A comparison between Structural Equation Modelling (SEM) and Bayesian SEM approaches on in-store behaviour

1 Introduction

Kotler (1974, p. 50) first defined atmospherics as "the conscious designing of space to create certain effects in buyers". Since the 1970s, both retailers and marketers across the globe have attempted to manipulate various aspects of store atmospherics that appeal to the human senses (e.g. climate, music, scent, in-store display, etc.) to stimulate positive consumer reactions. In fact, this long-standing preoccupation with atmospherics is intensifying especially in the highly competitive retail sector worldwide (Kumar and Kim, 2014). This is because both retailers and marketers regard store atmospherics as a highly effective aspect of marketing that they could fully manipulate (Heung and Gu, 2012; Turley and Chebat, 2002). Most importantly, there is a wealth of evidence that most consumers consider store atmospherics as an important criterion when deciding where to shop (see, for instance, Nicholls, Li, Mandokovic, Roslow and Kranendonk, 2000; Kusumowidagdo, Sachari and Widodo, 2012). This justifies retailers' emphasis on creating an appealing environment to evoke shoppers' emotions that, in turn, trigger 'desirable' behaviours such as increasing time and money spent, positive word-of-mouth communication, and higher re-purchase intentions.

The widespread interest in atmospherics has also triggered a wealth of related academic research (e.g. Mohan, Sivakumaran and Sharma, 2012; Turley and Milliman, 2000; Heung and Gu, 2012; Ballantine, Jack, and Parsons, 2010; Cai and Shannon, 2012, Haque and Rahman, 2009, Kumar, Garg, and Rahman 2010; Ong, Khong, Faziharudean and Xin, 2012). Despite the significant amount of empirical work on atmospherics, existing evidence is largely mixed and inconclusive. For instance, Hussain and Ali (2015) found that the use of music and colour by retailers have insignificant impact on consumers' purchase intention. Therefore, even though it may be intuitively appealing to presume that many 'typically researched' aspects of atmospherics do significantly influence consumer behaviour, this may not necessarily be the case. In addition, there is increasing recognition that:

i. wider contextual aspects matter when considering store atmospherics as, owing to cultural differences, consumers do not behave in a generic manner across different countries and regions worldwide. Here, we observe that some of the recent empirical studies have explicitly taken these differences into account. For instance, Hussain and Ali (2015) emphasized on the usefulness of studying store atmospherics within the context of a developing country like Pakistan while Dabija and Babut (2014) suggested a similar reason for studying consumers in Romania. Similarly, Jones, Vilches-Montero, Spence, Eroglu and Machleit (2010) conducted a bi-cultural analysis to uncover differences between Australian and American consumers while Mohan et al. (2012) conducted their research on the distinctive behaviour of consumers in United Arab Emirates. Here, the contention is more studies in non-Western developed economy settings are required.
ii. there are important distinctions in terms of which elements (and, mix of such elements) of atmospherics are more relevant and/or matter more across different industries, sectors and even between differing retail store formats. For example, Dabija and Babut (2014) highlighted the need to investigate consumer behaviour within the context of non-food retail formats; Heung and Gu (2012) suggested the need to look specifically at subsectors within the hospitality industry; Davis and Hodges (2012) scrutinized department stores and mass merchandisers; Kumar and Kim (2014) focused specifically on single-brand apparel retailers; Mohan, Sivakumaran and Sharma (2013) discussed domains straddling retail store environment; Ha and Jang (2012) scrutinized service environments such as amusement parks & upscale restaurants where facilities/environmental elements might have more important impact on satisfaction and also repurchase intention. Similarly, Kaltcheva and Weitz (2006) speculated that grocery store customers experience a strong task orientation while those who shop in fashion boutiques would display a different set of orientations that is largely hedonic.

iii. even though the need for more holistic considerations of atmospherics (i.e. considering a range of atmospherics-related variables concurrently) is more well-established in the extant literature (Heung and Gu, 2012), the exploration of more complex relationships such as those involving moderating and/or mediating variables is still relatively uncommon. A few recent studies who have adopted such designs include Loureiro and Roschk (2014) and Ha and Jang (2012).

iv. More importantly, in terms of data analysis technique, frequentist statistical inference is commonly used when measuring the impacts of a range of atmospherics effects within a retail environment. Notwithstanding the general acceptability of the frequentist approach, of late, Bayesian statistical inference is gaining popularity in social science research as it arguably produces a better analysis that more aptly reflect substantive theories as compared to frequentist inference (Muthén and Asparouhov, 2012). A key argument is that the Bayesian method offers a much more flexible approach to stochastic modelling (Casella, Fienberg and Olkin, 2009; Muthén and Asparouhov, 2012; Kanapathy, Khong and Dekkers, 2014).

