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The Relevance of Shopper Logistics for Consumers of Store-based Retail Formats

Christoph Teller^I, Herbert Kotzab^{II} and David B. Grant^{III}

I, [*corresponding author*] The Surrey Business School, University of Surrey, GU2 7HX Guildford, United Kingdom; Tel: +44 (0)1483 682851, e-mail: c.teller@surrey.ac.uk;

II, Institute for Logistics and Supply Chain Management, University of Bremen, 2000 Bremen, Germany; Tel.: +49 (0)421 218 66981, e-mail: kotzab@uni-bremen.de; CBS International Professor, Glasgow Caledonian University;

III, Logistics Institute, University of Hull, HU6 7RX Hull, United Kingdom; Tel.: +44 (0)1482 347500, e-mail d.grant@hull.ac.uk;

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Abstract

This paper discusses and empirically evaluates the relevance of shopping-related logistics for consumers of store-based retail formats. Based on a literature review a conceptual model was developed and subsequently tested using a survey of more than six hundred consumers in the grocery retail sector. Respondents were those primarily responsible for grocery shopping in their households located in a highly concentrated European urban retail market. Variance based structural equation modelling reveals that shopper logistics has a major impact on the convenience of store-based shopping and partly influence consumers' perceptions of shopping related costs. Nevertheless, shopper logistics does not affect consumer behaviour in terms of the share of visits of a store. These results are moderated by age, hedonic shopping orientation, shopping frequency, average spending per trip and store format preference. We conclude that shopper logistics is relevant for consumers of grocery stores but its relevance varies between different shopper groups.

Keywords: Shopper logistics, retail format, grocery sector

Shopper Logistics and Consumers of Store-based Retail Formats

Introduction

Everyday across the globe consumers fulfil their grocery shopping needs in self-service, store-based retail formats such as convenience/discount stores, supermarkets or hypermarkets. Due to the self-service nature of these store formats consumers also fulfil in-store to home logistics tasks, which we term shopper logistics, such as handling, picking, packing, transportation and storage at home (Granzin and Bahn, 1989). Retail stores can therefore be considered as demand fulfilment centres where consumers assemble their individual baskets of products or commodities (Alba *et al.*, 1997).

However, consumers nowadays have more choice to use home delivery services that allow grocery retailers to fulfil certain logistics tasks using non-store-based retail formats (Murphy, 2003). Overall, there has been a steady rise in the market share of non-store retailing due to the growing use of the Internet as an information and order processing tool (Mintel, 2009); however the share of online sales remains less than 10% of total retail sales (KPMG, 2011). Further, different forms of non-store retailing cannibalise each other rather than taking away market share from store-based retail formats (Mintel, 2010). In the grocery sector – arguably the most important retail sector - the online market remains an even smaller niche. In the UK where online grocery retailing is already highly developed and widely accepted by consumers the share of online sales is about 5% relative to the total grocery sales (Mintel, 2009; KPMG, 2011).

The dominance of store-based retailing indicates that consumers and most importantly shoppers still manage the flow of products and related information between the retail stores

and their households, *i.e.* they execute shopper logistics on an everyday basis and to a considerable degree (Kotzab and Teller, 2005a).

And yet, in terms of shopper logistics the procurement of groceries is a necessity and cannot be easily deferred by consumers having no possibility to have it done by someone else (Teller and Gittenberger, 2011). The perishable nature of groceries results into a comparably high shopping frequency, which is determined by those products that are needed most and have the shortest storage life, *e.g.* diary products, fruits or vegetables (Kotzab and Teller, 2005b). Since most consumers have a lack of choice and have to shop for groceries at least once or perhaps several times a week, shopper logistics tasks and costs are higher compared to shopping endeavours for other product categories.

However, a key question that remains is why do consumers still prefer store-based retail formats for grocery shopping? Arguably this is an inconvenient, time consuming and cost creating task that is repeated frequently (Ingene, 1984). So far, the literature has dealt with the phenomenon of logistics-related tasks being carried out by consumers when they shop for groceries in a descriptive way. However, it has failed to investigate consumers' perceptions about the logistics process and consequently its relevance regarding patronage behaviour of store-based formats.

This paper's aim is to discuss and evaluate the relevance of shopping-related logistics tasks or shopper logistics to consumers of store-based retail formats in the grocery sector. The major contribution of this paper for retail and service research is to provide further insights into the perceived role of consumers as unwillingly and/or unconscious active members in the food supply chain. Thus, this paper contributes to a better understanding of the co-production of distribution services in store-based grocery retailing.

This paper is organised as follows: after these introductory remarks we present a literature review that provides a synopsis of the dormant discussion on shopper logistics. Based on that, five hypotheses are developed within a conceptual model, then, the methodological characteristics for empirically testing this model and the results from this research are presented. In the discussion section the findings are reflected upon with respect to the existing literature. A research limitations and outlook section concludes the paper.

