



Consumer preferences in the design of airport passenger areas



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ABSTRACT

In recent decades, commercial developments have become increasingly important for the overall profit of airports. However, little is known about consumer preferences regarding the design of passenger areas, which is striking as the design of terminal buildings affects consumers' emotional state and shopping behaviour. The aim of this study was therefore to investigate how architectural design characteristics are valued by airport passengers, using visualizations of hypothetical passenger areas.

Discrete choice experiments were used to investigate passenger preferences for eight design characteristics. Data on 346 passengers were collected in June 2008 in departure and transfer areas at Amsterdam Airport Schiphol.

Analyses showed that passengers preferred a passenger area with a curvilinear roof, a curved layout, the presence of greenery, no decoration reflecting the distinctiveness of Holland, warm lighting, wide dimensions and white materials. Signage had no influence.

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1. Introduction

Airports historically aim to process passengers and their luggage in the most efficient and rapid way possible. Initial design guidelines emphasized the way architecture could be used to facilitate passenger flows (Odoni & de Neufville, 1992). Most terminal buildings were designed to facilitate passenger flow in a constrained way from check-in, through security into the departure area, and from there to the boarding gates. Between the subsequent processing sites, passenger mobility is constrained by corridors and walls (Adey, 2008). From the perspective of passenger logistics, the commercial developments at the airport seem to be at odds with the operational management processes. Shopping passengers may not only forget the time and consequently delay their flights, but commercial developments might also block off visual lines that facilitate passengers' wayfinding and reduce their orientation. However, in recent decades commercial developments have become increasingly important for the overall profit of airports. Commercial revenues now account for around half of total revenues (Graham, 2009). To enhance revenues from retail, passenger areas are being designed or redesigned to limit and quite rigidly enforce

the movement of passengers in such a way that they might be seduced by the many shops to which they are exposed (Adey, 2008).

Airports intensively monitor consumer preferences, and several literature studies have investigated consumer behaviour to improve wayfinding (Adey, 2008; Churchill, Dada, de Barros, & Wirasinghe, 2008; Correia, Wirasinghe, & de Barros, 2008a), or to improve access travel times and modes of transport (Tsamboulas & Nikoleris, 2008) to support their operations processes and to increase retail revenues. However, very little is known about how consumers value the design of airport passenger and retail areas. This lack of knowledge is striking, since the atmospherics of terminal buildings affect the emotional state of consumers, either encouraging them to remain in the retail areas and to evaluate the setting and purchases in the shops, or discouraging them from doing so (Adey, 2008; Omar, 2002).

To enhance revenues from commercial activities, one needs to increase the amount of pleasure generated by sales and consumption settings and to prevent extreme levels of arousal (Russell & Mehrabian, 1977). For the airport, it is therefore highly important that airport design reduces stress in passengers, as this will increase their revenues from retail (Adey, 2008). To address passenger satisfaction with the design of passenger areas and to investigate whether pleasure and arousal levels were affecting their satisfaction with the design of passenger areas, an alternative research method was applied in this study. The general method of monitoring passenger satisfaction with the passenger areas and services

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was thought to yield too generic responses. Like other airports, Amsterdam Airport Schiphol ('Schiphol airport') extensively monitors passenger satisfaction using questionnaires, but the use of semantic questions seemed insufficiently sensitive for the purposes of the study. We therefore investigated how design characteristics were valued by passengers using a questionnaire with visualizations of hypothetical passenger areas, and evaluated the influences of emotional states on the appreciation of these design characteristics.

In the sections that follow, we first discuss the literature on architectural design characteristics that we included in the study. We then discuss the measurement of preferences and the pilot study we conducted. Thereafter, we report and discuss the design and results of the choice experiments with visualizations and their relationship with general indices and indices measuring pleasure and arousal.

2. Architectural design characteristics

In view of the increasing importance of commercial revenues to the total revenues of airports (Graham, 2009), the design of passenger areas might benefit from research insights into consumer preferences in retail design. Bell (1999) found that consumer shopping behaviour was dependent on whether the consumer liked the shopping area (affect), the physical attractiveness (visual amenity), the quality and range of products and shops, price fairness, the convenience of location and customer service. Turley and Milliman (2000) referred to customer services as human factors and also included in this category such factors as crowding. They evaluated the influences of atmospherics on three types of outcomes: purchase behaviour, time spent in a shopping mall, and whether consumers felt attracted to the shopping environment (approach behaviour) or not attracted to it (avoidance behaviour). Mehrabian and Russell (1974) posited that consumers' approach and avoidance behaviour is mediated by their emotional state. It might be concluded from the review by Turley and Milliman (2000) that purchase behaviour and the valuation of the shopping mall could be considered valid measures of consumer satisfaction. Following the classification of Turley and Milliman (2000), we now provide an overview of evidence regarding the atmospheric variables that are of interest to the present study.

