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The Role of Environmental Stimuli in Shopping Evaluation and Responses[1]

*Ferdinand DAŇO – Dagmar LESÁKOVÁ**

Abstract

The main objective of the paper is to explore the impact of store design factors on consumer behaviour and to indicate how the store design evaluations influence customers' relationship to a particular store. In our research we explore the store design factors of shelf height and shelf layout. We examine both cognitive and affective information processing in shaping store preference framework. Empirical research was conducted using laboratory experiments with photographic images of store design. Data were gathered from a total of 240 respondents. Non-probability sampling in the form of convenience sampling was employed. Analysis of variance was employed to test the hypotheses. We conclude that both design factors investigated in the study are important determinants of repeat purchase intention, however with different effect on cognitive and affective level.

Keywords: *Stimulus-Organism-Response model, environmental impact, approach behaviour, avoidance behaviour, repeat purchase*

JEL Classification: M30

Introduction

The store environment is among the most important determinants of store choice by byers. It has long been recognized that the atmosphere of the store can be more influential than the product itself in the purchase decision (Kotler, 1973). Many buying decisions are made at the point-of-sale, so that atmosphere in the store can increase sales. In a highly competitive environment, where retailers

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pursue customers' retention strategies, the store atmosphere is an important differentiator. Professionals concerned with the management side of retail stores advice how to use space, colours, lighting and interior design to create environments that attract customers.

Psychologists have studied environment-behaviour relationships, developing a distinct psychological discipline known as "environmental psychology". This discipline attempts to predict the effect of stimuli upon human's feelings and behaviour. Models used to explain the impact of environment on decision processes are based on the assumption that particular environmental stimuli provoke shoppers to evaluate the information presented through the stimuli and then, based on these evaluations, positively or negatively respond to these stimuli. In this context, the atmosphere is the stimulus (S) that causes a consumer's evaluation (O) and this evaluation causes some behavioural response (R), which could have a form of approach or avoidance.

According to stimuli-response model, the environment-person interaction consists of two phases. In the first phase, environmental stimuli generate emotions of pleasure, arousal and dominance, entitled as the "PAD". In the second phase, the emotions stimulate approach (positive) or avoidance (negative) behaviours. This model was applied in many disciplines. One of these disciplines is atmospherics. In 1982 Donovan and Rossiter (Donovan and Rossiter, 1982) applied the environment-response framework to test the store atmosphere's impact on customers' behaviours. Their findings suggest that feelings evoked by a store can increase time spent in the store and also willingness to interact with sales personnel.

1. Theoretical Framework of Human Responses to Environment

The most widely used theory explaining the impact of environment on humans' evaluation is the environmental response model proposed by Mehrabian and Russel (1977). The Mehrabian-Russel approach uses a stimulus-organism-response sequence (SOR). The first component in the SOR and in the Mehrabian--Russel sequence is the stimulus. While the variables representing the evaluation part (O) and the response part (R) of the model are clearly defined, the taxonomy of stimulus variables (S) is less unambiguous. The selection of appropriate stimulus taxonomy is extremely difficult because of the complex and changing combinations of stimuli in any environmental setting.

To investigate the stimulus side, Mehrabian and Russel (1977) use information theory. They apply an all-encompassing stimulus descriptor called "information rate", representing the amount of information contained or perceived

in the environment (Mehrabian, 1996). This rate is described as the information load of an environment. It is the quantity of elements in a particular environment and their degree of change. The more information in the form of stimuli, the higher the load of the environment.

Mehrabian and Russel (1977) define the information load of any environment as a combination of its novelty and complexity. The novelty of an environment refers to the degree of unfamiliarity and uncertainty. Complexity represents the number of elements, features or changes in an environment. Summary of the factors of novelty and complexity creates "a load" – a measure representing the environmental stimuli part.

The second component in the SOR framework is the organism, representing the stage in which the stimuli are evaluated by the individuals. Various physical or social stimuli produce evaluations that can result in one (or more) of three emotional states: pleasure, arousal, and dominance. These three emotional states can be described by how an individual feels, how much an individual is stimulated, and how much an individual has the situation under control. Pleasure refers to the humans' level of happiness, joy and satisfaction. Arousal refers to the humans' level of excitement, activity and stimulation. Dominance refers to the level, in which a person feels unrestricted and in a control of the situation. Mehrabian and Russell (1977) argue that pleasure, arousal, and dominance are the three basic emotional reactions to all environments. However, subsequent research has found that pleasantness and arousal explain most of the variance in affection and behaviour, and thus research attention has been focused on these two variables (Russell, 1978).