Literature Review

The role of a household is that of the last link in a supply chain, following the notion of ‘point-of-origin to point-of-consumption’ familiar in the logistics and supply chain management (SCM) discipline (CSCMP, 2011). However, the relevance of shopping-related logistics for consumers or shopper logistics has not received wide attention in the marketing, retailing or logistics literature. Notwithstanding, we have identified four research streams investigating the role of households in supply chains and consequently consumers acting as logisticians:

Consumer logistics: Granzin and Bahn (1989) provided the first explicit conceptual discussion of consumer logistics. They transferred the concept of business logistics to a logistics setting in households. They set up a process model that describes and categorises logistics tasks undertaken by consumers. Based on that, they then presented a research agenda to guide future research. Subsequent descriptive publications of Granzin and colleagues proposed consumer logistics tasks or logistics-related household characteristics as segmentation criteria of markets (Granzin *et al.*, 1997, 2005). Overall, these publications included not only the logistics attached to shopping but also the logistics processes within households. However, their simple idea of looking at households as logistics systems has not

yet been picked up by other authors to a substantial degree and there has been little empirical study.

Non-store retailing: With the appearance and growing use of the Internet authors have begun to enlarge on the topic of distance and non-store retailing and thus the ‘insourcing’ of shopper logistics tasks (*e.g.* Eastlick and Feinberg, 1999; Ring and Tigert, 2001; Ward, 2001; Gehrt and Yan, 2004; Hansen, 2008). This body of literature considers store-based shopping and related logistics tasks as an ‘antithesis’ of non-store retailing but does not provide in-depth discussions or empirical insights into the relevance of shopper logistics. These papers convey the tacit assumption in the way that shopping in store-based formats is an exhausting and/or annoying task for consumers – possibly because of shopper logistics. Thereby the authors focus more on the utilitarian rather than the hedonic dimension of shopping and orientation of consumers (Babin *et al.*, 1994).

Recent non-store retailing literature has focused on the use of the Internet and its implications on consumer behaviour (Dennis *et al.*, 2009; Hernandez *et al.*, 2009). Regarding retailers, the literature has investigated their success strategies (Doherty and Ellis-Chadwick, 2009) and relationship with logistics service providers and consumer service quality (Xing and Grant, 2006; Xing *et al.*, 2010). However, none have been concerned with consumer or shopper logistics activities.

Store-based retailing: The most consideration of selective shopper logistics tasks can be found in store (format) choice and patronage literature, although the notions of shopper and consumer logistics are only conveyed implicitly. Particular temporal and spatial aspects of shopping in terms of distance or accessibility have received considerable attention since seminal work from Reilly (1931) and Huff (1964), for example Fotheringham (1988), Grace

and O'Cass (2005), Pan and Zinkhan (2006) and Reutterer and Teller (2009). Some other authors have focussed on convenience by providing infrastructural services (*e.g.* signage, recreational areas, specially adapted trolleys) or services facilitating the shopping process (*e.g.* information services, sales advice and self-service technologies) (Bearden, 1977; Reinartz and Kumar, 1999; Tang *et al.*, 2001; Baker *et al.*, 2002; Beatson *et al.*, 2006). Overall though, the logistics contribution of consumers and its relevance is not discussed or investigated holistically.

Cost of shopping: Another research stream tries to convert shopping endeavours and therefore shopper logistics into tangible costs. Ingene (1984) conceptually discussed measures of labour productivity with respect to consumers' shopping endeavours and thereby considered measures of shopper logistics in terms of time, money and psychic efforts. Bell *et al.* (1998) extensively discussed the extent of shopping costs and tied them into a choice model to predict store patronage behaviour. Ruiz *et al.* (2004) included a quasi measure for (non-economic) costs in their activity-based segmentation approach with regards to shopping mall clientele. They used perceptual measures like accessibility and distance to operationalise shopping related costs. Lastly, Kotzab and Teller (2005a) provide empirical evidence that the estimated transportation costs related to shopping trips to (centrally located) supermarkets and (peripherally located) category killers play a significant but still marginal role in explaining the willingness to pay for home delivery services. However, the work around the topic of 'cost of shopping' has only considered shopper logistics to a marginal degree; the authors did though provide applicable notions to measure the relevance of shopper logistics for consumers.

After reviewing these different literature streams related to the shopper logistics phenomena, we consider there is a substantial gap in actually operationalising and measuring the

relevance of logistics endeavours of store-based retail format consumers. The discussion of shopper logistics is not recent, quite scattered, implicit, and unfocused, which results in the broad set of contributions illustrated above. Further, there is a deficit of empirical studies regarding the extent of logistics tasks undertaken by consumers when they shop. We propose a conceptual model in the next section to address these shortcomings in line with empirical research aims provided in the introduction.