Considering the various gaps in the extant literature (as detailed above), our study examines the effects of a range of store atmospherics-related elements (i.e. the influence of music, colour, and store layout) present on shoppers' affective state as well as in-store behaviour. This is because there is some empirical evidence suggesting that the use of atmospheric cues will result in positive affective state that could influence in-store behaviour (Khong and Ong, 2014). This suggests that the influence of atmospherics on in-store behaviour is indirect, via affective state (Kumar and Kim, 2014). As such, we scrutinize the mediating influence of affective state since it is important for both researchers and marketers to gain a better understanding of the specific channels/mechanisms by which atmospherics influence behaviour within a retail environment. Our study focuses on customers of clothing retail outlets located within Malaysian shopping malls (a developing economy setting). Specifically, we will investigate the mediating role of affective state of consumers on in-store behaviour using both frequentist and Bayesian statistical approaches. The comparison between these two approaches may reveal new insights into the predicted relationships. With such a focus as well as study design, our study contributes to the extant literature in line with the highlighted gaps above.

2 Literature Review

2.1 Theoretical Underpinnings

In terms of theoretical underpinnings, most past empirical studies have adopted Mehrabian and Russell's (1974) stimulus-organism-response (i.e. S-O-R) model (see, for instance, Rayburn and Voss, 2013; Oh, Fiorito, Cho and Hofacker, 2008). According to Loureiro and Roschk (2014) and Donovan and Rossiter (1982), the term 'stimulus' refers to the set of characteristics inside the environment (e.g. store atmospherics in retail settings) that affect the internal states of consumers. Organism, on the other hand, refers to the intervening internal processes that take place post-stimulus but before undertaking final actions where changes in the emotional states of consumers are effected (Kumar and Kim, 2014). Here, consumers 'convert' stimulus into meaningful information that facilitates understanding of the environment before making decisions. Finally, response is the expression of satisfaction or dissatisfaction with the consumer experience (Loureiro and Roschk, 2014; McKinney, 2004) manifested as attitudes and behavioural intentions e.g. approach and avoidance behaviours (Heung and Gu, 2012). Approach is the desire to remain and continue to shop for relatively long periods while avoidance is associated with negative reactions including a desire to leave (Kumar and Kim, 2014; Mehrabian and Russell, 1974). In simpler terms, Kusumowidagdo et al. (2012) summed up the assumptions of the S-O-R model where the environment is filled with Stimuli (Stimulus) that cause changes to consumers' organismic state (Organism) that, in turn, affect their behaviour (Response). Within the retail context, stimuli can be in the form of store atmospheric cues (i.e. all the physical and nonphysical elements of a store) that affect the internal states of the consumer (Schellinck, 1980; Kumar and Kim, 2014).

Partly due to the extensive range of studies conducted from the S-O-R tradition (see, for instance, Kaltcheva and Weitz, 2006; Oh et al., 2008; Loureiro and Roschk, 2014; Sherman, Mathur and Smith,

1997; Turley and Milliman, 2000), some researchers have attempted to contribute to the extant literature by adopting other complementary frameworks that extend and enhance the sophistication of the said model. One notable example of this is Rayburn and Voss (2013) who opted to focus specifically on developing the 'Organism' level of the S-O-R model using perceived value theory (see Hirschman and Holbrook, 1982; Sanchez-Fernandez and Iniesta-Bonillo, 2007). More specifically, they utilized the utilitarian and hedonic value dimensions to better understand consumer attitudes (Ashley, Ligas and Chaudhuri, 2010; Voss, Spangenberg and Grohmann, 2003).

In line with the approach taken by the researchers above, we aim to extend the S-O-R model by complementing it with the cognition, affect and behaviour (CAB) model (Davis and Hodges, 2012). In the CAB model, cognition variables determine affective responses (i.e. state of predisposition) that, in turn, guides subsequent behavioural effects (i.e. in-store behaviours) (Davis and Hodges, 2012). Such a sequence is important as there is a long-standing debate on whether consumers first experience cognition or affect when they encounter an environment (Kumar and Kim, 2014). In this regard, some researchers argue that the emotional states precede cognitive states while others advocated the opposite during the process of evaluation (Pham, Cohen, Pracejus and Hughes, 2001). Available empirical evidence seems to be more supportive of the cognition-emotion sequence where individuals cannot have an emotional reaction to a stimulus in the absence of at least some cognitive appraisal of the said stimulus. Our study subscribes to this sequence especially since Chebat and Michon (2003) found that their cognition-emotion sequenced model better explained the effect of atmospherics on behavior as well as displayed a better model fit than its counterpart in a mall environment. This is because our chosen retail outlets are also based in a mall environment albeit in a developing economy setting. Similar to Kumar and Kim (2014), we take into account the cognition-emotion sequence to elaborate the internal evaluations.