2.1. Exterior factors

2.1.1. Design/architecture

The preference for exterior architectural design factors has mostly been investigated in residential settings and focused on three characteristics of façades, namely silhouette or shape complexity, massing or façade articulation, and surface complexity. The highest user preferences were found for surface complexity; shape complexity was found to be least preferred (Stamps III, 1999). Whereas Stamps III (1999) emphasized a more geometrically based approach in his review, Herzog and Shier (2000) used a sample of students to assess a variety of buildings. The students were also asked for their building preferences. Using a composite measure of complexity (including visual richness, ornaments, curves, contoured walls, texture variation and fancy windows), they found that after adjustment for differences in maintenance, higher complexity is preferred over lower complexity. In their review, Turley and Milliman (2000) found that only a few studies had examined the influence of exterior architectural design factors on customer behaviour; however, all these studies suggested that exterior architectural design factors are of importance. In contrast, Kent and Kirby (2009) suggest that exterior architectural design factors are not very important in the formation of a retail image by consumers.

In this study, the design of the building created a space that was valued, but the exterior design was not significant in the construction of a retail image in such a way that respondents identified a particular style. Zielke and Toporowski (2009, 2012) investigated the negative effects on price perception of shop atmospherics by comparing a shop with conventional exterior design architecture with a shop with an 'appealing' exterior design architecture. They found that in the absence of price and brand information, the students interpreted appealing exterior architecture as a cue for higher prices. However, if brand or particularly price information was available, then there was no longer a difference in price perception between conventional and appealing architecture.

2.1.2. Accessibility

Turley and Milliman (2000) reported that accessibility was not included in many studies, but the few researchers who did, found that this is important to consumers. Thang and Tan (2003) included accessibility with other exterior variables like merchandising, promotion, facilities and services, and found that accessibility ranked high. Pan and Zinkhan (2006) conducted an extensive literature search and were able to include in a meta-analysis 45 studies that involved determinants of repatronage behaviour. They found that levels of services and accessibility were all significantly related to the repatronage behaviour of customers. Repatronage behaviour is to be considered a kind of approach behaviour (Mehrabian & Russell, 1974).

2.2. General interior factors

The general interior factors summarized by Turley and Milliman (2000) are music, olfactory stimuli (including tobacco smoke), colour and floor coverings. The colour and materialization of a shopping mall are interrelated, as for instance brickwork introduces a certain colour. Another important general interior factor is daylight ingress, or more generally lighting, including both daylight and the shopping mall's artificial lighting.

A colour's hue or gradation is determined by its wavelength. Short wavelengths are associated with 'cool' colours, and long wavelengths with 'warm' colours. Cool colours (purple, blue, green) were found to be preferred over warm colours like yellow or red (Mehrabian & Russell, 1974; Yildirim, Akalin-Baskaya, & Hidayetoglu, 2007). However, Mehrabian and Russell (1974) found that people's muscle activity responded more quickly to red than to green. Brengman and Geuens (2004) showed that light colours stimulate consumers to explore the environment, and that these colours were preferred over dark colours. In a passenger area, cool colours might be preferred to warm colours, as these colours will calm people who may have higher stress levels than usual (Mehrabian & Russell, 1974; Stone, 2003). In contrast, recreational shoppers found a red environment more pleasurable; this resulted in more approach behaviour in recreational shoppers compared to a blue environment, whereas no such effect was observed in task-oriented shoppers (Van Rompay, Tanja-Dijkstra, Verhoeven, & van Es, 2012). Much of the colour research in retail concentrates on the effects of a colour's hue, and neglects the other two dimensions of colour, namely saturation and value. Saturation refers to the intensity or amount of pigment in a colour; value refers to its darkness or lightness (Labrecque, Patrick, & Milne, 2013). Saturation, but not value was found to have an effect on excitement: the more saturation, the higher the excitement (Labrecque & Milne, 2012). However, it has long been recognized that the perceived height of a room increases with increasing ceiling value or lightness. Rooms also appeared higher when the lightness of the walls was increased, and the effects of ceiling lightness and wall lightness were generally found to be additive (Oberfeld, Hecht, & Gamer, 2010). It had

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