An important point of the evaluation stage is the information-processing level, at which the stimuli are evaluated. Stimuli can be evaluated either at an affective or cognitive level. Cognitive evaluation is the domain of thinking, using language and guiding behaviour. It refers to ways in which we process, remember and use information. This is to be differentiated from affective evaluations, which are related to feelings and emotions. The distinction between the affective and the cognitive is sometimes considered as a distinction between the heart and the mind. The model of Mehrabian and Russel considers only the affective part and emotional states of a person as a mediating variable, influencing human's behaviour. It is assumed that information load of an environment is a direct correlate of arousal. The higher the load, the higher a person's arousal level. Therefore, an environment that is unfamiliar, surprising, crowded and complex will cause that a person becomes stimulated, excited and alert. Conversely, an environment that is common, usual and expected, will cause feelings of relaxation and calmness.

The response (R) of an individual to any environment may be categorized as either approach or avoidance behaviour. Approach behaviours include physically moving toward, exploring, and performing in an environment, as well as returning to that environment. Avoidance behaviours include a desire to leave, disinvest, poor performance in an environment, as well as never returning to that environment. In the context of retailing, approach behaviour includes spending more time and money in the store, enjoying the shopping experience and more time spent browsing through the store (Donovan and Rossiter, 1982; Donovan et al., 1994). Avoidance behaviour means discomfort and displeasure or a shorter time spent in the store (Bitner, 1992). Retailers intend to encourage approach behaviour and to eliminate avoidance behaviour in customers.

The model explaining the influence of environment on customer behaviour was developed by Donovan and Rossiter (1982). They found that two main dimensions could be considered as intermediating variables in evaluating the effects of store environment: pleasure (which refers to the level of positive emotions), and arousal (which refers to the feelings of excitement and stimulation). Studies have shown that with increasing pleasure, the duration of a store visit, amount of purchasing, as well as the re-visit intentions rise. The level of arousal is determined by the information rate of the store, that is, the novelty (the unexpected, surprising, unfamiliar in an environment) and complexity (the number of elements, changes in the setting, etc.) of the total environment. Arousal theory implies that optimal information rates contain some novelty and some complexity, which activate the consumer, but also include some calming elements.

In applying the environmental response model to the retailing, it can be predicted that customers would spend more time and make more purchases in the stores which evoke pleasure and a moderate to high degree of arousal (Spies, Hesse and Loesch, 1997).

2. The Concept of Retail Store Atmosphere

The concept of retail atmosphere (referred also as atmospherics) was introduced by Kotler in 1973, in his article „Atmosphere as a Marketing Tool". Kotler (1973) introduced four dimensions of store atmosphere in terms of the humans' sensory channels as visual, aural, olfactory, and tactile. According to his definition the main visual elements of an atmosphere are: colour, brightness, size, and shapes; the aural elements are represented by volume and pitch; olfactory elements refer to scent and freshness; and finally the tactile elements include softness, smoothness and temperature. The fifth sense of taste has not been

included as a dimension into Kotler's categorization (1973) because the atmosphere of a retail store cannot be described in terms of this sense. The ultimate goal of creating positive atmosphere was to evoke certain effects in buyers. A more detailed definition of store atmosphere can be found in the work of Levy, Weitz and Grewal (2014) as "the combination of store's characteristics such as design, layout, display, signs, colours, lighting, temperature, sounds and smells, which together create an image in consumer's mind, stimulate customers' perceptual and emotional responses and affect his purchasing behaviour". Bitner (1992) adopted in his atmosphere typology broader approach and included ambient cues (those affecting the five senses); layout and functionality (store arrangement and ability to facilitate consumer goals); and signals that communicate information to the shopper (signs, symbols, and artefacts).

Berman and Evans (2010) have formulated a different categorization. They divided atmospheric stimuli into four categories: the exterior of the store, the general interior, the layout and design variables and the point-of-purchase and decoration variables. The design factors contributing most to the visual environment of the store are the exterior, interior and the layout of the store, colours and lighting. Store layout and space architecture influence customers' buying decision. Main goal of a store design for a customer is convenience, which means entering and leaving the store quickly and finding the products easily. Badly designed stores may cause emotional stress and reduce the shopping pleasure (Baker et al., 2002).