Conceptual model

Unlike Granzin's work which includes logistics processes within households we focus on the logistics activities during the shopping process. Shopper logistics includes a range of different activities such as transportation, picking and packing and is heavily influenced by how a retailer operates a certain store format strategy. These retail factors in particular comprise:

- the location that determines the distance to and the accessibility of stores,
- the store layout and space management that influences the manoeuvrability of shoppers and internal accessibility of products in store, and
- the provision of infrastructure services (*e.g.* signage, support by sales staff, sufficient cash desks, facilitating the orientation within the store).

How shoppers interpret and perceive these stimuli (*i.e.* the use of marketing instruments or format) affect their attitudes and behaviour according to stimulus-organism-response (S-O-R) theory – and consequently explain the relevance of shopper logistics for consumers of store-based retail formats. The S-O-R framework (Donovan and Rossiter, 1982) is rooted in the work of Mehrabian and Russell (1974) whereby a stimulus is posited to lead to an evaluation and emotional reaction which subsequently influences consumer behaviour. This model has

been successfully applied in the retail environment (*e.g.* Mazursky and Jacoby, 1986; Finn and Lourviere, 1996; Sherman *et al.*, 1997).

Our conceptual model is therefore derived from the S-O-R framework within which we identify our hypotheses. It proposes relationships between retail format strategy (stimuli like location, merchandising, store layout, pricing, and promotion), consumers' perceptions of the resulting shopper logistics and consumers' evaluations of store-based shopping (organism) that result into patronage intentions and behaviour (response). Further we focus on the organism part and investigate how shoppers process the stimuli and convert them into meaningful information (perception of shopper logistics) which is used to evaluate the environment (store-based shopping) and results into a reaction in terms of behaviour (Finn and Lourviere, 1996). Thus the significance and strength of the relationships or effects between constructs measuring shopper logistics and the reference constructs (*i.e.* overall evaluation of store-based shopping and patronage behaviour) serve as indicators for the relevance of shopper logistics. We now turn to the development of the conceptual model and our constructs.

Shopper logistics is perceived by various attributes of store-based shopping process from a consumer's point of view (Granzin *et al.*, 2005). This comprises attributes related to transportation (*i.e.* easy access (x_{11})), picking (*i.e.* clear store layout (x_{12}), good arrangement of products (x_{13}), clear display of prices (x_{14}) and support of the sales personnel (x_{15})), payment and packing (*i.e.* sufficient checkouts (x_{16})). Further, shopper logistics is perceived as the time invested in the whole process, which comprises the time spent to access and return from the store (x_{21}) and the time spent in the store (x_{22}) (Ingene, 1984; Gert and Yan,

2004). In summary, we propose store-related shopper logistics attributes (ξ_1) and the time spent on store-based shopping (ξ_2) as measures for shopper logistics.

Granzin *et al.* (2005) consider shopper logistics has a substantial effect on a consumer's perceived convenience of store-based shopping. According to Eastlick and Feinberg (1999) the convenience of shopping (ξ_3) can be measured by overall convenience (x_{31}), the amount of physical effort (x_{32}), time intensiveness (x_{33}) and the level of 'hecticness' (x_{34}) attached to the whole process. We therefore propose the following two hypotheses:

H_{1a}: The better store-related shopper logistics attributes (ξ_1) are perceived the better the convenience of store-based shopping (ξ_3) is perceived.

H_{1b}: The longer the shopper logistics-related time (ξ_2) the worse the convenience of store-based shopping (ξ_3) is perceived.

Another measure to evaluate store-based shopping and its burden on consumers is the cost attached to buying groceries from stores (η_2 ; Bell *et al.*, 1998; Kotzab and Teller, 2005a). This cost comprises both fixed and variable components for transportation, picking or packing and general opportunity costs (x_{41} ; Ingene, 1984; Pashigian, 2003). Opportunity costs can be measured indirectly by the willingness to pay someone else for undertaking a shopping trip to a store (x_{42} ; Kotzab and Teller, 2005a). According to Teller *et al.* (2006) we consider there is an effect of shopping logistics to the cost of shopping which results in the following hypotheses:

H_{2a}: The better store-related shopper logistics attributes (ξ_1) are perceived the lower the estimated costs of store-based shopping (ξ_4) are.

H_{2b}: *The longer the shopper logistics-related time (ξ_2) the higher the estimated cost of store-based shopping (ξ_4) are.*

Based on the notions of Eastlick and Feinberg (1999) we propose that the convenience of shopping and the cost of shopping as overall evaluations of the undertaken shopper logistics tasks affect patronage behaviour in terms of share of visits to a store (Bell *et al.*, 1998). The resultant hypotheses are:

H_{3a}: *The better the convenience of store-based shopping (ξ_3) is perceived the higher the share of visits (η_1).*

H_{3b}: *The lower the costs of store-based shopping (ξ_4) are perceived the higher the share of visits (η_1).*

This set of hypothesis spans our conceptual model which, apart from the direct effects, proposes indirect relationships between the included factors as shown in Figure 1.

