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Patronage Behaviour of Elderly Supermarket Shoppers – Antecedents and Unobserved Heterogeneity

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Abstract

This article investigates grocery store format patronage behaviour of elderly shoppers. The aim is to identify specific antecedents of this consumer group and investigate heterogeneity between segments in terms of their patronage behaviour. Based on a literature review we set up a conceptual model that proposes effects between the perception of store attributes, satisfaction, patronage intention and the share of visits. We test the model using a survey of more than 400 supermarket patrons aged 60 and over who live in a highly concentrated urban retail environment. Variance based structural equation modelling reveals that the product range and the price-value ratio have the most considerable impact on patronage behaviour of supermarkets. Nevertheless, response based segmentation identifies unobserved heterogeneity in the overall modelling results. Unlike demographic characteristics of the respondents the variables ‘availability of a car’ and ‘problems in walking longer distances’ explain the heterogeneity of the results between segments where significantly different impacts of accessibility and price-value ratio on patronage behaviour can be identified.

Keywords: Response based segmentation, grocery, older consumers

RESEARCH PAPER

Patronage Behaviour of Elderly Supermarket Shoppers – Antecedents and Unobserved Heterogeneity

Introduction

Older shoppers have become an important and growing segment due to the ‘greying of market places’ (Zeithaml and Gilly 1987) and being a challenged and disadvantaged consumer group. For that reason Pan and Zinkhan (2006) call for a stronger research focus on the question ‘Why do older people shop where they do?’ A deeper understanding of the store format patronage behaviour of this particular consumer segment would ultimately enable retailers to take the specific needs of elderly consumers into account in their operations (Mason and Bearden 1979). This is particularly true for grocery shopping - a frequent and challenging task in older consumers’ lives (Whelan et al. 2002).

The phenomenon of store patronage behaviour in general has received extensive attention in the marketing, retailing and consumer behaviour literature for more than seventy years (see the meta-analysis of Pan and Zinkhan (2006) or Reutterer and Teller (2009)). Therefore, grocery stores - due to their number and importance for consumers’ daily life - have traditionally been of primary interest for researchers. Nevertheless, the grocery store patronage behaviour and its antecedents of older consumer cohorts have received only limited explicit attention (see Table 1). The major critique towards existing findings is that they neglect an explicit aggregated view on a store format level. This is surprising because before consumers choosing a specific store they first decide on the store format, *e.g.* supermarkets, hypermarkets, convenience stores or discounters (González-Benito, Muñoz-Gallego and Kopalle 2005). Thus store patronage is embedded in store format patronage.

Since the shopping behaviour of older consumers is found to be distinctive, further research with respect to store format patronage is seen to require stronger consideration by researchers (Yoon et al. 2005). The only study considering grocery store format patronage was conducted by Keillor, Parker and Erffmeyer (1996). They revealed that the process of choosing store formats in terms of older consumers in the United States does not vary between age cohorts only between formats. Overall the shortcomings of existing studies dealing with either grocery store patronage can be summarised as follows:

- There is no explicit view towards store format choice and patronage with respect to the specific needs and shopping behaviour of older consumers.
- The multi-dimensional character of store (format) attributes has not been taken into account to a satisfactory degree.
- The relationship between the perception of format attributes, satisfaction, patronage intention and actual store format patronage behaviour, *e.g.* share of visits or spending, has been neglected (Orth and Green 2009; Grace and O'Cass 2005).
- The segmentation of older shoppers was conducted 'a priori' by usually using either a demographic or a psychographic variable. A response based segmentation using the actual patronage behaviour and its antecedents has not been applied.

Research also fails to investigate (the determinants of) heterogeneity of older consumers based on their grocery store (format) patronage behaviour. Based on this research gap the aim of this paper is (1) to investigate the antecedents of store (format) patronage behaviour of older cohorts, (2) to identify segments of older consumers based on their store format patronage behaviour and (3) consequently to characterise these segments. Thus, the contribution of this paper is to reveal variables that directly impact and moderate patronage behaviour of older consumers.

[Table 1 near here]

The paper has the following structure: after these introductory remarks we present a conceptual model that comprises the major hypotheses derived from literature. The next section characterises the empirical research design and explains the analysis approach. Consequently, the modelling results are presented and discussed with respect to the literature. A limitation and outlook section concludes the paper.

Conceptual model and hypotheses

The phenomenon of store patronage behaviour has received extensive attention in the marketing and retailing literature for more than seventy years (see *e.g.* the seminal works from Reilly (1931) and Huff (1964)). To understand the antecedents of store patronage studies have been grounded in the stimulus-organism-response (S-O-R) framework (*e.g.* Mazursky and Jacoby 1986; Finn and Louviere 1996; Sherman, Mathur and Smith 1997). This framework is rooted in the work of Mehrabian and Russel (1974) whereby a stimulus is posited to lead to an evaluation and emotional reaction which subsequently informs consumer behaviour (Donovan and Rossiter 1982).