Baker, Grewal and Levy (1992) define three categories of store stimuli: ambient, social and design. Ambient stimuli include lighting, music and store climate, while social stimuli are concerned with the human element and refer to the environmental conditions created by employees, customers and their interactions. Design dimensions include the layout, architecture and other physical features of the environment. Among the ambient factors colour is considered to be a design factor, which affects mood, feelings and emotions of customers and can have positive or negative perceptions of store environment (Turley and Chebat, 2002). Lighting is an important atmospherics element used to draw attention on specific areas and products and to create the store's image (Turley and Milliman, 2000). As more retailers started to believe that the olfactory cues also influence customer's evaluation of the store, it became popular to use aromatherapy to change the store environments. It was documented that similar to scent stimuli music also influences customers in various ways such as time spent in a store, purchase intention, evaluation of services, etc. (Mattila and Wirtz, 2001).

The store layout is the key design factor with the greatest impact on customers. It has an impact on forming customers' cognitive maps, which can help in

understanding the store environment (Kaplan, 1987). Creating simple symmetric (grid floor pattern) with lower shelves is proposed to help consumers better understand the store environment. Titus and Everett (1995) found that it is easier for individuals to understand environments with visual symmetry than environments with visual asymmetry. Following this logic, a store which is more symmetric (simple shelves layout) and more visually accessible (lower shelves) is considered to be less arousing and more legible. Most retail store settings use one of two types of store layouts: simple (grid) store layout and complex (free--form or racetrack) store layout. A simple store layout is characterised by long parallel aisles, with merchandise on shelves on both sides. This layout is often not very stimulating, but it can be suited for shopping in which customers need move fast through the entire store and easily locate products without losing time. Customers perceive this shopping process as fast and efficient (Iyer, 1989). In simple layout form the space is utilised to a large extent. A complex store layout follows an irregular pattern. It is organized into individual, separate areas, each built around a particular product category/shopping theme. The complex layout leads the customer to visit as many store sections or departments as possible and to encourage impulse buying (Hansen, Raut and Swami, 2010). It stimulates more relaxed and unplanned shopping. The aim of such a layout is to stimulate and provoke the customer to explore the store. The complex layout is often used in department stores and stimulates customers to visit more departments. This layout, however, requires the availability of personnel to help the customers to find the products needed.

Store atmosphere could be interpreted as the mood exuded by the retail offer, which is then interpreted by the customer. Store atmosphere is very much in the mind of the customer; it is the individuals' perception of the cues provided by the store, primarily by its location, interior environment and personnel.

3. Goals and Methods

The principal goal of our research is to investigate the stimuli effect on store evaluation (organism stage) and repeat purchase intention (response stage). In particular, we test the impact of shelves height (visibility) and shelves layout (complexity) on cognitive and affective path of store evaluation, and based on these results we identify how these evaluations influence repeat purchase intention of customers. We suppose that both cognitive and affective evaluations of retail stores may impact consumers' response (Vrechopoulos et al., 2004; Smith and Burns, 1996; Titus and Everett, 1995; Mehrabian and Russell, 1974).

By focusing on the design factors of shelf height and shelves layout we investigate whether a store which is more symmetric (e.g. simple-grid shelves layout) and more visually accessible (e.g. low shelves), is perceived as less arousing and more legible. Therefore, following hypotheses were formulated:

H1: *A store with low shelves generates a higher level of legibility than a store with high shelves.*

H2: *A store with a simple shelves layout generates a higher level of legibility than a store with a complex shelves layout.*

H3: *A store with low shelves generates a lower level of arousal than a store with high shelves.*

H4: *A store with a simple shelves layout generates a lower level of arousal than a store with a complex shelves layout.*

The impact of legibility and arousal on repeat purchase intention is tested in the hypotheses:

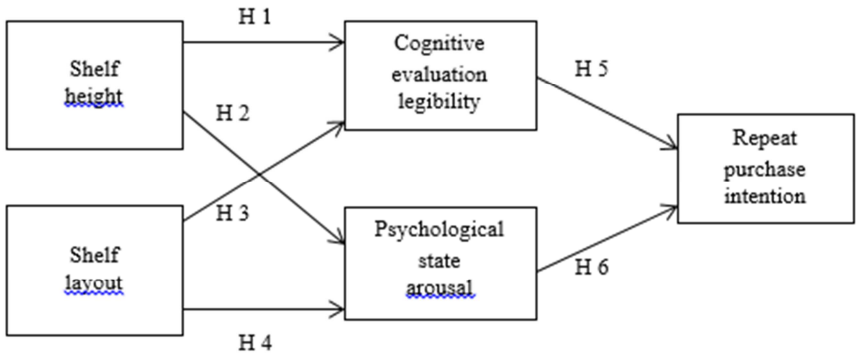
H5: *A store with higher level of legibility will result in a higher repeat purchase intention.*

