such as how easy it is for the consumer to use the web site, the consumer's perceived control on the web site, and the speed of the web site. However, in making the decision of whether to utilize the internet or to shop at the nearest retailer, the entire process will be evaluated, meaning that a consumer assesses the trade-off between the potentially lower transaction costs for searching and ordering online (Chiang and Dholakia, 2003) and the expected effort for receiving the product. Only a few studies such as Novak *et al.* (2000) include the aspect of quick delivery and show that over half of the consumers regard it as important for the overall experience of online shopping. Thus, the convenience of internet shopping highly depends on the effective management of the physical interface between the retailer and the consumer. If home delivery fails because there is nobody available to accept the delivery, the effort involved to receive an order may significantly increase and the purchase may be perceived as inconvenient: either the parcel has to be re-delivered or recipients have to pick up the parcel themselves. In Germany (where the research presented in this paper was carried out), it depends on the logistics service provider how unsuccessful delivery attempts are handled: if DHL, for example, cannot deliver the package because nobody is available, recipients have to pick up the parcel at one of the offices of Deutsche Post/DHL. The earliest pick-up time is during the next day's office hours, and DHL will store the parcel up to seven days before returning it to the sender. Similarly, Hermes, another large provider, will store the parcel at one of its pick-up points, which is typically located in a nearby gas station or shop. Other providers, such as FedEx or UPS, try to schedule a second or third delivery. Self-pick-up (as with DHL or Hermes) may induce significant effort and transaction costs on the consumer's side. Moreover, waiting for a second or even third delivery attempt may pose personal time restrictions and hence cause inconvenience for consumers.

Time-based delivery would enable consumers to control this trade-off by being able to select a pre-defined delivery time slot in advance, therefore lowering their effort. By replacing a consumer activity (e.g. self-pick-up) with a provider activity, the consumer can limit the amount of time and effort required to receive a parcel while at the same

time enhancing his convenience. However, none of the existent logistics service providers in Germany has such technological interfaces available to allow consumers to receive their parcels within certain time frames. Accordingly, Roy (2001, p. 7) states that logistics service providers "will have to adapt by forming partnerships with customers, providing logistical services, investing in new information and communication technologies, and using real-time decision tools".

Retailer perspective

Time-based delivery cannot only be advantageous for consumers. The service also yields potential benefits for retailers because they can attract new target groups, achieve higher demand, and charge higher prices for the convenience (Geyskens *et al.*, 2002). To realize these benefits, Zeithaml *et al.* (2002) propose a shift in focus from e-commerce, meaning the transaction, to e-service: including all consumer activities before, during and after the transaction. Thus, in an online context, the reliability and fulfillment of the retailer partly translates into on-time and accurate delivery. However, because retailers outsource the management of the physical interface to the consumer, for example the delivery of their products to a logistics service provider, retailers cannot control the exact time of delivery. For this reason, retailers cannot influence the perceived "access convenience" (Seiders *et al.*, 2007) and amount of effort a person has to make to receive a parcel. This situation is remarkable because generations of retailers regarded their location and the corresponding access convenience to a store to be fundamentally important (Berry *et al.*, 2002) for store choice and consumer behavior (Durvasula *et al.*, 1992). In a home-delivery situation, access convenience involves other aspects of consumer convenience than were previously important. The most critical aspect of home delivery is how easily and quickly the offering has access to the consumer and not vice versa. Therefore, a time-based delivery service would support retailers in making their offerings more attractive to consumers. It is interesting to note that in traditional distribution systems, retailers had control over the physical consumer interface; in home delivery, however, management of this interface is relegated to a logistics service provider and the retailer has very little control over the convenience perceived by the consumer.

Logistics service provider perspective

Time-based delivery is an "enormous logistical challenge because of the unpredictability of demand coupled with strict delivery windows and low profit margin products" (Campbell and Savelsbergh, 2006, p. 327). Despite this challenge, logistics service providers could save money with a time-based delivery service by avoiding the costs for handling, storage, transport, and additional administrative activities associated with unsuccessful delivery attempts. The logistics service provider has the responsibility that the consumer receives an order and can handle an unsuccessful delivery in one of two ways: either attempt to deliver the parcel again or store the parcel in one of their offices, obliging the consumer to pick the parcel up at this location, as highlighted previously. However, logistics service providers may not only save costs by offering the new service, but also generate additional profits in two ways:

(1) through higher revenues if consumers are willing to pay a price premium for time-based delivery; and

(2) through higher volumes and revenues originating from the increase in perceived quality.

Research reveals that consumers who perceive a service attractive, are willing to pay more (Finkelman, 1993; Homburg *et al.*, 2005), and at the same time use the service more extensively (Seiders *et al.*, 2005). In summary, offering time-based delivery services may allow logistics service providers to invest in more convenient technological interfaces.

Research motivation

Based on the importance of effectively managing the interface between retailers and consumers, as illustrated above, the research presented in this paper investigates this specific area of convenience (i.e. time-based delivery services) at the interface between retailer and consumer in more detail. Two streams of literature motivate our research:

(1) Prior research analyzes the impact of convenience and focuses on behavioral intentions, store choice, purchasing levels and consumer switching behavior (Seiders *et al.*, 2007) rather than on the attractiveness of a new service and its consequences on the willingness to pay (WTP) as the maximum amount a consumer is ready to spend for a product or service (Monroe, 2003). In their research Seiders *et al.* (2005) concentrate on adapting existing services to be more convenient by optimizing shopping processes. Thompson *et al.* (2005) analyze the same problem setting with a focus on increasing the number of choices or features of specific services to achieve sales volume targets. Substantial evidence from prior research suggests that providing market-oriented services that are profitable is not an easy task (Tuli *et al.*, 2007).