Within this framework and based on Sheth's (1999) integrated theory of patronage behaviour we built upon the models of patronage behaviour of elderly grocery shoppers (Sirohi, McLaughlin and Wittink 1998; Szymanski and Henard 2001). The model proposes direct effects between store attributes (stimuli or antecedents) and the satisfaction (response or shopping predisposition). Furthermore, satisfaction is proposed to result in repatronage intentions (Oliver 1980; Szymanski and Henard 2001); such repatronage intentions lead to patronage behaviour (Fornell 1992; Sirohi, McLaughlin and Wittink 1998; Sheth 1999). In terms of the selection of relevant store attributes we follow the notions of Pan and Zinkhan

(2006) and take the special needs and preferences of older consumers into account. The seven hypotheses setting up the conceptual model are as follows (see Figure 1).

For older consumers the physical access is a crucial determinant of store patronage behaviour in particularly in the case of grocery shopping (Whelan et al. 2002; Hare 2003). Since the personal mobility deteriorates with increasing age accessibility of stores becomes more important for older consumer cohorts (Moschis, Curasi and Bellenger 2004). Therefore we propose a significant impact of accessibility on satisfaction in hypothesis H₁ (Clark, Long and Schiffman 1999):

H₁: The accessibility of a store has a significant impact on satisfaction.

The manoeuvrability within the outlet is another antecedent of store patronage behaviour (Meneely, Strugnell and Burns 2009). Due to their physical, biological and cognitive abilities older consumers find it more problematic to navigate their way round a store and target the products they look for (Hare, Kirk and Lang 2001). From this we derive the second hypothesis H₂:

H₂: The manoeuvrability within a store has a significant impact on satisfaction.

The presentation and promotion of products on shelves (*i.e.* shelf management) enables consumers to find and compare products and thus facilitate the shopping process in-store. The whole picking process is more challenging for older consumers (Goodwin and Mcelwee 1999). They have difficulties reading labels and finding the products they look for due to deteriorating eye-sight (Hare 2003). Older consumers also have problems reaching products in top or bottom shelf levels. Since older consumers cope with these challenges worse than younger consumers we propose H₃:

H₃: The shelf management has a significant impact on satisfaction.

Besides accessibility the two other most frequently investigated determinants are the price-value ratio and the product range of a store (Radford-Lewis and Nimbs 2005; Pan and Zinkhan 2006). Older consumer cohorts are characterised as being price and quality sensitive or savvy and spending more time in comparing prices and quality of products in store (Keillor, Parker and Erffmeyer 1996; Goodwin and Mcelwee 1999; Moschis, Curasi and Bellenger 2004). The next two hypotheses are:

H₄: The price-value ratio of products offered in grocery store has a significant impact on satisfaction.

H₅: The product range in a grocery store has a significant impact on satisfaction.

[Figure 1 near here]

According to Sheth's (1999) theory, satisfaction results into behavioural intentions and consequently behaviour (Szymanski and Henard 2001). Although older consumers - due to their diminishing cognitive and intellectual abilities show a weaker link between these three constructs (Yoon et al. 2005) we propose:

H₆: The satisfaction with a grocery store has a significant impact on repatronage intentions of consumers.

H₇: The repatronage intentions with respect to a store have significant impact on patronage behaviour.

We now turn to the empirical investigation of our conceptual model.

Empirical study

Research design

To test the conceptual model we use the data from a survey that focused on the grocery shopping behaviour of older consumer cohorts in a typical European urban retail environment, *i.e.* high store density, high standardisation of outlets, high price and quality based competition. The sampling approach consisted of two stages. Firstly, in order to target the most appropriate informants in terms of store patronage behaviour of older shoppers within households we first drew a purposive sample and included only those consumers older than sixty who did not have any disabilities that substantially constrained them in their daily life and who were able carry out their grocery shopping themselves. Secondly, we applied quota sampling and used age, gender and district of residence as quota controls. Out of a sample of 800 senior grocery shoppers we selected those 404 who patronise supermarkets. This store format comprises stores with a floor space of 800 square metres offering around 7,000 stock keeping units. Supermarkets are the dominant store format in this urban market whereas – due to the high concentration – the outlets are much standardised in terms of the layout, the product range and retail marketing strategy in general. Our professional interviewers administered the standardised questionnaire and interviewed the senior shoppers in their homes. The questionnaire contained questions of grocery shopping habits, store patronage behaviour, store attributes, shopping orientation and demo-/ psychographics.