H6: *A store with lower level of arousal will result in a higher repeat purchase intention.*

The path-diagram of hypotheses is presented in Figure 1.

F i g u r e 1

Diagram of Hypotheses



Source: Own development.

As mentioned earlier, legibility is related to the navigation and comprehension of the environment, and therefore more related to cognitive processing rather than emotions stimulated by the store (Zeithaml, Berry and Parasuraman, 1996). On the other hand, arousal is less related to the navigation and comprehension of a store and more to emotions. Thus, both cognitive and affective part of the information processing was explored.

One of the methodologies most widely used to investigate the impact of the environment on human decision is experimental design. In our experimental research the effect of the store environmental stimuli of shelf height and shelves layout on consumer behaviour and specifically on repeat purchase intention was studied. In the present study, a grocery store with foodstuffs assortment served as the context for the manipulation of the design store atmospherics variables. We used video pictures of store environments to test the environmental preference and perception. This technique has been the domain of researchers in various disciplines including environmental psychology. The pictures concerning the 2 design factors used the following four design alternatives: high shelf height – simple shelves layout; low shelf height – simple shelves layout; high shelf height – complex shelves layout; low shelf height – complex shelves layout. Thus, four environments were created with the selected images as a basis for questionnaire. Empirical research was conducted on a sample of 240 part-time university post-graduate students (aged 22 – 36 years), with 126 female and 114 male participants. Such respondents are appropriate subjects for this kind of experimental study, sice supermarkets as a target of our experiment, were principal part of their shopping experience. Similar sampling frame was used by Baker, Grewal and Levy (1992) in their study and in the research of Jin (2009). Non-probability sampling in the form of convenience sampling was employed. This type of sampling collects all subjects that fit a particular criterion, which is regular grocery shopping. Average frequency of grocery shopping in the sample was 3.65 times a week. Thus, the unit of analysis for our particular research was an individual shopper.

Four groups each consisting of 60 respondents were exposed to one particular image and asked to respond to the pictures of shelves layout and shelf height and to express their views to the questionnaire. In our research we investigated cognitive as well as affective store design evaluations of consumers. The cognitive part of evaluation was tested on legibility, representing how easy the store environment can be recognized, or how easy it is to find a way in a store. The level of legibility was assessed on a 7-point scale (7 – no problems in way finding, 1 – massive problems in way finding). The affective part of evaluation was tested on arousal that is a psychological construct related to emotions stimulated by the store. Very low levels of arousal result in a lack of interest, while very high levels of arousal can lead to "panic" and lead a consumer to avoid a store or to leave a store quickly. Crowded spaces may create such a level of arousal. Arousal was measured using 7-point scale, where 7 – highest excitement and 1 – lowest excitement. Repeat purchase intention is associated with preferring one store over the other, frequent purchasing from this store, and intentions

to shop in the store in the future. For the purpose of our research a 7-point scale was used with extremes 7 – very high purchase intention and 1 – very low purchase intention.

To assess the key design variables, following statements were used as measurement items: (1) Shelf height (for low shelf height 160 cm and for high shelf height 230 cm): "This shelf height is appropriate to me"; (2) Shelf layout: "Finding products in this store is easy"; (3) Legibility: "I am confident to find my way in this store"; (4) Arousal: "I feel excited in this store"; (5) Repeat purchase intention: "My shopping in this store will be in the future probable". All measurement items were assessed on a 7-point scale (1 – strongly disagree, 7 – strongly agree).

Analysis of variance was employed as a primary statistical technique in the research to test the hypotheses (Rossiter, 2002; Parasuraman, Zeithaml and Berry, 1998).

4. Results and Discussion

To analyse whether the manipulations of the two design factors reached the intended levels and could be used in the subsequent research, one-way ANOVA was used. Four conditions with appropriate store pictures were produced in a 2 (shelf height: high vs low) x 2 (shelves layout: simple vs complex) design.