(2) The reasons for these challenges are manifold. Time-based delivery leads to complex vehicle routing and interfaces between tactical and operational planning resulting from the design of specific time slots (Campbell and Savelsbergh, 2006). Agatz *et al.* (2008, p. 380) discuss challenges and opportunities and point out that "it is customary in attended home-delivery services for the company to offer the customer a choice of narrow delivery time slots". Accordingly, they concentrate on the analysis of time slot specification and related cost effects within an e-commerce environment. In this scenario, companies are able to build on extensive consumer knowledge and incorporate real-time decision making for attended home delivery with respect to the number of time slots offered as well as the fees charged. However, this specific environment may not necessarily be transferred to other channels served by logistics service providers on a more general level (Agatz *et al.*, 2010). Furthermore, prior literature only concentrates on costs and fees that may be charged, without explicitly considering the WTP of consumers. A logistics service provider offers a profitable service when he offers an adequate price, or a price in accordance with consumers' WTP, for a marketable quantity. Campbell and Savelsbergh (2006) state that the failure of many e-grocers is caused by the lack of an appropriate and financially attractive distribution model that enables them to stay competitive with local grocery stores. Thus, correctly estimating the WTP for time-based delivery services is a crucial task before launching such a service. For this reason, our research is not only relevant for markets in which this service has not yet been established (e.g. in Germany), but also for other countries where a similar service is to be introduced or may already exist.

The research presented in this paper focuses on the consumers' perceived attractiveness for time-based delivery. Based thereon, the WTP and the revenue potential of different consumer segments are estimated. More specifically, this study answers the following three research questions:

Service attractiveness

RQ1. What influences the perceived attractiveness of time-based delivery?

WTP and usage

RQ2. How does the perceived attractiveness of the service affect WTP and the level of usage of the service?

Revenue potential

RQ3. Based on the assessment of the WTP and level of usage, what is the revenue potential of different consumer groups?

To answer these questions, the next section first describes the research model and develops hypotheses with respect to the drivers of the perceived attractiveness (*RQ1*). In the subsequent section the methodology, measure development, questionnaire and data collection are described. The fourth section addresses the antecedents of attractiveness, WTP and level of usage and their results (*RQ2*). Subsequently, demand curves and revenue functions for time-based delivery are estimated to gauge the service's revenue potential (*RQ3*). In the final section, the main results are presented and the key findings are summarized to highlight managerial implications, research limitations, as well as future research opportunities.

2. Research model

In line with the research questions, this study comprises two parts. Part one addresses the antecedents of perceived attractiveness of time-based delivery (*RQ1*). Part two addresses the outcome of perceived attractiveness on the WTP and the level of usage (*RQ2* and *RQ3*) (Figure 1).

This study is based on transaction cost theory. Whereas Coase (1937) introduces the idea that the functioning of the economic system causes costs, Williamson (1987)

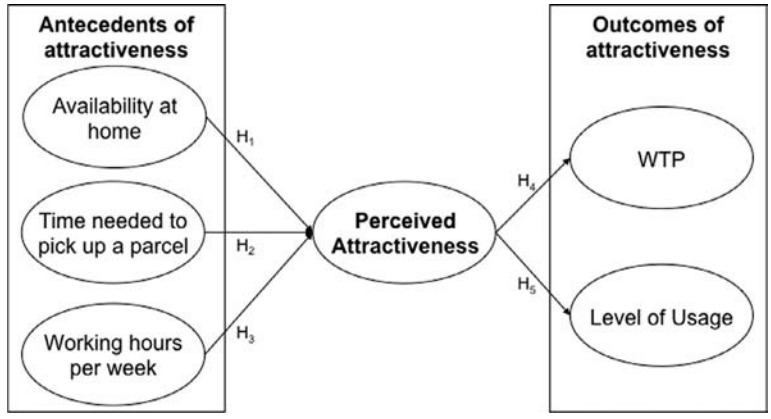

Figure 1.
Antecedents and outcomes of service attractiveness

contributes to transaction cost theory by distinguishing different forms of transaction costs, for example, *ex-ante* information and searching as well as *ex-post* completion and control costs of an exchange. Transaction cost theory is often applied to marketing contexts and relationships (Rindfleisch and Heide, 1997). Behaviors of consumers and providers appear to engender both (non-monetary) transaction costs and (monetary) costs for the offering as well as (non-monetary) benefits and benefits from the offering itself (Kim, 2007). Associated with *RQ1*, this study examines antecedents influencing the transaction costs and perceived attractiveness of the service, that is, the level of availability in the household to receive parcels, the time required to pick up a parcel and the working hours per week.

Level of availability

The reasoning that offerings are evaluated as a trade-off between get- and give-components (Zeithaml, 1988) leads to the assumption that lower transaction costs, as part of the give-component, lead to a better evaluation of the overall offering. Often no one is available to accept the delivery at the time the logistics service provider attempts to deliver a parcel. In these cases, the consumer commonly receives a notice and has to pick up the parcel at the logistics service provider's office. Consumers with a low level of availability in their households have a higher probability for the need to pick up parcels themselves and, therefore, higher transaction costs. Since time-based delivery would make the moment of delivery predictable and thus avoid transaction costs related to a pick-up or extended waiting time, consumers with a low level of availability are assumed to perceive the service as more attractive. These individuals are able to lower the give-component while at the same time equally maintaining the get-component:

H1. The level of availability to receive a parcel at home decreases the perceived attractiveness of the service.

Time required to pick up a parcel

The transaction costs of receiving a parcel increase if delivery attempts have failed. If a consumer lives near a pick-up location of the logistics service provider, the transaction costs may be relatively low and the consumer might not perceive a self-pick-up as a major effort. However, as the distance to the pick-up location increases, the transaction costs for the consumer also increase. We utilize the required time to pick up a parcel to represent the transaction costs incurred by the consumer. Similar to our argument in conjunction with *H1*, we can assume that the overall offering is evaluated as a trade-off between get- and give-components (Zeithaml, 1988). Thus, it is assumed that the time to pick up a parcel increases the perceived attractiveness of time-based delivery:

H2. The time required to pick up a parcel at the office of the logistics service provider increases the perceived attractiveness of the service.