The sample predominantly consists of female consumers (69.7%; n, 404). About 44 per cent are married or live in a partnership; the rest are single, divorced or widowed. The respondents are highly educated, every fifth has an A-level equivalent qualification (26%) and every eighth (14.3%) has a university degree. On average they live in households together with another person (μ , (mean value), 1.66; σ (standard deviation), .88) whereas the number of

persons under 18 years is 0.11 on average per household (σ , 0.31). Three out of five respondents are retired. The average chronological age of the sample is 69.89 (σ , 8.19). Overall, the sample reflects the demographic structure of the urban population older than 60 in terms of gender, chronological age, marital status, educational level and household size (X^2 -test; $p > .05$).

Analysis

The conceptual model includes reflective constructs, thus the indicators representing manifestations of the constructs. The scales standing behind the latent construct were taken from the literature and slightly adapted based on the result from three preliminary focus group discussions (see Appendix). We applied variance-based structural equation modelling (Partial-Least-Square (PLS)) to test the proposed effects (Chin 1998; Tenenhaus et al. 2005), and used the software SmartPLS (Ringle, Wende and Will 2005). To test for unobserved heterogeneity in the PLS path modelling results and consequently identify segments within our sample we utilised the Finite Mixture Partial Least Square Approach (FIMIX-PLS) as proposed by Sarstedt and Ringle (2010). For the post hoc analysis we followed the notions of Ramaswamy et al. (1993) and Hahn et al. (2002).

The PLS and the FIMIX-PLS approach conveys a number of advantages in terms level of measurement and multinormality compared to a co-variance based SEM-approaches. Nevertheless, the primary motivation of applying PLS was to estimate structural models for identified segments (subsamples) of smaller sample sizes.

To investigate the moderating effect of those variables that are identified in the post hoc analysis we tested for invariances of the structural effects by using the formula as presented by Keil et al. (2000):

$$t = \frac{\beta_1 - \beta_2}{\sqrt{\frac{(n_1 - 1)^2}{n_1 + n_2 - 2} * se_{\beta_1}^2 + \frac{(n_2 - 1)^2}{n_1 + n_2 - 2} * se_{\beta_2}^2} * \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where β_1 (β_2) is the path coefficient of group 1 (group 2) to be compared, n_1 (n_2) is the number of observations in group 1 (group 2) and se_1 (se_2) standard error of β_1 (β_2). In the case of a significant empirical t -value invariance of path coefficients can be assumed.

Finally, we present the (global) modelling results based on the whole sample of 404 and consequently turn to the FIMIX-PLS segmentation.

Results

Structural effects – aggregate results

In a first step we applied the standard PLS path modelling algorithm to the data from the whole sample and evaluated the measurement (outer) model and consequently the coefficients from the structural (inner) model. By testing the local fit of the outer- or measurement model (*i.e.* the sets of constructs with the observable items standing behind them) we see that 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 to be satisfactory for all factors with Cronbach Alphas exceeding 0.7 (Nunnally, 1978) and the composite reliability of all factors greater than 0.7 (Fornell and Larcker 1981). The degree of convergent validity of each of the constructs 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). It can be concluded that there is a sufficient local fit of the data.

To evaluate the overall fit of the model with the empirical data we calculated the goodness of fit criterion proposed by Tenenhaus et al. (2005) in the form of the geometric mean of the average communality and average r^2 . The data from the whole sample provides a reasonable fit to the proposed model being slightly below the recommended threshold of 0.5 ($\text{GoF}_{(\text{global})}$, .444).

Next we focus on the structural effects. By following Chin (1998) we evaluated the structural models 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. The results based on the total sample of supermarket patrons show that all hypotheses can be confirmed except H_1 and H_3 . Thus both accessibility and shelf management have no impact on satisfaction. Therefore, the t -values of the path coefficients are below the threshold of 1.965 which indicated that the structural effects are not significant on a 5% level. By interpreting the f -values we see that the product range has the strongest positive effect on satisfaction followed by the price-value ratio. The orientation within the store has a comparably weak effect on the dependent construct. The effect between satisfaction and repatronage intention turns out to be both highly significant and strong. Despite this, the significant impact of the construct of behavioural intention and actual behaviour in terms of the share of visits is low.

Response based segmentation

The latent variable scores for each observation obtained from utilising the standard PLS path modelling on the aggregated data feed into the FIMIX-PLS (for more detail on the four analysis steps see Sarstedt and Ringle (2010)). Since the number of segments was not known we ran the procedure for two to six segments. Due to the fact that it is not clear whether the

FIMIX-PLS stops at a local instead of an overall optimum solution the algorithm was started the procedure 20 times for each predefined number of segments and selected those segmentation result that showed the lowest heuristic measures in terms of Akaike's information criterion (AIC), Bayesian information criteria (BIC) and Consistent AIC (CAIC) as suggested by *e.g.* Hahn et al. (2002). These criteria are derived from the goodness-of-fit of models and the number of parameters used to achieve that fit (Ringle, Sarstedt and Schlittgen 2010). A combination of all three criteria was used to examine the competing models with different numbers of segments. From that it is clear that the two segment solution shows the lowest values of each alternative number of classes (see Table 2). The normed entropy statistics are above the recommended threshold of 0.5 and thus indicate a satisfactory degree of separation between the two segments (Wedel and Kamakura 2000; Sarstedt and Ringle 2010).