Figure 1 near here

By following the S-O-R theory, the constructs of evaluating store-based shopping from a convenience and cost point of view mediate the effect between the shopper logistics constructs (ξ_1 , ξ_2) and the share of visits (η_1). These resulting indirect effects can be justified as follows. Bell *et al.* (1998) and Hand *et al.* (2009) see the logistics effort as drivers of store format choice. Further, Ingene (1984) regards perceived time constraints of consumer as a main determinant of store patronage. Consequently, we propose both store-related shopper logistics attributes and shopper logistics-related time as determinants for the share of visits.

Granzin et al. (1997) used shopper logistics-related personal and behavioural characteristics of consumers as a base for identifying and consequently differentiating between different consumer segments. Such variables can thus be seen as influencing the relevance of shopper logistics and as moderators on the proposed effects operationalised in our six hypotheses. Beside others personal characteristics age (μ_1) can determine the ability to carry out shopper logistics (Keillor *et al.*, 1996; Teller and Gittenberger, 2011). The relevance of the shopping logistics as part of the shopping experience is also strongly dependent on the shopping orientation whereas a hedonic shopping orientation (μ_2) decreases the perception of shopping as a burden (*e.g.*, Babin et al., 1994). Behavioural characteristics indicating the extend of the shopper logistics tasks are shopping frequency (μ_3), average spending per trip (μ_4), then number of persons within the household supplied by each shopping trip (μ_5) and the use of transport means (μ_6) (Granzin *et al.*, 1997). Finally the format of the preferred store (μ_7) determines the extent of shopper logistics due to heterogeneous format specific characteristics like *e.g.* the location, floor space, depth and with of product range and in-store services (Solgaard and Hansen, 2003).

This leads to the last hypotheses where we propose moderating effects as follows:

H_m: The ability (μ_1), the willingness (μ_2) and extent of carrying out shopper logistics task (μ_3 - μ_7) significantly moderates the relevance of shopper logistics as proposed in H_{1ab} , H_{2ab} and H_{3ab} .

The next section discusses the methodology used to empirically test this model.

Methodology

Empirical research design

Our empirical study focused on grocery consumers, as that sector of the retail market is the most significant as identified above, and we surveyed those respondents who are mainly responsible for the procurement of groceries within their households. They can be seen as experts in the field of shopper logistics as they are confronted with the management and execution of logistics tasks on a regular basis when buying groceries. Thus, they have the most in-depth knowledge about shopper logistics within their household.

We defined all households within the capital city (~ 2 million inhabitants) of a central European country as our population and drew a quota sample of 603 consumers using age, household size and household income as quota controls. These variables were chosen since they distinguish between the different extents of logistics tasks to be undertaken in households (Rhee and Bell, 2002). As mentioned, age differentiates between the different abilities of respondents to carry out shopper logistics (*e.g.* Keillor *et al.*, 1996; Meneely *et al.*, 2009). Household size takes into account differences in the amount of products to be bought. Household income considers the different opportunities but also the potential to outsource shopping logistics to retailers by being able to pay for delivery fees.

Professional interviewers confronted respondents with a standardised questionnaire. Regarding the survey structure we first asked respondents to focus exclusively on the most frequently visited grocery store in order to increase the concreteness of the phenomenon for them. Thereafter we asked them questions on shopper logistics-related to visiting these patronised stores.

The retail market in the selected city can be described as typical for central and western European urban retail environments: highly concentrated, declining number of small independent grocery shops and a high outlet density. The demographic characterisation of

respondents is shown in Table 1. There were no significant differences regarding incomes of households, number of persons living in the household and age compared to the overall population (X^2 -test; $p>.05$).

Table 1 near here

Scales and analysis

The conceptual model includes both reflective and formative scales (for a detailed discussion regarding the differences, see Jarvis *et al.*, 2003). In terms of the reflective constructs ζ_1 , ζ_3 , and η_1 , the indicators representing manifestations of the constructs were taken from literature (see Appendix; Granzin and Bahn, 1989; Teller *et al.*, 2006). They were pre-tested according to suggestions by Churchill (1979). In terms of the formative constructs, the characteristics of the constructs ζ_2 and ζ_4 are defined by the items. The completeness of indicators of each factor is supported by Ingene (1984) in terms of ζ_2 and by Bell *et al.* (1989) in terms of ζ_4 .

Since most of the constructs in our model are of latent nature we applied variance-based structural equation modelling using the partial-least-square (PLS) approach to analyse the proposed effects (Chin, 1998; Tenenhaus *et al.*, 2005), and the software SmartPLS (Ringle *et al.*, 2005). The PLS approach conveys a number of advantages in terms of the required sample size, level of measurement and multinormality compared to a co-variance based structural equation modelling approach. Most importantly, the PLS approach allows to include both formative and reflective constructs (Fornell and Bookstein, 1982; Chin and Newsted, 1999).