Working hours per week

The theory of allocation of time suggests that time and money are interchangeable currencies (Becker, 1965). For some offerings (e.g. cleaning or cooking), consumers can decide whether to invest time in self-service or to invest money in acquiring a certain good or service (Okada and Hoch, 2004). Becker (1965) argues that a rise in income

leads to higher opportunity costs of time. Thus, consumers with high incomes are more likely to substitute their time with expenditure for goods or services. The measurement of the opportunity cost per time unit on a monetary basis is inherently difficult (Okada and Hoch, 2004; Michael and Becker, 1973). In most studies, wages are used as a measure for the opportunity costs of time (Shaw, 1992). Due to the difficulties associated with inquiring wages in face-to-face interviews, in this study the number of working hours are used as an indicator for the opportunity costs of time. Generally, it is assumed that consumers with a high workload and less free time will perceive the transaction cost-saving service of time-based delivery as more attractive:

H3. The hours a consumer works per week increases the perceived attractiveness of the service.

Beyond identifying the antecedents of attractiveness, this study also intends to show how the perceived attractiveness of the service influences the outcome of attractiveness in terms of WTP and the level of usage. Research suggests that a positive evaluation of a service has an influence on WTP (Finkelman, 1993; Homburg *et al.*, 2005). Furthermore, Bolton and Lemon (1999) prove that future service usage is based on current service experience. Accordingly, higher levels of a positive evaluation of a service lead to higher levels of usage of a service in subsequent time periods. In the case of time-based delivery, however, because of the novelty of the service, neither service experience nor, in more general terms, a positive evaluation of a service, for example in terms of consumer satisfaction, can be determined. For a new service, consumers can, a priori, only assess the perceived attractiveness of a service. Therefore, we hypothesize the following (Figure 2):

H4. The price that consumers are willing to pay for a time-based delivery service is positively related with the perceived attractiveness of the service.

H5. The usage of a time-based delivery service is positively related with the perceived attractiveness of the service.

Revenue potential

Some services (e.g. health care) have a stable level of demand due to situational factors (e.g. illness), whereas the demand of other services (e.g. concerts) is dependent on the perceived attractiveness. Whenever situational factors are the sole antecedent of service

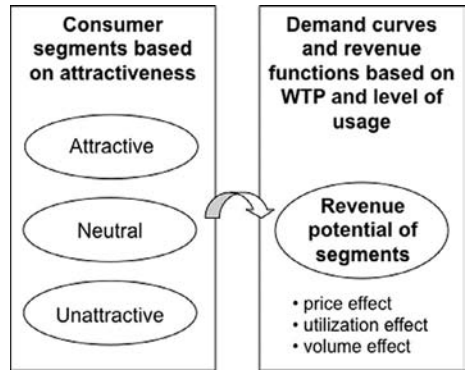

Figure 2.
Revenue of the service

demand and no alternative services are available, the level of demand and the WTP are assumed to be independent of the level of attractiveness (Lee and Cohen, 1985). In contrast, if alternative services are available (e.g. concert versus cinema), the level of demand and the WTP are assumed to be dependent on the service attractiveness. For the time-based delivery service, it can be assumed that the level of demand and the WTP are not solely driven by situational factors but also by the service characteristics for two reasons: first, multichannel management reveals that using home delivery is only one alternative channel amongst others. Second, as an alternative to utilizing time-based delivery, consumers can try to be available at home or pick up the parcel themselves. Thus, the level of demand and the WTP for time-based delivery are dependent on the level of attractiveness of this service. In accordance with *H4* and *H5*, the more attractive a service is, the higher the WTP and the level of usage. As a consequence, consumers who perceive the service to be more attractive should reveal a higher revenue potential than consumers who perceive the service less attractive. Thereby, the maximum price a consumer is willing to pay, the related level of usage for this price and the number of parcels he or she receives determine the overall revenue potential. To investigate the interplay between WTP, level of usage and the average parcel volume, we also explore the revenue potential of different consumer segments.

3. Methodology

An empirical investigation was conducted to answer the research questions and to test the hypothesis of the research model that was developed in the previous section.

Measure development and questionnaire

Measure development. Measure development is based on an in-depth literature review and draws upon existing scales (Schulze *et al.*, 2005; Tatham *et al.*, 1995) whenever possible. Expert interviews were conducted with managers from different divisions of a large multi-national logistics service provider to review the initial item pool for face validity, using a decision rule similar to the one recommended by Hardesty and Bearden (2004). To assure that respondents understand the service, a brief description of the service was provided.

Questionnaire pretest. An in-depth pretest was conducted with 16 potential respondents of the sample population. For the pretest, a technique called cognitive interviewing, as proposed by Dillmann (2000), was employed. This method recommends asking participants to respond to the questionnaire in the presence of the researcher and to think aloud while reviewing the items. The pretest revealed that respondents fully understood the nature of the service and, moreover, were able to provide estimates of different prices and the respective quantities for which they would utilize the service. Some slight modifications of the final wording of the questionnaire as well as the service explanation were made based on the results of the pretest.

Data collection

Sample setting. The research team obtained extensive training on the new service as well as how to conduct the interviews. The members of the research team held face-to-face interviews in ten stores of a multi-national logistics service provider as well as in pedestrian zones in Germany in November and December 2007. The data collected in stores provided access to a high percentage of people, who had previous experience with

parcel services. Every respondent received a brief and concise description of the service and the members of the research team ensured that each respondent fully understood the nature of the service.

Sampling procedure. The survey encompassed rural areas, suburbs and urban areas to enhance the validity of the sample because these areas represent the different living area structures of society, which might have an influence on the attractiveness, the WTP and the level of usage of the service.