[Table 2 near here]

The unambiguousness of the segmentation can also be seen from the probabilities indicating the segment membership of each observation. Table 3 shows the distribution of probabilities for each solution in terms of different numbers of predefined segments. In the case of the two segment solution almost 90% of all observations are assigned a segment with a probability higher than 0.7. This share decreases for solutions with more predefined segments ($K > 2$).

[Table 3 near here]

Thus, we can conclude that the two segment solution is to be favoured showing a split between a big segment containing 86% (K_I) and a small segment including 14% (K_{II}) of all observations.

Table 4 depicts the path coefficients of the two segments. Unsurprisingly the path coefficients of K_I are quite similar to the modelling results that are based on the aggregate data. An exception is the role of accessibility which now shows a positive impact on satisfaction. Furthermore the effect of patronage intentions on patronage behaviour is considerably smaller. By interpreting the r^2 -values it can be seen that both satisfaction and patronage intention show a higher share of explained variance whereas this share is very low for patronage behaviour, *i.e.* intention does not reflect behaviour. The structural effects in the smaller segment K_{II} vary from the overall results considerably. Therefore, satisfaction – having a remarkably high r^2 -value - is strongly affected by shelf management and the product range. Remarkably, repatronage intentions show a very high impact on patronage behaviour. The high explanatory power of behaviour intention is consequently reflected in a high r^2 -value of the behavioural constructs.

From this finding it becomes clear that an interpretation of the modelling results from the aggregate data can be misleading and unobserved heterogeneity can be observed. In order to characterise (the differences between) the two segments and to enrich the interpretation of the variances between the effects we now turn to the results of the post hoc analysis.

[Table 4 near here]

Post hoc analysis

In line with the suggested FIMIX PLS approach from Hahn et al. (2002) we analysed the (posterior) probabilities of memberships based on the model of Ramaswamy et al. (1993). The demographic and psychographic variables that we propose to explain the probabilities are based on the notions of Radford-Lewis (2003), Radford-Lewis and Nimbs (2005), Goodwin and McElwee (1999) and Sudbury and Simcock (2009b). We distinguish between

personal characteristics (sex, chronological age, cognitive age, marital status, professional status, health condition, activity level), household characteristics (household size, dependent children/teenager in the household, availability of a car) and personal shopping-related issues.

Table 5 depicts the impact coefficients and their t -values. We see that only two variables have a significant impact ($p < .05$) and are consequently interpreted as descriptors of the two segments, *i.e.* the availability of a car and issues with walking more than 500 metres. By interpreting the sign of the (beta) coefficient (β_{uk}) it can be concluded that the availability of a car for the respondent indicates that he/she is more likely to belong to the smaller segment.

[Table 5 near here]

The less a respondent indicates that he/she has problems with walking longer distances the more he/she is likely to be a member of the smaller group. Apart from these two variables no other variable shows significant impact on the probabilities.

By conducting the last step in the FIMIX PLS procedure we use the two descriptors as a priori grouping and accordingly estimate our model based on appropriate splits. The results can be retrieved from Table 6. By comparing the structural effects between the groups differentiated by the availability of a car we see significant different effects in terms of accessibility, manoeuvrability and shelf management on satisfaction and in terms of satisfaction on repatronage intention. All four differences reflect the FIMIX PLS results (see Table 4).

[Table 6 near here]

Comparing the results between the groups based on whether the respondents have problems when walking longer distances against the impacts of accessibility and shelf management turn out to be significantly different. Additionally, the price-value ratio plays a different role for the two groups which again is in line with the FIMIX PLS results.

Conclusions

This study investigates the patronage behaviour of older shoppers of supermarkets, *viz.* a store format that exclusively includes highly standardised outlets. The modelling results of the aggregate sample confirm the importance of several store format attributes for the satisfaction of our respondents in line with findings from literature. Furthermore, satisfaction impacts the repatronage intentions significantly and the repatronage intentions affect the share of visits. Therefore, we can conclude that significant attributes represent antecedents of store format patronage behaviour. More specifically, the most important determinant attributes are the product range and price-value ratio. This is consistent with the findings of most studies dealing with store patronage and choice behaviour of older shoppers (Tantiwong and Wilton 1985; Keillor, Parker and Erffmeyer 1996; Radford-Lewis 2003; Radford-Lewis and Nimbs 2005). Both antecedents have also been identified by various studies on store format patronage behaviour which do not exclusively focus on the older consumer segment (see *e.g.* Reutterer and Teller 2009). In line with Lumpkin, Greenberg and Goldstucker (1985) and Goodwin and McElwee (1999) the manoeuvrability within the supermarkets proves to be of additional importance for the shopper segment investigated here. This finding proves to be more typical for the older consumer segment since they are more challenged in finding their way around the store (Hare 2003; Meneely, Strugnell and Burns 2009).