The analysis of variance for both shelf height and shelf-layout was used to check the manipulations. As documented in Table 1, both manipulations were successful and indicated that the difference between high vs low shelves height and simple vs complex shelves-layout was statistically significant at $p < 0.001$. It can be concluded that the manipulations were suited to be used in the research. Table 1 presents the results of the manipulation check.

T a b l e 1

Analysis of Variance for Design Stimuli – Manipulation Check

Design stimuli	Mean value (M)	F-value	p-value
Shelf height	M high shelves = 6.05 M low shelves = 3.75	196.54	P < 0.001
Shelves layout	M simple layout = 4.92 M complex layout = 3.85	37.12	P < 0.001

Source: Own calculation.

The results for shelf height indicated that the difference between the high-shelf and low-shelf conditions was statistically significant. The p-value was beyond a level of 0.001 with an F-value 196.54. The mean (M) of high-shelves

was significantly higher than for the low-shelves (M high shelves = 6.05 vs M low shelves = 3.75). Results for shelves layout produced F-value of 37.12 and a p-value below 0.001 and document that this particular manipulation was successful as well. The difference between the group means for simple layout and complex layout was statistically significant (M simple layout = 4.92 versus M complex layout = 3.85).

Hypotheses 1 and 2 relate to the cognitive path of the model. Hypothesis 1 proposes that stores with low shelves are more legible than stores with high shelves. Analysis of variance was used to test the difference. The one-way ANOVA test indicates (Table 2) that the mean legibility (L) for high-shelf stores is significantly lower than the mean legibility for low-shelf stores (ML high shelves = 3.64 < ML low shelves = 4.88; F = 19.472; $p < 0.001$). Hypothesis 1 is supported, because a store with low shelves will produce a higher level of legibility than a store with high shelves. In general, shelf height has a significant impact on legibility.

T a b l e 2

ANOVA Results for H1 (Dependent variable: Legibility)

	Sum of squares	**Degrees of freedom**	**Mean square**	**F-value**	**p-value**
Between groups	29.388	1	29.388	19.472	0.000
Within groups	692.413	238	2.046		
Total	721.801	239			

Source: Own calculation.

Hypothesis H2 investigated the impact of floor pattern on legibility and proposed that a simple shelves layout is associated with a higher level of legibility. For retail stores with simple shelves layout as compared to complex shelves layout the difference in means for legibility was statistically significant. The results of ANOVA for H2 (Table 3) reveal a higher level of the mean legibility in simple shelves layout than the mean legibility of complex shelves layout (ML simple layout = 4.97 > ML complex layout = 3.56; F = 84.203; $p < 0.001$). Thus, the hypothesis H2 was supported.

T a b l e 3

ANOVA Results for H2 (Dependent variable: Legibility)

	Sum of squares	**Degrees of freedom**	**Mean square**	**F-value**	**p-value**
Between groups	98.012	1	98.012	54.203	0.000
Within groups	700.402	238	1.912		
Total	798.414	239			

Source: Own calculation.

Hypotheses H3 and H4 relate to the affective path of the stimuli evaluation and test whether the effects of shelf height and shelves layout are statistically significant. Hypothesis H3 testing differences in arousal (A) caused by shelf height (Table 4) was not supported (MA high shelves = 4.13 > MA low shelves = 3.66; F = 2.498; p = 0.049).

The same was found in examining the design factor shelves layout in hypothesis H4 (Table 5), which proved also not statistically significant (MA simple layout = 3.79 < MA complex layout = 3.89; F = 2.042; p = 0.299). It is an important result indicating that also subsequent hypothesis (H6) working with arousal cannot be supported, because a precondition of any hypothesis to be tested is that the prime variables are effective. Since both factors utilized in the research (shelf height and shelves layout) did not produce significant differences between levels of arousal, an exploration of the dependence proposed in H6 will be unwarranted.

A possible explanation for the results of H3 and H4 is that store design factors examined in the research do not evoke enough affective responses in consumers.

T a b l e 4

ANOVA Results for H3 (Dependent variable: Arousal)

	Sum of squares	**Degrees of freedom**	**Mean square**	**F-value**	**p-value**
Between groups	4.412	1	4.412	2.498	0.049
Within groups	389.038	238	1.316		
Total	393.450	239			

Source: Own calculation.