Sample size. The size of the original sample amounted to 356. Respondents with inconsistent answers, for example conflicting responses of mutually exclusive options, were omitted. The final sample size was 315. This sample was used to test the proposed hypotheses and research model included in the first part of our analysis. In order to determine the demand curves and revenue functions (second part of our analysis), we required complete information about the average number of parcels received per year as well as four different price points with corresponding relative usage levels (see the subsequent section for details). In total, 129 respondents had difficulties in estimating the yearly number of parcels or the required relative price/usage combinations or provided inconsistent answers. To ensure high reliability and validity of our estimates of the demand curves and revenue functions, we chose to eliminate these respondents, leaving a sample size of 186 consumers for the second part of our analysis.

Testing for bias. After one-third of the survey period, the already-completed questionnaires were reviewed for bias with respect to location and interviewer. No such bias was found. The study included all age classes and professions to analyze if personal characteristics induced preferences. By comparing relevant data of the German population (Destatis, 2008) with the data of the sample, it can be affirmed that the profile of the consumers in the sample is similar to the structure of the relevant population.

4. Measurement

Antecedents of attractiveness

As outlined previously, the relevant antecedents of perceived attractiveness of the service are the level of availability, the time required to pick up a parcel, and the number of working hours per week. The respondents were asked whether someone in the household is available to receive parcels during the day. For this particular item, the authors used a three-point scale for the answers: always available, not always available, and depends. Additionally, the respondents were asked to state the amount of time in minutes they needed to pick up a parcel and their working hours per week on open scales. According to Bergkvist and Rossiter (2007), single item measurement can be utilized if the reference object is sufficiently concrete and singular (Rossiter, 2002). In the setting of this study, level of availability, time required to pick up a parcel, and the working hours per week fulfill these requirements.

Andreassen and Lervik (1999) state that attitude (towards an advertisement) is preferably measured by a single item because the variable is sufficiently concrete (Bergkvist and Rossiter, 2007, p. 182). Since face-to-face interviews require a short questionnaire, the authors followed the recommendation of Bergkvist and Rossiter (2007) and assessed the attitude towards the home delivery service in terms of perceived attractiveness based on a five-point Likert-type scale (ranging from very attractive to very unattractive). The measurement items are included in the appendix.

Outcomes of attractiveness: WTP and level of usage

WTP is the maximum amount a consumer is willing to spend for a product; WTP is also referred to as reservation price (Monroe, 2003) or the maximum of the price tolerance span (Herrmann *et al.*, 2004). Due to the nature of the service, many of the common approaches to measure WTP are not applicable. Two major reasons restrict the choice:

(1) for the potential consumers, time-based parcel delivery is novel and a reference service does not exist; and

(2) the service is difficult to implement in test regions because a logistics service provider would have to make a substantial investment.

For these reasons, this study can neither determine WTP by means of explicit product offers nor by means of purchasing data. As a consequence, techniques based on consumers' stated preferences (Ben-Akiva *et al.*, 1994) were applied.

One attractive option to elicit consumer preferences is conjoint analysis. When employing conjoint analysis, respondents rank or rate a set of existing or hypothetical product alternatives that are based on different attributes, such as product features and price. The WTP is derived from the part-worths estimated for all attribute levels expressing the overall utility (Kohli and Mahajan, 1991; Kalish and Nelson, 1991). For three major reasons, conjoint analysis was not applied to elicit WTP:

(1) The service characteristics do not lend themselves to conjoint questioning rationale (Tatham *et al.*, 1995): the number of feasible options for the service is too low to generate a sufficient number of stimuli for product features of this service.

(2) Conjoint analysis is not a suitable method to investigate the relationship between the price and the level of usage. Conjoint analysis derives the WTP and usage for a certain predefined stimuli. However, the level of usage of the service and, thus, the relationship with WTP cannot be inferred.

(3) To ensure the best access to respondents who experience the service, it was decided to conduct face-to-face interviews with potential users of the service in pedestrian zones and offices of a logistics service provider.

This type of interview requires a short and easily understandable questionnaire. In contrast, conjoint analysis constitutes high consumer involvement and more complicated questions (Voelckner, 2006).

In contrast to conjoint analysis, contingent valuation techniques directly elicit WTP. Respondents state one specific price for a product (open-ended contingent valuation) or are confronted with different prices for which they have to state a level of usage (closed-ended contingent valuation) (Halvorsen and Sælensminde, 1998). Contingent valuation techniques are easy to employ because they do not impose high demands on the respondents' cognitive capabilities (Voelckner, 2006). Tatham *et al.* (1995) state that contingent valuation yields acceptable results if a reference price does not exist. A number of authors suggest that contingent valuation and conjoint analysis lead to similar estimates of WTP (Voelckner, 2006; Backhaus *et al.*, 2005; Sattler and Nitschke, 2003).

For the analysis of the WTP of a time-based delivery service, a modified version of a specific contingent analysis, called the van Westendorp method (Evangelist *et al.*, 2002), was applied. In the traditional van Westendorp method, respondents usually

state a price that they consider to be too cheap, cheap, expensive and too expensive. In this study, each respondent provides his assessment of what he considers a low, moderate, expensive and too expensive price to be for time-based delivery. The original method was adapted for the following reasons: first, in the original van Westendorp design, the prices considered to be too cheap and cheap are used to capture poor perceived quality because the price is often interpreted as an indicator of quality (Lichtenstein *et al.*, 1993). For products or services which require substantial time and knowledge to make a sound quality judgment, consumers are more likely to base their judgment on the price. In the setting of this study, however, one can assume that the price does not indicate service quality because the information to make a quality judgment are objectively measurable and do not require a great deal of knowledge or time. Additionally, a money-back guarantee (if parcels are not delivered on time) signalizes service quality. Second, respondents were also asked to provide an estimate of the average number of parcels they receive per year and to state the fraction of their annual parcel volume for which they would choose a time-based delivery if offered for a low, moderate or expensive price. Overall, the adaptation allowed us to ask for the parcel volume of a low and moderate price instead of asking the rather illogical question of the parcel volume for a service that is too cheap. Thus, contingent valuation in the adapted version was preferred to conjoint analysis, since we aimed to relate the price of the service with its (price dependent) usage.