Shelf management cannot be seen as a major antecedent of satisfaction and consequently on behavioural intentions and the patronage behaviour. This result contradicts the findings of

Johnson-Hillery and Kang (1997) and Goodwin and McElwee (1999) and indicates that our respondents do not seem that challenged in reading labels, reaching and finding products on shelves (Hare 2003).

The only unexpected result is the lack of significance and homogeneity of coefficients with respect to the effect of accessibility on satisfaction. This contradicts work dealing with older grocery shoppers – in particular that of Whelan et al. (2002), Hare (2003) and Moschis and Mathur (2006) (see Table 1). Nevertheless, the specific characteristics of the investigated retail market have to be taken into account, in particular its high store density. This finding can also be a consequence of the purposive sampling approach. We only targeted those older consumers who are still capable of carrying out the grocery shopping task for themselves and their households.

Our results confirm the strong link between satisfaction and behavioural intentions as proposed by *e.g.* Sheth (1983) and Szymanski and Henard (2001) for older consumers. Nevertheless, we must confirm the notions of Glasman and Albarracín (2006) in terms of repatronage intentions being a poor reflection of actual behaviour - a phenomenon that can be identified with various shopper segments – not exclusively old ones.

Another core finding of our study is that we found heterogeneity within the global results and thus between different segments. This contradicts the findings from *e.g.* Keillor, Parker and Erffmeyer (1996), Radford-Lewis, (2003) or Radford-Lewis and Nimbs (2005) that are based on a priori segmentation procedures. In our case we identified two sub segments whose store format patronage behaviour - as proposed in our conceptual model - is distinctive from each other. The two groups are not different based on their demographic characteristics rather than their availability of a car within their household and their ability to overcome longer spatial distances by foot. The modelling results of these segments show a distinctive impact of the

price-value ratio and the factors that can be understood as store- and product- related accessibility (accessibility, manoeuvrability, shelf management). These findings call for rethinking traditional (a priori) segmentation of older consumers based on demographic variables and a stronger awareness of latent heterogeneity behind global results of models explaining store (format) patronage behaviour (Wedel and Kamakura 2000).

Limitations and Outlook

In order to keep the model parsimonious we included only a limited number of store attributes which are proposed to be of considerable relevance for older consumers. In future research the model could be amended or extended by factors like such as atmosphere, convenience or infrastructural services.

We find that the focus on supermarket patrons is another limitation. The presented study could be replicated for consumers patronising other store formats in other retail industries (*e.g.* hypermarkets, category killers, shopping centres).

The number of tested descriptors included in the post hoc analysis was also limited to the most important ones mentioned in literature. In particular psychographic variables such as shopping orientation should be considered in future research endeavours.

Like every empirical investigation in consumer research our results are influenced by the specific retail and research environment of our study. A replication of the survey in more rural and less concentrated retail settings could have led to other results. The heterogeneity of patronage behaviour of elderly shoppers in such other contexts could be focused in future research.

Appendix

[Appendix near here]