T a b l e 5

ANOVA Results for H4 (Dependent variable: Arousal)

	Sum of squares	**Degrees of freedom**	**Mean square**	**F-value**	**p-value**
Between groups	1.263	1	0.744	2.042	0.299
Within groups	295.44	238	0.930		
Total	296.677	239			

Source: Own calculation.

Hypothesis H5 proved to be supported. The ANOVA findings suggest that the repeat purchase intention (RPI) for higher level of legibility was significantly higher than for the lower levels of legibility (MRPI higher legibility = 5.89 > MRPI lower legibility = 3.04; F = 79.793; p <0.001). In summary, a store design that evokes a higher level of legibility stimulates more intention to return to the store.

Conclusion

The aim of the paper was to identify the effect of store layout in retail design on shopping behaviour using a cognitive and affective information processing. We explained how the environmental stimuli (store design elements) influence legibility and arousal (evaluation states) and how these evaluation states mediate the effects of stimuli on responses and thus affect the behavioural outcomes (repeat purchase intention).

The design factors of shelf height and shelves layout were investigated and found to influence the store evaluations. Legibility was tested for the cognitive part and arousal for the affective part of the evaluation. Experimental research was employed to assess the design changes and test the hypotheses.

Results indicate that the design factors of shelf height and shelves layout have an impact on shopping behaviour. Stores with low shelves and simple shelves layout result in a higher level of legibility than it is in stores with high shelves and complex shelves layout. However, the shelf height and shelves layout do not result in significantly different levels of arousal. These findings support the conclusion that both the design factors have a significant effect on the cognitive, but not on the affective part of the information processing and confirm the conclusions of Donovan et al. (1994). The study illustrates the importance of shelf height and shelves layout in designing the stores and its outcomes are in line with the findings of Nierop, Fok and Frances (2008) investigating the impact of shelf layout. It might help managers in better understanding the customer's shopping decisions.

Several studies (Dawson, Bloch and Ridgeway, 1990; Vazquez and Bruce, 2002; Kent, 2007) confirm that attitudes toward the retail store environment can sometimes be more influential in determining the store choice than attitudes toward the product. Hence, decisions regarding atmosphere attributes should not be done in an intuitive way, but based on deep exploring customer experience. The amount of time, which a customer spends in a store, is very important, therefore retailers design their stores to increase this time by enhancing the shopping experience. The higher the set of design factors, the longer the visit in the store and the higher the probability of the purchase. Findings of our research enable the recommendations to retail management in the area of adopting direction labels helping orientation in the store, improvement of shelf labelling and ensuring visual accessibility of the store (avoiding high shelves). Changes to layouts can reduce shopping stress and enhance the shopping experience. Clear and legible store design reduces uncertainty often associated with large floor spaces.

Store atmosphere is critical in stimulating customers to visit a store and to increase the shopping frequency. Positive shopping experience and store evaluation

can influence future shopping preferences and help in developing store loyalty. Our findings support the notion that there should be higher attention devoted to the effects of architecture and interior design on individual and social behaviour. This research helps to introduce more complex exploration in atmospherics, by combining affective and cognitive path of information processing. By adopting environmental psychology findings into the atmospheric context, new areas for future research could arise for traditional theory to be tested. Further, the information provided might help reduce costs depending on store design and increase financial opportunities for retailers. Finally, the theoretical structure of this research could be extended beyond the design elements to include also social and ambient factors to create more comprehensive understanding of "why" and "how" atmospherics influences shopping behaviour.

However, it is important to realize that even if the atmosphere is considered successful, it must undergo a periodic review, as its impact on customers declines over time and competitors may come with more efficient and new atmosphere ideas (Turley and Chebat, 2002; Turley and Milliman, 2000). Complete reformulation of atmosphere is not a simple challenge, but it has the ability to significantly modify customers' perceptions of the store.

We are aware of some procedure-related limitations of our research. The sampling procedure might seem to be rather simple and convenience (purposive) sampling might not be the most refined and precise approach. However, the experience of existing expert studies based on similar sampling (Levy, Weitz and Grewal, 2014; Jin, 2009) and our respondents selection with a clear purpose in mind, entitle the choosen method. Future research could also consider factors such as age, gender and impact of geographic consumer characteristics on the atmospherics perception. Next to design factors the investigation of ambient and social factors in store atmosphere opens an interesting research route. Among all these future research perspectives it has to be considered that store design should be a determinant of joyful and positive feelings in shopping process.

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