Finally, we measured the significance of interaction effects of all proposed moderating variables on an interval scale level (μ_1 - μ_5) based on the two-step approach as described by

Chin *et al.* (2003). For all variables on a binary scale level (μ_6 and μ_7) we applied multi-groups comparisons as proposed by Keil *et al.* (2000).

Results

Local fit

We first evaluated the measurement or outer models (*i.e.* the sets of constructs with the observable items standing behind them). Subsequently we investigated the proposed effects between the latent constructs within the structural or inner models.

All *t*-values of the factor loadings prove to be highly significant ($p < 0.001$) and all loadings exceed the suggested size of 0.7 (Hulland, 1999). The internal consistency is also considered satisfactory for all factors with Cronbach Alphas exceeding 0.7 (Nunnally, 1978) and the composite reliability of all factors greater than 0.7 (ρ , Fornell and Larcker, 1981).

The degree of the convergent validity is acceptable with average variances extracted (AVE) in the range of 0.5 or higher (Bagozzi and Yi, 1988). With regard to the constructs' discriminant validity, the AVE is larger than the highest squared intercorrelation with every other factor in the measurement models; *i.e.* the Fornell-Larcker-Ratio (FLR) is less than <1.0 (Fornell and Larcker, 1981).

Hypothesis testing

By following Chin (1998) we evaluated the structural model by using the coefficients of determination (r^2), the size, signs and significance of the single path coefficients (γ_n) and the effect sizes (f^2). The results are shown in Table 2.

Table 2 near here

The store-related shopper logistics attributes (ξ_1) have a highly significant and very strong positive effect on convenience of store-based shopping (ξ_3). This finding therefore clearly supports hypothesis H_{1a} . Shopper logistics-related time (ξ_2) also has a significant negative impact on convenience whereas the effect can be regarded as being quite weak. Nevertheless, this finding supports H_{1b} .

The time construct shows a highly significant and medium sized effect on the costs of store-based shopping (ξ_4) which leads to the support of H_{2b} . However, the effect between the store-related shopper logistics attributes (ξ_1) and the costs of shopping in (ξ_4) stores is extremely low and insignificant. This finding clearly does not support H_{2a} .

Finally, there is a no significant impact of the convenience of store-based shopping (ξ_3) and the shopping costs (ξ_4) and share of visits (η_1). Consequently, both overall evaluations of the store-based shopping process do not contribute to the explanation of the behavioural consequences substantially. Consequently H_{3a} and H_{3b} are clearly not supported.

By taking into consideration the indirect effects of our shopper logistics constructs on the share of visits (η_1), we find that neither store-related shopper logistics attributes ($\gamma_{31} * \gamma_{13} + \gamma_{41} * \gamma_{14}$, -.018; t -value, .771; p -value, .441) nor shopper logistics-related time ($\gamma_{32} * \gamma_{13} + \gamma_{42} * \gamma_{14}$, -.001; t -value, .094; p -value, .925) show a significant impact.

The coefficients of determination indicate that a considerable degree of variance in the construct convenience of store-based shopping (ξ_3 , r^2 , .305) is explained. However, the explanatory power of those constructs proposed to affect the costs of store-based shopping (ξ_4 , r^2 , .076) and the share of visits (η_1 , r^2 , .010) is quite low.

The measurement of interaction effects revealed the following significant results as depicted in Table 3). Age and shopping frequency moderates the effect γ_{31} significantly; for both variables the moderating effect result into a higher impact between store-related shopper logistics attributes (ξ_1) and the convenience of store-based shopping (ξ_3). Average spending per trip moderates effect γ_{42} positively and significantly. Consequently, higher spending results in a higher impact of shopper logistics-related time (ξ_2) on the cost of store-based shopping (ξ_4). The impact (γ_{13}) of the convenience of store-based shopping (ξ_3) on the share of visits (η_1) is affected by the hedonic shopping orientation and the type of patronised format. The more respondents have a hedonic shopping orientation the higher the impact of convenience on the share of visits. Further, this impact is significantly highest for patrons of hypermarkets compared to those of supermarkets and discount stores. Despite the significance of identified moderating effects we see that the effect size measured by f^2 -value is around .02 and thus to be considered as weak. Nevertheless, we conclude that hypothesis H_m can be confirmed for the variables age (μ_1), hedonic shopping orientation (μ_2), shopping frequency (μ_3), average spending per trip (μ_4) and the store format preference (μ_7). The number persons for whom the respondent shops (μ_5) and the use of a means of transport (μ_6) show no significant impact on any of the six effects and consequently the hypothesis is rejected there.