Demand curves and revenue functions

Based on the price/usage combinations of our contingent valuation design, we were able to estimate individual demand curves. A demand curve shows how the volume of a demand varies depending on the price, holding all other factors equal (Mankiw, 2000). We obtained these four price/usage combinations ($p_{i,j}$, $q_{i,j}$) for each respondent i, where $p_{i,j}$ denotes the price the ith respondent stated as low ($j = 1$), moderate ($j = 2$), expensive ($j = 3$) and too expensive ($j = 4$), and $q_{i,j}$ denotes the corresponding fraction of parcels for which the ith respondent would choose the service at price $p_{i,j}$. It is assumed that $q_{i,4} = 0$, that is, at the too expensive price $p_{i,4}$ consumers will not utilize the service. Given the price/usage combinations ($p_{i,j}$,$q_{i,j}$) an individual demand curve $q_i(p)$ for each respondent i is estimated assuming an exponential demand curve with base demand a_i and elasticity parameter b_i (a_i,$b_i \geq 0$):

$$q_i(p) = a_i \cdot \exp(-b_i \cdot p) + \varepsilon_i \tag{1}$$

ε_i denotes a random error. Ordinary least squares regression was utilized to estimate the parameters of the demand curve. Based on the demand curves $q_i(p)$ a revenue function $r_i(p)$ can be determined for each consumer i:

$$r_i(p) = p \cdot [a_i \cdot \exp(-b_i \cdot p)] \cdot Q_i \tag{2}$$

In equation (2), Q_i denotes the average number of parcels respondent i receives per year. Differentiation of equation (2) with respect to p yields the revenue-maximizing price $p_i^* = 1/b_i$ for respondent i. Substituting p_i^* into equation (1), gives the relative demand $q_i(p_i^*)$ at the revenue-maximizing price. The revenue-maximizing price p_i^* indicates the WTP of respondent i and the corresponding demand $q_i(p_i^*)$ indicates the level of usage. We utilized p_i^* and $q_i(p_i^*)$ to represent the dependent variables (WTP and level of usage) in our research model (Figure 1).

5. Analysis and results

Antecedents and outcomes of the attractiveness of the service

Antecedents of perceived attractiveness. In conjunction with our *RQ1*, *H1-H3* suggest that availability at home, time required to pick up a parcel, and working hours influence the perceived attractiveness of the service. A one-way ANOVA was used to test *H1* and linear regression analysis to test *H2* and *H3*.

H1 proposes that availability at home to receive a parcel decreases the perceived attractiveness of a service including time-based delivery of parcels. Because an ordinal scale was used to measure the availability at home, a one-way ANOVA was used to test *H1*. The mean perceived attractiveness varies significantly across the different groups of respondents ($F = 11.075$; $p < 0.001$) confirming *H1*. More specifically, the results displayed in Table I illustrate that respondents with low availability perceive the service most attractive, followed by consumers who are not always available and consumers who are always available to receive parcels at home. To analyze the individual differences between the groups, we performed an independent samples *t*-test. The results reveal that the groups of respondents that are not available and that are sometimes available do not differ significantly in terms of their mean attractiveness of the service. In contrast, the groups of respondents that are sometimes available and that are always available differ significantly. Based on these results, it can be concluded that consumers take into account if someone is available in the household and thus, the potential effort for picking up a parcel when assessing the attractiveness of the service.

The following linear regression models were used to test *H2* and *H3*:

$$ATT_i = b_0^t + b_1^t T_i + u_i^t \tag{3}$$

$$ATT_i = b_0^w + b_1^w W_i + u_i^w \tag{4}$$

ATT_i denotes the perceived attractiveness of the ith individual, T_i the time required to pick up a parcel and W_i the working hours per week. b_0^w and b_0^t denote the intercepts, b_1^w and b_1^t the slope, and u_i^w and u_i^t the random error terms in equations (3) and (4), respectively.

H2 proposes that the perceived attractiveness of the service increases with the amount of time required to pick up a parcel at the office of the logistics service provider. The left-hand side of Table II displays the results of the model; these results do not provide support for *H2* ($b_1^t = -0.012; p = 0.494$). Therefore, it cannot be confirmed that the perceived attractiveness of the service is influenced by the time

Measure	Groups	Mean attractiveness (a)	Differences between means	
Perceived service attractiveness	Always available ($n = 102$)	3.19	Always available versus sometimes available	0.63*
	Sometimes available ($n = 97$)	2.56	Always available versus not available	0.87**
	Not available ($n = 114$)	2.32	Sometimes available versus not available	0.24

Note: Significant at: *$p = 0.01$ and **$p = 0.001$ levels

Table I. Antecedents of attractiveness – availability: differences between group means

Table II.

Linear model: time required for self-pick-up					Linear model: working hours per week				
Parameter	Effect	Estimate	*t*-value	*p*	Parameter	Effect	Estimate	*t*-value	*p*
b_0^t	Intercept	3.451	20.248	<0.001	b_0^w	Intercept	2.859	22.356	<0.001
b_1^t	Time	-0.012	-0.685	0.494	b_1^w	Working hours	0.017	4.557	<0.001
R^2		0.002			R^2		0.062		
Number of observations		310			Number of observations		315		

required to pick up a parcel at the office of the logistics service provider. Although this result suggests that consumers do not take into account the transaction costs associated with self-pick-up of parcels, one has to be careful about drawing quick conclusions. One potential explanation for this rather counterintuitive result could be that most of the respondents in the sample receive the majority of their parcels from the largest logistics service provider in Germany (Deutsche Post/DHL) that maintains a very dense network of offices in urban, suburban and rural areas. As a consequence, the time required to pick up a parcel has a relatively low dispersion across the different respondents (mean 9 min, SD 4.7 min). For this reason, the time required to pick up a parcel may have a low predictive power for the perceived attractiveness of the service.