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Figure 1: Conceptual model

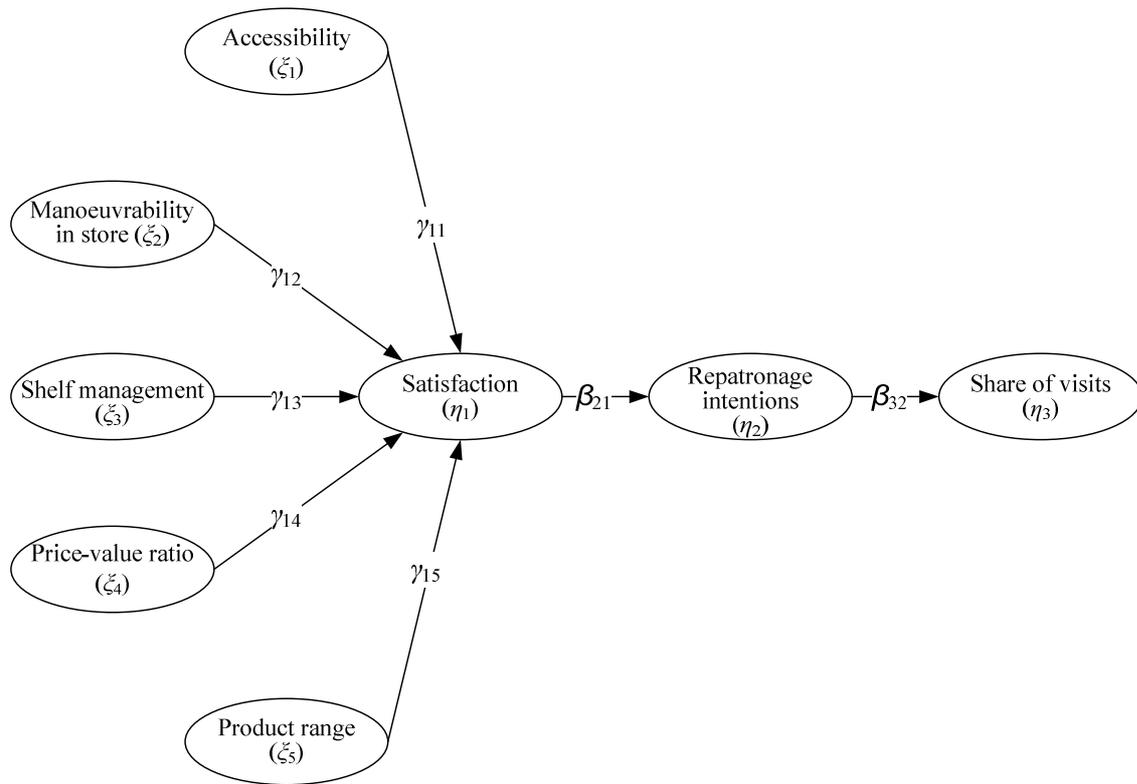


Table 1: Studies on patronage behaviour of older consumers

Author(s)	Methodology	Sample	Core findings
Tantiwong and Wilton 1985	Postal survey Conjoint analysis	100 grocery shoppers (65+) in a rural area (United States)	The authors investigate the importance of store attributes - such as store size, accessibility, service level and price - on store choice. They find price and accessibility as being most determinant for the store choice of older consumers. Additionally, benefit segments – based on the attributes’ role for store choice – are identified.
Lumpkin et al. 1985	Postal survey Self explicated weights and multi discriminant analysis (MDA)	3009 consumers (United States)	The authors had their respondents evaluated different sets of attributes with respect to stores. These sets included convenience-store location and mobility, instore convenience and physical environment, price and quality aspects, social needs of the elderly. The most determinant attributes for consumers’ patronage decision were related to the price/quality relationship and finding satisfactory products.
Keillor et al. 1996	Postal survey χ^2 -test, <i>t</i> -test;	754 consumers (55+) (United States)	Store format choice of older consumers is a very homogenous process. Differences can only be identified between different formats (exclusive, specialty, general store and non-store format). Determinant attributes are both store and product related.
Johnson-Hillery and Kang 1997	Postal survey Factor analysis	372 consumers (65+) and 167 sales personnel of a department store (United States)	This study investigated the gap between the preferences and expectations of older consumers and sales personnel’s view on what this consumer group wants. Such misbelieves of personnel include the importance of politeness, price labelling, shelf management and the perceptions of personnel who are of the same age or older than the older consumers surveyed.
Goodwin and Mcelwee 1999	Postal survey Multi discriminant analysis	393 grocery shoppers (three cohorts (55-64, 65-74, 75+) (New Zealand)	The authors reveal the shift of importance of specific store attributes for store choice along with increasing age. Differences between cohorts (55-64, 65-74 und 75+) could be identified for discounts, close by parking spaces, assistance for finding products in store, specific checkouts, well known brands, product quality and price-value ratio.
Radford-Lewis 2003; Radford-Lewis and Nimbs 2005	Postal survey Multi discriminant analysis	366 grocery shoppers (65+) (United States)	The core findings of this study are that the most important factors when shopping groceries for consumers 65+ are the price-value ration and the product range. Store layout-related attributes, e.g. wide aisles, shelf management, are of inferior importance for this cohort. These findings do not vary between older consumer cohorts having a different chronological age, self-perceived activity level, mobility or health state.
Moschis et al. 2004	Postal survey Factor analysis	1.437 heads of household (55+) (United States)	The authors identified 14 factors that are relevant for older consumers when shopping for groceries. Among others they include accessibility, proximity to their homes, availability of well-known brands, fast checkout and discounts. Four homogenous sub segments were identified based on these factors.
Berger 2007	Respondent administered survey at the Point of Sales	148 supermarket-shoppers (50+) (Austria)	This study shows that older supermarket patrons prefer competent and friendly sales personnel, good quality products and an appealing store design. The web-presence, home delivery services and extended opening hours are of minor importance. Close proximity to their homes are of more importance to older consumers compared to younger ones.
Sudbury and Simcock 2009b	Quantitative study Postal survey Cluster analysis	650 grocery shoppers (50-79 years) (United Kingdom)	The authors show that older consumers represent a fragmented market. They present homogenous sub segments based on demographic, psychographic and behavioural variables. These consumer groups are labelled as ‘solitary sceptics’, ‘bargain-hunting belongers’, ‘self-assured sociables’, ‘positive pioneers’ and ‘cautious comfortables’.