Table 3 near here

Discussion

The findings clearly show the relevance of shopper logistics for the convenience of store-based shopping in the grocery sector confirming previous suppositions of Ingene (1984), Gert and Yan (2004) and Granzin *et al.* (2005). In particular, the store-related shopper logistics

attributes linked to transportation, picking and packing activities of consumers can be considered as relevant for store-based shoppers. In other words, the convenience attached to a shopping experience can be an influencer to facilitate logistics endeavours by making the store easy to access, clearly laying out the stores, arranging products and displaying prices clearly, and making enough cash tills available when needed. This finding calls for making the shopping process simpler for consumers in terms of logistics activities (Baker *et al.*, 2002). This is particularly true for consumers of a higher age and those who shop at grocery stores more often. We thus identify the relevance of shopper logistics in a grocery retail setting for elderly and frequent shoppers and thereby confirm work by Keillor *et al.* (1996), Meneely *et al.* (2009), Reutterer and Teller (2009) and Teller and Gittenberger (2011).

Further, and in line with Ingene (1984), the other determinant of the convenience of store-based shopping is time. The perception of time in-store can be influenced by streamlining and optimising shopper logistics as suggested above and by influencing perceptions. That can be achieved for example by minimising obvious waiting times at counters or cash tills which are perceived as non-value adding activities by shoppers (Bennett, 1998).

Inline with Bell *et al.* (1998) and Ingene (1984), shopping time has an impact on the perceived cost of shopping. The impact is higher for those consumers who spend more per trip which ultimately indicates the size of shopping baskets. By confirming Granzin *et al.* (1997) we conclude that the shopper logistics is more relevant for those consumers who are exposed to the logistics task more by picking, packing and moving more products per trip than others. However, we cannot confirm Ingene's (1984) notions in terms of the impact of store-related shopper logistics attributes on perceived cost of shopping.

A major finding is that across all respondents the perception and evaluation of shopper logistics does not result in behavioural consequences measured by the share of visits, which confirms findings from Teller *et al.* (2006). Further, neither (in-)convenience nor the cost of store-based shopping can be seen as a major driver for store patronage. Nevertheless, we see a moderating effect of the hedonic shopping orientation and the store format patronage behaviour. For more hedonic oriented shoppers convenience has a higher impact on the patronage behaviour than for less hedonic shoppers. This extends the findings from Babin *et al.* (1994) in terms of grocery retailing. They see convenience more important for utilitarian shoppers compared to hedonic ones. Further, the results of the group of hypermarket patrons indicate that store-related shopper logistics attributes have a significant total effect ($\gamma_{31} * \gamma_{13} + \gamma_{41} * \gamma_{14}$, .124; *t*-value, 1.955; *p*-value, .05) and convenience a significant direct effect (γ_{13} , .209; *t*-value, 2.000; *p*-value, .05) on the share of visits. Thus, shopper logistics is of relevance for patrons of large retail formats like hypermarkets compared to supermarket and discount stores.

We conclude that shopper logistics is relevant for consumers of store-based grocery retail formats; it particularly influences the convenience dimension of the shopping experience. The relevance of shopper logistics is influenced by both the ability and the willingness to carry out and extent of the shopper logistics task. This ultimately suggests that shopper logistics is perceived and evaluated and consequently impacts of different consumer groups distinctively and thus is a relevant criterion to segment consumer markets as suggested by Granzin *et al.* (1997).

Limitations and further research

Like every empirical study there are some limitations in this work that motivates further research. The urban retail market investigated can be seen as representative for many others

in developed European cities. Nevertheless, we neglected markets with other spatial and infrastructural characteristics. We therefore suggest replicating our study in more rural areas and countries/cities with a less developed infrastructure.

This paper focused solely on the relevance of shopper logistics for consumers of store-based grocery retail formats. As many grocery retailers offer home delivery services that feature all products, including perishable items, consumer decision making regarding these services should be investigated.

Lastly, our results demonstrate the high relevance of shopper logistics on the convenience of store-based grocery shopping. Further research could focus explicitly on the individual elements of attributes related to convenience considered in our model, *i.e.* items behind the construct, to improve, for example, store accessibility, store layout, arrangement of categories and products in-store, display of prices in-store, and store check-out procedures.