H3 predicts that the number of hours a consumer works per week increases the perceived service attractiveness. The panel on the right-hand side of Table III displays the results of the regression model. b_1^w is positive and significantly different from zero ($b_1^w = 0.017; p < 0.001$). The results confirm *H3* and provide evidence that consumers with a higher workload perceive the service as more attractive. As conjectured previously, these results provide support that consumers do take opportunity costs of time into account when assessing perceived attractiveness of a time-based delivery service.

WTP and level of usage. Related to our *RQ2* regarding the outcomes of attractiveness, *H4* predicted a positive relationship between perceived attractiveness of the service and WTP. The following linear regression model was used to test this hypothesis:

$$p_i^* = b_0^p + b_1^p ATT_i + u_i^p \tag{5}$$

ATT_i denotes the perceived attractiveness stated by the ith individual; b_0^p, b_1^p and u_i^p represent the intercept, slope and the random error for the ith individual. The estimation results in Table III illustrate that b_1^p is positive and significantly different from zero ($b_1^p = 0.827; p < 0.001$). This result indicates a significant positive relationship between perceived attractiveness and the WTP, confirming that WTP increases with the perceived level of attractiveness.

H5 predicts a positive relationship between perceived attractiveness and the level of usage of the service. A regression model, analogous to the one used to test *H4* was used to test this hypothesis. Table IV presents the results of the estimation. The estimate of b_1^q is also positive and significantly different from zero ($b_1^q = 0.041; p < 0.001$), confirming a significant positive relationship between perceived attractiveness and level of usage.

Summarizing the findings from the prior analysis, it can be concluded that the perceived attractiveness is influenced by the availability of someone at home to receive a parcel as well as the hours someone works per week. Additionally, the results suggest that higher levels of perceived attractiveness also lead to higher levels of usage and WTP for time-based delivery (Table V).

Parameter	Effect	Estimate	*t*-value	*p*
b_0^p	Intercept	−0.949	−1.559	0.121
b_1^p	ATT	0.827	5.410	<0.001
R^2		0.137		
Number of observations		186		

Table III.
Linear model: WTP

Revenue potential

Demand curves. To address *RQ3* and to investigate the relationship between attractiveness and the revenue potential, demand curves for different consumer segments are derived. Three individual segments were created by grouping those consumers together who consider the service as very attractive/attractive (segment attractive), as neutral (segment neutral) and unattractive/very unattractive (segment unattractive). For each segment, a demand curve was determined as a weighted aggregate of the individual demand curves of the respondents belonging to this segment. Figure 3 shows the demand curves for the individual segments.

The results of the analysis support the relationships previously derived from relevant theory and our empirical results: consumers who perceive the service as attractive are willing to pay more (Finkelman, 1993; Homburg *et al.*, 2005) while, at the same time, would use the service more extensively (Seiders *et al.*, 2005). For example, as shown in Figure 3, the consumer segment which considers the service to be attractive would choose the service for 35 percent of the parcels received at a price of €2.00, while consumers who perceive the service as neutral (not attractive) would only

Table IV.
Linear model: level of usage

Parameter	Effect	Estimate	*t*-value	*p*
b_0^q	Intercept	0.198	0.030	<0.001
b_1^q	ATT	0.041	0.008	<0.001
R^2		0.142		
Number of observations		186		

Table V.
Measurement items

Abbreviation	*Measurement items: willingness to pay and level of usage*
WTP_low	For the previously mentioned preferred time frame, what do you consider to be a low price per parcel?
WTP_ moderate	For the previously mentioned preferred time frame, what price do you consider to be a moderate price per parcel?
WTP_ expensive	For the previously mentioned preferred time frame, what price do you consider to be an expensive price per parcel?
WTP_too_ expensive	For the previously mentioned preferred time frame, what price do you consider to be a too expensive price per parcel?
Usage_low	For which portion of your received parcels would you buy the service at the stated low price?
Usage_ moderate	For which portion of your received parcels would you buy the service at the stated moderate price?
Usage_ expensive	For which portion of your received parcels would you buy the service at the stated expensive price?
Parcels	How many parcels do you receive per year?
Abbreviation	*Measurement items antecedents of attractiveness*
Availability	Is somebody in your household usually available during the daytime?
Minutes to office	How many minutes does it take you to get to the next office of the logistics service provider?
Working_ hours	How many hours do you usually work per week?
Attractiveness	How attractive do you perceive the service to be?

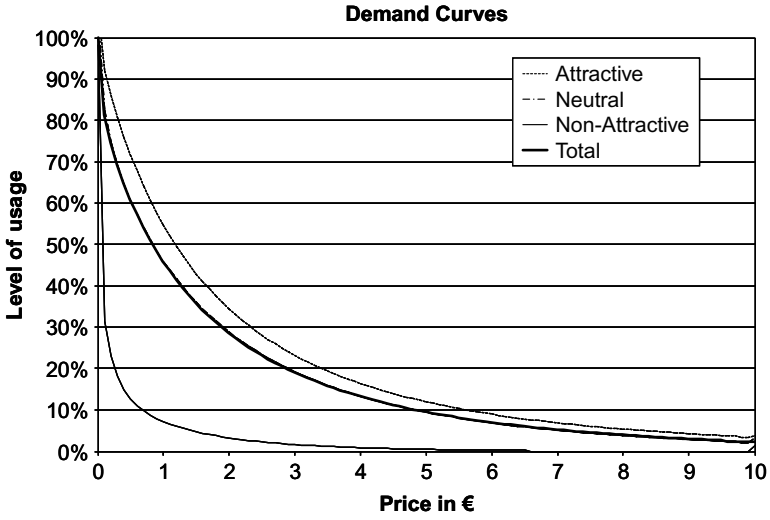

Figure 3.
Demand curves for individual segments

purchase the service for 30 percent (3 percent) of the overall number of parcels they receive for €2.00. It can be observed that the price elasticity of consumers perceiving the service as non-attractive is very high compared to the attractive and neutral consumer segment. The demand curve of the consumer segment that perceives the service as neutral has a similar slope as the consumer segment perceiving the service as attractive. This finding implies that the potential base of consumers that can be addressed with an equally priced product includes both segments.