Table 2: Classification criteria

Segments (K)	lnL	Akaike's information criterion (AIC)	Bayesian information criterion (BIC)	Consistent AIC (CAIC)	Normed entropy statistics (EN)
2	-1587.366	3216.731	3300.761	3300.813	0.638
3	-1688.397	3440.795	3568.840	3568.919	0.494
4	-1581.616	3249.232	3421.293	3421.340	0.733
5	-1665.367	3438.735	3654.811	3654.945	0.612
6	-1552.798	3235.597	3495.689	3495.849	0.758

Table 3: Probability of segment memberships

P _{ik}	K=2	K=3	K=4	K=5	K=6
[.9, 1]	.413	.253	.524	.231	.34
[.8, .9]	.375	.102	.094	.129	.263
[.7, .8]	.1	.137	.094	.186	.169
[.6, .7]	.069	.189	.141	.164	.117
[.5, .6]	.044	.243	.102	.171	.086
[.4, .5]	0	.07	.035	.089	.022
[.3, .4]	0	.007	.012	.030	.005
[.2, .3]	0	0	0	.002	0
[.1, .2]	0	0	0	0	0
[0, .1]	0	0	0	0	0
Sum	1.000	1.000	1.000	1.000	1.000

Table 4: Structural effects

Structural effects	Global (n, 404)	FIMIX PLS two segment solution	
		K _I (n, 86%)	K _{II} (n, 14%)
γ_{11} : Accessibility (ζ_1) \rightarrow Satisfaction (η_1)	-.010 ^{ns(w)}	.133	-.104
γ_{12} : Manoeuvrability (ζ_2) \rightarrow Satisfaction (η_1)	.127 ^{*(w)}	.197	.034
γ_{13} : Shelf management (ζ_3) \rightarrow Satisfaction (η_1)	.132 ^{†(w)}	-.016	.974
γ_{14} : Price-value ratio (ζ_4) \rightarrow Satisfaction (η_1)	.234 ^{***(m)}	.279	-.300
γ_{15} : Product range (ζ_5) \rightarrow Satisfaction (η_1)	.354 ^{***(m)}	.270	.662
β_{12} : Satisfaction (η_1) \rightarrow Patronage intentions (η_2)	.606 ^{***(s)}	.691	.412
β_{13} : Patronage intentions (η_2) \rightarrow Share of visits (η_3)	.182 ^{***(w)}	.099	.641
$r_{\eta_1}^2$	.396	.555	.764
$r_{\eta_2}^2$	.367	.402	.269
$r_{\eta_3}^2$	.033	.111	.829

Caption: ζ_n , η_n , constructs; γ_n , β_n , proposed effects; ns, t -values are not significant ($p > .05$); †, t -values are significant ($p < .1$); *, t -values are significant ($p < .05$); **, t -values are significant ($p < .01$); ***, t -values are significant ($p < .001$); (w), weak effect (f^2 -value $\sim .02$), (m), moderate effect (f^2 -value $\sim .15$); s, strong effect (f^2 -value $\sim .35$); n, sample size;

Notions: t -values calculated by applying a bootstrapping procedure with 1,000 sub-samples (Chin 1998);

Table 5: Post hoc analysis: two segment solution

Descriptive variables (u_k)	Estimates	δ_{uk}	β_{uk}	t -value	p -value
Sex		-.289	-.086	-1.635	.103
Chronological age		-.006	-.029	-.396	.692
Cognitive age [†]		-.018	-.122	-1.676	.095
Marital status		.029	.009	.135	.893
Professional status		.135	.031	.536	.592
Household size		.038	.021	.317	.752
Availability of cars		-.625	-.189	-3.056	.002
(Self perceived) Health condition		-.153	-.074	-1.132	.258
(Self perceived) Activity level		.136	.061	.942	.347
Shopping related issues					
- Overcome distance (>500m)		.232	.192	2.281	.023
- Standing in store (>5 min)		-.110	-.091	-1.157	.248
- Lifting shopping bags (5kg)		-.083	-.067	-.891	.374
- Reading shelf labels		-.064	-.050	-.818	.414
- Lifting heavy items and place them in the trolley		.144	.113	1.542	.124
- Pick items from bottom/top shelves		-.010	-.008	-.106	.916
Intercept		3.435	-	3.534	.000

Caption: δ_{uk} , unstandardised impact coefficient for variable u and segment k ; $\beta_{\delta_{uk}}$, standardised coefficient for variable u and segment k ; \dagger , scale of self-perceived age (see e.g. Sudbury and Simcock 2009a) including items indicating age along the dimensions of feel (psychological/emotional), look (biological/physical), act (social), think (cognitive/ intellectual interests), comprised by calculating a mean value for each respondent.