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Appendix: Scales and local fit measures

Factor Indicator	Measures/indices		
	μ (σ)	α/ρ	AVE/FLR
ξ_1 : Store-related shopper logistics attributes			
x_{11} : Difficult to access $\leftrightarrow$ easy to access ^{† (a)}	1.1 (1.6)	.765/.836	.560/.615
x_{12} : Confusing layout $\leftrightarrow$ clear layout ^{†(b)}	1.0 (1.7)		
x_{13} : Products difficult to find $\leftrightarrow$ easy to find ^{†(c)}	1.0 (1.8)		
x_{14} : Prices difficult to recognise $\leftrightarrow$ easy to recognise ^{†(d)}	-1.8 (1.8)		
x_{15} : Unsupportive personnel $\leftrightarrow$ supportive personnel ^{†(e)}	1.2 (1.4)		
x_{16} : Not enough cash desks available $\leftrightarrow$ enough available ^{†(f)}	1.6 (1.4)		
ξ_2 : Shopper logistics-related time			
x_{21} : Access time ^{††(g)}	6.4 (4.6)	n.a.	n.a.
x_{22} : Retention time ^{††(h)}	21.3 (12.0)		
ξ_3 : Convenience of store-based shopping			
x_{31} : Inconvenient $\leftrightarrow$ convenient ^{†(i)}	1.6 (1.6)	.670/.797	.597/.569
x_{32} : Exhausting $\leftrightarrow$ not exhausting ^{†(j)}	1.0 (1.9)		
x_{33} : Time intensive $\leftrightarrow$ not time intensive ^{†(k)}	0.8 (1.8)		
x_{34} : Stressful $\leftrightarrow$ relaxing ^{†(l)}	0.8 (1.7)		
ξ_4 : Costs of store-based shopping			
x_{41} : Estimated costs ^{†††(m)}	2.9 (5.2)	n.a.	n.a.
x_{42} : Willingness to pay for someone else undertaking the shopping trip ^{†††(n)}	3.6 (4.4)		
η_1 : Share of visits			
y_{11} : Share of visits to this store compared to all visits to grocery stores ^{††††(o)}	69.7 (16.7)	n.a.	n.a.

Caption:†, bipolar 7point rating scale (-3↔+3) including a neutral middle category (0); ††, metric scale, minutes; †††, metric scale, Euro; ††††, per cent, metric scale; μ , mean value; σ , standard deviation; α , Cronbach’s Alpha; ρ , composite reliability; AVE, average variance extracted; FLR, Fornell-Larcker-ratio

Notions: Cutoff values for measurement validity: $\alpha>.7$; $\rho>.6$; AVE>.5; FLR<1 (Fornell and Larcker, 1981; Bagozzi and Yi, 1988); since different units of measurement were used the values were converted into z-scores for modelling purposes

Sources: (a), Reinartz and Kumar, 1999; (b), Tang *et al.*, 2001; (c) (d), Eastlick and Feinberg, 1999; (e), Baker *et al.*, 2002; (f), Tang *et al.*, 2001; (g), Rhee and Bell, 2002; (h), Baker *et al.*, 2002; (i), Eastlick and Feinberg, 1999; (j), Teller *et al.*, 2006; (k), Eastlick and Feinberg, 1999; (l), Baker *et al.*, 2002; (m), Bell *et al.*, 1998; Pashigian, 2003; Kotzab and Teller, 2005; (n), Kotzab and Teller, 2005; (o), Teller *et al.*, 2006;

Figure 1: Conceptual model

Table 1: Demographic characterisation of respondents

Demographic variables	Characterisation
Gender	Female, 67.5%
Age (years)	μ (mean value), 41.6; σ (standard deviation), 15.9
Household income (Euro per month)	μ , 2,223.7; σ , 1,382.5
Share of expenditures for grocery as a percentage of the household income	μ , 23.4%; σ , 14.2%
Number of persons in households (incl. respondents)	μ , 2.0; σ , 1.1
Education (Top 3)	A-Level/pre university qualification, 42.2%
	University degree, 18.8%
	Secondary school diploma, 17.6%
Profession (Top 3)	White collar worker, 41.9%
	Student/Trainee, 18.4%
	Senior citizen, 14.3%

Table 2: Structural effects

Hypothesis, effect	Path coefficient	f^2 -values	t -values	p -values
H _{1a} , γ_{31}	.545	.334	16.472	<.001
H _{1b} , γ_{32}	-.146	.010	3.039	.002
H _{2a} , γ_{41}	.039	.022	1.058	.290
H _{2b} , γ_{42}	.270	.080	6.151	<.001
H _{3a} , γ_{13}	-.032	.001	.761	.447
H _{3b} , γ_{14}	-.013	.001	.268	.789
Notions: Sample size n=603; t -values calculated by applying a bootstrapping procedure with 1,000 sub-samples (Chin, 1998)				