Revenue potential of individual consumer segments. To gain further insight into the valuation of the service by different consumer segments, the revenue potential, dependent on the price for the three segments, was analyzed. Revenue curves of each segment were determined by taking the mean of the individual revenue curves of the respondents belonging to this segment. The results are in line with the prior findings: the average revenue per consumer segment strongly depends on the level of perceived attractiveness. Thus, the perceived attractiveness of the services increases the revenue potential (Figure 4).

Three individual effects driving the revenue potential of the individual segments can be identified: the price effect, the utilization effect and the volume effect. The price effect originates from a higher WTP and the utilization effect stems from a higher percentage of parcels for which respondents would choose time-based delivery. The higher overall number of parcels of a particular segment causes the volume effect. Thus, the revenue potential of a segment depends on:

(1) their WTP;

(2) the number of parcel for which they would utilize the service; and

(3) the overall number of parcels a particular segment receives.

Analyzing these effects is particularly interesting because a large difference exists in the average revenue potential of the neutral and attractive segments (€6.40) at their individual revenue-maximizing prices. Also, the difference in the average revenue

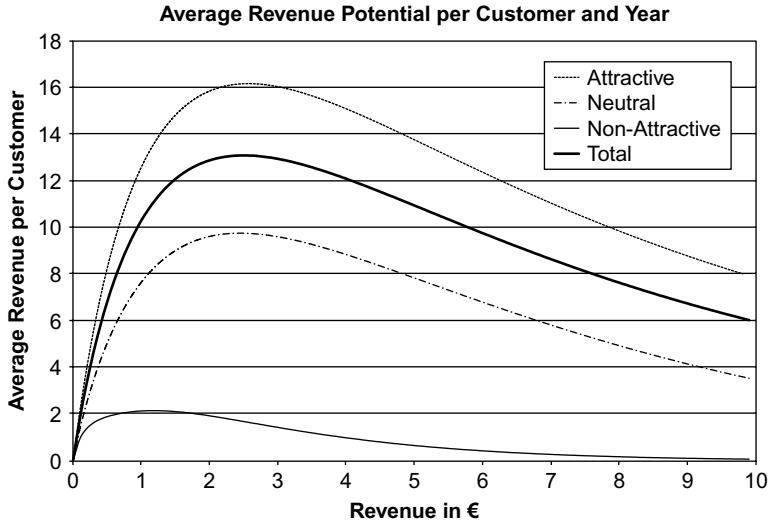

Figure 4.
Average revenue potential per customer and year

potential appears to be much more pronounced than the difference in the demand curves between these two groups (Figure 3). Figure 5 shows the results.

The top bar in Figure 5 represents the average revenue potential of the neutral segment at its revenue-maximizing price (€2.40). Taking the average revenue potential of this segment as a reference, Figure 5 shows the individual effects that determine the difference between the two segments. It can be observed that only a small portion of the difference (13 percent) can be attributed to a higher WTP of the respondents in the attractive segment (price effect). The higher level of usage (utilization effect) induces a larger portion (23 percent). The most prevailing impact stems from the volume effect

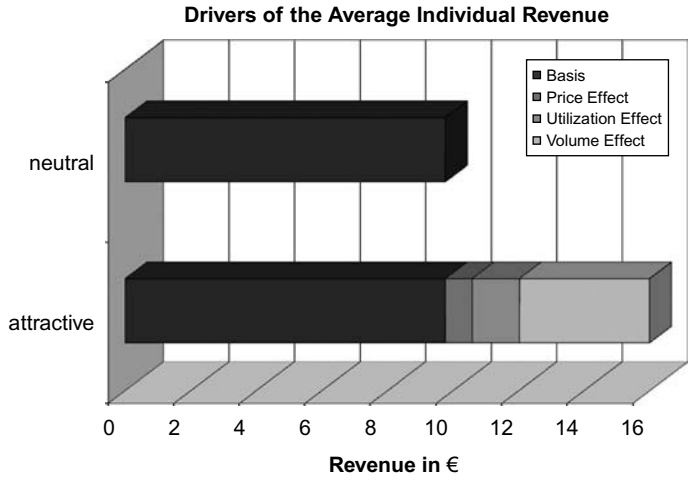

Figure 5.
Drivers of average individual revenue

(65 percent): the consumer segment that considers the service to be attractive exhibits a significantly higher parcel volume than the segment that perceives the attractiveness of the service as neutral.

6. Conclusion and managerial implications

The research presented in this paper provides insights for logistics service providers and retailers on how to manage more effectively the retailer-consumer interface. As highlighted previously, this issue has become increasingly important because the management of this interface is often outsourced and the logistics service provider is the only physical linkage between retailer and consumer. More specifically, the findings offer guidance on whether the adoption of time-based delivery to their service portfolio is worthwhile. In addition, this study identifies and characterizes relevant criteria that need to be considered when developing a marketing strategy for this novel service.

One main objective of the study was to identify the antecedents of perceived service attractiveness for a time-based delivery. The analysis reveals that the level of availability to accept delivery, as well as the professional occupation (in terms of time), has a positive impact on the perceived attractiveness of a time-based delivery service. In contrast, no evidence was found that the amount of time required to pick up a parcel has a significant influence on the service's attractiveness. The results support managers in developing their marketing strategy to identify which consumers to concentrate on when defining concerted advertisement effort. As a direct implication of the results, a logistics service provider or retailer could start to offer time-based delivery in a very restricted geographical area in which Geomarketing data suggest that consumers have a very high workload in terms of time and, at the same time, live in single households (low availability). This area could function as a test market before launching the service on the entire market. Since the distance to the pick-up location of the logistics service provider does not influence service attractiveness, all regions should be addressed in advertising efforts.