Notions: Post hoc analysis based on the model of Ramaswamy et al. (1993); for the two segment solution it is only necessary to estimate the model for one segment (here the larger segment K_1);

Table 6: Structural effects based on a priori grouping

Structural effects	Car availability			Problems with walking more than 500 metres		
	No (n, 217)	Yes (n,187)	Δ	Yes (n, 285)	No (n, 119)	Δ
γ_{11} : Accessibility (ζ_1) \rightarrow Satisfaction (η_1)	.095 ^{ns}	-.148 ^{***}	*	.058	-.153 [†]	†
γ_{12} : Manoeuvrability (ζ_2) \rightarrow Satisfaction (η_1)	.215 ^{***}	.03 ^{ns}	†	.149 [*]	.112 ^{ns}	ns
γ_{13} : Shelf management (ζ_3) \rightarrow Satisfaction (η_1)	.025 ^{ns}	.322 ^{***}	*	.036	.313 [*]	*
γ_{14} : Price-value ratio (ζ_4) \rightarrow Satisfaction (η_1)	.288 ^{***}	.126 ^{ns}	ns	.299 ^{***}	.096 ^{ns}	*
γ_{15} : Product range (ζ_5) \rightarrow Satisfaction (η_1)	.332 ^{***}	.339 ^{***}	ns	.368 ^{***}	.335 ^{***}	ns
β_{12} : Satisfaction (η_1) \rightarrow Patronage intentions (η_2)	.682 ^{***}	.536 ^{***}	*	.604 ^{***}	.620 ^{***}	ns
β_{13} : Patronage intentions (η_2) \rightarrow Share of visits (η_3)	.187 ^{**}	.155 [*]	ns	.165 ^{***}	.245 [*]	ns
$R^2_{\eta_1}$	.472	.374		.442	.381	
$R^2_{\eta_2}$	.466	.287		.365	.384	
$R^2_{\eta_3}$	.035	.024		.027	.060	

Caption: ζ_n , η_n , constructs; γ_n , β_n , proposed effects; ns, t -values are not significant ($p > .05$); †, t -values are significant ($p < .1$); *, t -values are significant ($p < .05$); **, t -values are significant ($p < .01$); ***, t -values are significant ($p < .001$); n, sample size; Δ , variant structural effects based on a multi group comparison;

Notions: t -values calculated by applying a bootstrapping procedure with 1,000 sub-samples (Chin 1998)

Appendix

Factor
Indicator
ξ_1: Accessibility^{†, I}
x_{11} : You can get easily to [...].
x_{12} : You can get to [...] quickly
x_{13} : You can get to [...] without problems
x_{14} : You can get to [...] without problems
ξ_2: Manoeuvrability^{†, II}
x_{21} : You can move around without problems in [...] .
x_{22} : You can move around safely and quickly in [...] .
x_{23} : You can easily orientate yourself within [...] .
ξ_3: Shelf management^{†, III}
x_{31} : The products are clearly arranged in [...] .
x_{32} : Sought products can be found quickly in [...] .
x_{33} : Products can be reached easily in [...] .
x_{34} : Prices can be read without problems in [...] .
ξ_4: Price-value ratio^{†, IV}
x_{41} : The overall price level is low in [...] .
x_{42} : You can find a lot of special offers in [...] .
x_{43} : The price-quality ratio is good in [...] .
ξ_5: Product range^{†, V}
x_{51} : There is a wide variety of products in [...] .
x_{52} : There is a wide variety of products in each category.
x_{53} : There is a wide variety of brands in [...] .
x_{53} : There is a wide variety of high quality products in [...] .
η_1: Satisfaction^{††, VI}
y_{11} : How satisfied are you with the town centre (very dis-/satisfied)
y_{12} : How does the town centre meet your expectations (not at all/totally)
y_{13} : Think of an ideal grocery store! To what extent does [...] come close to that? (not close/very close).
η_2: Repatronage intentions^{†††, VII}
y_{21} : You are a loyal customer of [...].
y_{22} : You don't consider yourself a loyal customer of this store
y_{23} : You will probably visit [...] in the future
y_{24} : You care about the long term success of [...] .
η_3: Share of visits^{††††, VIII}
y_{31} : Think of all your grocery shopping trips to various stores! What per cent of all these visits do you do in [...] .

Caption: †, 7point rating scale (0, totally disagree ↔ 6, totally agree); ††, bipolar 7point rating scale (-3↔+3) including a neutral middle category (0); †††, 10 point rating scale (0, totally disagree ↔ 6, totally agree); ††††, metric scale; I, Tang et al. 2001; Rhee 2002; II, Reinartz and Kumar 1999; Baker et al. 2002; III, Sirohi et al. 1998; Mägi 2003, Bhatnagar and Ratchford 2004; IV, Sirohi et al. 1998, Baker et al. 2002; V, Tang et al. 2001, Baker et al. 2002; VI, Severin 2001, Mägi 2003; VII, Mittal et al. 1998, Lemon et al. 2002; VIII, Mägi 2003;