Table 3: Moderating effects

Moderators		μ_1 : Age ^I	μ_2 : Hedonic shopping orientation ^{I, III}	μ_3 : Shopping frequency per month ^I	μ_4 : Average spending per trip ^I	μ_5 : Shopping for x persons in household ^I	μ_6 : Use of transport means ^{II}	μ_7 : Patronised store format (supermarket, hypermarket, discount store) ^{II}		
Effects							$\Delta_{onf, trans}$	$\Delta_{sm, hm}$	$\Delta_{sm, ds}$	$\Delta_{hm, ds}$
γ_{31}	β_{ξ_1}	.525 ^{***}	.515 ^{***}	.532 ^{***}	.535 ^{***}	.531 ^{***}	$t_{(601)}, .701^{ns}$	$t_{(445)}, .578^{ns}$	$t_{(464)}, 1.685^{\dagger}$	$t_{(291)}, .760^{ns}$
	β_{μ_n}	.045 [†]	.105 ^{**}	.047 [†]	-.066 [†]	-.015 ^{ns}				
	β_{μ_n, ξ_1}	.134 ^{***}	.032 ^{ns}	.082 [*]	-.003 ^{ns}	-.056 ^{ns}				
γ_{41}	β_{ξ_1}	.074 [†]	.062 ^{ns}	.060 ^{ns}	-.055 ^{ns}	.054 ^{ns}	$t_{(601)}, -.763^{ns}$	$t_{(445)}, -.079^{ns}$	$t_{(464)}, .668^{ns}$	$t_{(291)}, .487^{ns}$
	β_{μ_n}	-.070 [†]	-.023 ^{ns}	-.115 ^{**}	-.142 ^{**}	.122 ^{**}				
	β_{μ_n, ξ_1}	-.019 ^{ns}	-.050 ^{ns}	-.003 ^{ns}	.007 ^{ns}	-.010 ^{ns}				
γ_{32}	β_{ξ_2}	.029 ^{ns}	.245 ^{***}	-.109 ^{**}	-.099 [†]	-.099 [*]	$t_{(601)}, .286^{ns}$	$t_{(445)}, -.409^{ns}$	$t_{(464)}, .050^{ns}$	$t_{(291)}, .277^{ns}$
	β_{μ_n}	.021 ^{ns}	-.130 ^{**}	.013 ^{ns}	-.018 ^{ns}	.020 ^{ns}				
	β_{μ_n, ξ_2}	-.038 ^{ns}	-.045 ^{ns}	-.063 ^{ns}	-.025 ^{ns}	-.009 ^{ns}				
γ_{42}	β_{ξ_2}	.278 ^{***}	.301 ^{***}	.266 ^{***}	.246 ^{***}	.264 ^{***}	$t_{(601)}, 1.737^{\dagger}$	$t_{(445)}, 1.364^{ns}$	$t_{(464)}, .788^{ns}$	$t_{(291)}, -.356^{ns}$
	β_{μ_n}	-.075 [†]	-.061 ^{ns}	-.059 ^{ns}	.077 [†]	.099 [*]				
	β_{μ_n, ξ_2}	-.076 [†]	-.068 [†]	.023 ^{ns}	.080 [*]	-.009 ^{ns}				
γ_{13}	β_{ξ_3}	-.034 ^{ns}	-.015 ^{ns}	-.031 ^{ns}	-.028 ^{ns}	-.033 ^{ns}	$t_{(601)}, .899^{ns}$	$t_{(445)}, -2.552^*$	$t_{(464)}, .768^{ns}$	$t_{(291)}, 2.663^{***}$
	β_{μ_n}	.002 ^{ns}	-.059 ^{ns}	.101 ^{**}	.171 ^{***}	-.015 ^{ns}				
	β_{μ_n, ξ_3}	.009 ^{ns}	.096 [*]	-.045 ^{ns}	.008 ^{ns}	-.015 ^{ns}				
γ_{14}	β_{ξ_4}	-.003 ^{ns}	-.006 ^{ns}	-.006 ^{**}	.097 ^{ns}	-.005 ^{ns}	$t_{(601)}, -.332^{ns}$	$t_{(445)}, -1.543^{ns}$	$t_{(464)}, -.323^{ns}$	$t_{(291)}, .806^{ns}$
	β_{μ_n}	.005 ^{ns}	-.055 ^{ns}	.097 ^{ns}	-.006 ^{**}	-.014 ^{ns}				
	β_{μ_n, ξ_4}	.046 ^{ns}	.040 ^{ns}	-.013 ^{ns}	-.013 ^{ns}	-.029 ^{ns}				

Caption: μ , moderator; β_{ξ_m} , single effect ($\mu, 0$); standardised regression coefficient; β_{μ_n} , effect of μ ; β_{μ_n, ξ_m} , effect of interaction terms (moderating effect); $t(df)$, t -value (degrees of freedom); [†], significance level $p < .1$; *, significance level $p < .05$; **, significance level $p < .01$; ***, significance level $p < .001$; ^{ns}, significance level $p > .1$; sm, supermarket; hm, hypermarket; ds, discount store; onf, on foot; trans, means of transport used; ^I, measurement of interaction effect based on the notions of Chin et al. (2003); ^{II}, measurement of interaction effect (multi group comparison) based on the notions of Keil et al. (2000); ^{III}, based on the item scale proposed by Babin et al. (1994), 12 items operationalising hedonic shopping orientation, Cronbach α , .936;