The other main objective of the study was to analyze the revenue potential of a time-based delivery service as a convenience-enhancing service. This study focuses on the individual demand curves for three different consumer segments with varying levels of attractiveness. Demand curves, in general, provide information for service providers and retailers as to how consumers react to different prices and are a prerequisite for proactive price management (Monroe, 2003). The findings demonstrate that the segment perceiving the service to be attractive has the lowest price elasticity, followed by a slightly higher price elasticity of the neutral segment. Therefore, both consumer segments, which account for over 70 percent of the basic population, can be addressed with equally priced services. The consumer group which considers the service to be unattractive is rather small and very price sensitive and would only utilize the service if it were offered at a very low price.

Although the service could be offered at equal prices, price differentiation usually leads to higher revenues (Monroe, 2003). For this reason, we analyzed the average revenue potential of the three consumer segments. The results can be used as the basis for different service bundles with differentiated prices to target the individual segments. In accordance with our previous results, the consumer segment which considers the service to be attractive reveals the highest revenue potential, followed by segments which perceive the service as neutral and non-attractive.

Thus, the study highlights the positive linkage of convenience as a major trend in consumer behavior and WTP. The investigation of time-based delivery, as an example of a convenience-enhancing service, supports the launch of such services.

The results concerning the drivers of the revenue potential demonstrate that a time-based delivery is a mass service for a large group of consumers, rather than an exclusive premium-priced service. Since more than 70 percent of the population would utilize the service for a similar price, the higher revenue potential of the group which perceives the service to be attractive mainly originates from volume and utilization effects rather than from price effect. Due to a significant rise of e-business transactions, one can assume that the overall volume of parcels will continue to increase rather than decrease. As mentioned previously, the amount of effort required to receive a parcel predominantly determines the perceived convenience of (internet-based) home ordering. A time-based delivery would help to lower this effort by making the delivery of parcels predictable, thereby avoiding the need for self-pick-up. A different distribution of the revenue effects would have indicated that the service would need to be priced with a premium price and offered to a small group of consumers. However, the results support the assumption that the service can reach a critical mass of potential consumers. A company which offers this service lowers the amount of consumer effort and thereby achieves competitive advantage.

Time-based delivery can potentially save (additional) costs of handling, storage and transport. In light of these costs, the decision to launch such a service for a logistics service provider is dependent on the relative and absolute number of parcels for which time-based delivery is chosen as a convenience-enhancing service. The results of our research provide information on consumers' expected utilization and their corresponding WTP. If a logistics service provider were to cooperate with a large retailer or company, the success of launching such a service would be more predictable and a first-mover status could be achieved among competitors. As indicated previously, the future market for home delivery is growing since more and more retailers implement purchasing channels offering home delivery service (e.g. internet, mail order catalog).

Overall, companies always have to assess if the introduction of new services, such as a time-based delivery, is viable. The implementation of new services often requires large financial investment and risk. Therefore, companies have to decide whether to incorporate time-based delivery into their existing service portfolio or to cooperate with external logistics service providers to reduce these risks and investments. The research presented in this paper provides valuable information to support this strategic decision.

7. Limitations and future research suggestions

This study addresses the gap in literature regarding the WTP and level of usage for the convenience-enhancing service of time-based delivery. As in any research project, the choice of the research design limits as well as provides avenues for further research. In general, questions about WTP will always include some limitation since such questions place consumers in a hypothetical buying situation. Since the time-based delivery service is innovative and new for consumers, they cannot compare the service and therefore have difficulty in estimating their WTP and assumed level of future usage. In our study, we opted for a contingent valuation approach (a modified form of the van Westendorp method) which was particularly suitable for short face-to-face interviews with potential users of the service, mainly because it is not very demanding

with respect to the respondents' cognitive capabilities. Respondents were only asked to provide different prices and corresponding levels of usage of the service. Despite the fact that this contingent valuation approach is relatively easy to employ, we found that a considerable number of respondents were not able to provide all of the required information in a consistent manner. To ensure reliability and validity of our WTP estimations, we were forced to eliminate these respondents from part of our analysis. Future research could build upon our experience and utilize methods that ensure lower drop-out rates. This could include field experiments in order to obtain data from real purchasing situations or even simpler contingent valuation approaches in which respondents have to provide fewer price/quantity combinations.

The data was collected in only one country and the results cannot be generalized at an international level. Future research could investigate if these results also hold true in other countries, and to which extent WTP and level of usage depend on country-specific factors and practices. For example, parcels are directly sent back to the sender if an immediate delivery is not possible in New Zealand (New Zealand Post Ltd, 2008). This may strongly affect both the perceived attractiveness and the WTP for time-based delivery.

Further research should also investigate for which products consumers are most inclined to lower their effort for receiving the parcel. This study assumes that some products and some buying situations are more time critical than others. This research would help logistics service providers to focus on certain types of retailers to offer their services to. Another interesting aspect to investigate is the sender's WTP, for instance the retailer offers and pays for the convenience-enhancing service for the consumer. This study only focuses on the recipient's WTP for time-based delivery of the parcel.

The research presented in this paper elaborates on the demand side (demand and revenue potential) of convenience-enhancing services. Since time-based delivery can potentially save costs for the provider, future research could also evaluate the supply side. We recommend two analyses in order to enhance the evaluation of the individual revenue potential for a certain logistics service provider. First, we recommend complementing this study with an analysis of the frequency and costs of unsuccessful delivery. Second, we propose analyzing additional costs for implementing and operating a time-based delivery. Costs of implementation and operation could focus on three major aspects which affect logistics service providers: systems would have to be established to handle parcels to be delivered within a specific time frame; an additional delivery network might have to be established; a system has to be created to allow consumers to register for and purchase the service.

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