As mentioned earlier, even though a wealth of empirical evidence has been amassed on the effects of store atmospherics on the behaviour of consumers in certain settings (e.g. in various service-related industries across developed Western economies), our understanding of such influences on corresponding subsectors in developing economies is rather limited. The contention here is that cultural differences matter and therefore, the often-made presumption that consumers worldwide would behave in a generic manner must be challenged. In fact, recent studies such as Hussain and Ali (2015), Dabija and Babut (2014) and Mohan et al. (2012) have focused their empirical investigations on store atmospherics specifically in developing economy settings. More specifically, Hussain and Ali (2015) claimed that their study "becomes even more useful in the context of a developing country like Pakistan". Furthermore, Zeynep and Nilgun (2011) argued that such studies should involve multiple atmospheric cues as well as establishing more complex relationships (i.e. moderated and/or mediated relationships) between these elements and related phenomenon such as repurchase intention, repeat purchase, etc. (see, for instance, Borges, Babin and Spielmann, 2013; Loureiro and Roschk, 2014; Ha and Jang, 2012).

Within the context of our study, there is some empirical evidence suggesting that the use of atmospheric cues will result in positive affective state that could influence in-store behaviour (Khong and Ong, 2014). This suggests that the influence of atmospherics on in-store behaviour is indirect, via affective state. Hence, in the following section, we elaborate on (i) the extant literature on affective state, (ii) affective state's likely relationships with other key atmospherics variables considered and (iii) the mediating role of affective state between atmospherics and in-store behaviour. This approach is consistent with that taken by Rayburn and Voss (2013) and Michon, Chebat and Turley (2005) who developed models of atmospheric perceptions based on the understanding that customers utilize multifaceted processing to form such perceptions. This is then followed by the establishment of corresponding hypothesis that is then subjected to empirical testing.

2.2 Affective state

Affective state has been described as a phenomenological property of a person's subjectively perceived affective state (Davis and Hodges, 2012; Gardner, 1985) and is often used to interpret the behaviour of consumers in service encounters or when exposed to point-of-purchase stimuli. Affective

evaluation is associated with emotions and feelings toward an object in terms of judging whether it is pleasant, attractive, valuable, likable, or preferable (Kumar and Kim, 2014). Physical settings in retail environments are actually designed with the intention of triggering certain affective states in customers (Chebat and Michon, 2003; Gardner, 1985).

Past studies do show that consumers' affective state can indeed be influenced by the clever manipulation of store atmospherics. Furthermore, Gardner (1985) observes that the effects of affective state may have special impact in retail or service encounters because of its interpersonal or dyadic nature. A positive affective state is said to increase the likelihood of approach behaviour within the retail environment. On the other hand, a negative affective state may reduce shoppers' desire to search or buy which is often referred to as the avoidance response (Heung and Gu, 2012; Eroglu and Machleit, 1990).

2.3 Music and Affective state

Music has been widely acknowledged to have a powerful effect on human responses (Morrison, Gan, Dubelaar and Oppewal, 2011; Sweeney and Wyber, 2002). Within the narrower retail context of our study, the effect of background music on shoppers' behaviour is relatively well-researched. See, for instance, Borges et al. (2013), Spangenberg, Grohmann and Sprott (2005) and Jones et al. (2010) on consumer store evaluations; Broekemier, Marquardt and Gentry (2008) on shopping intentions; Garlin and Owen (2006) on shoppers' levels of stimulation; Areni and Kim (1993) on consumption behaviour; Baker, Levy and Grewal (1992), Hui, Dube and Chebat (1997), and Kellaris and Kent (1992) on emotional responses; Gulas and Schewe (1994), Herrington (1996), and Yalch and Spangenberg (2000) on shoppers' behaviour.

Garlin and Owen's (2006) review of 157 papers on music revealed that (i) background music has a positive effect on patronage as well as pleasure 'felt', (ii) familiarity or liking for the background music has a positive effect on patronage, (iii) slower tempo, lower volume and familiar music resulted in shoppers staying marginally longer in contrast to faster tempo or higher volume, or unfamiliar music.

Overall, available evidence is supportive of the contention that music significantly influences the affective state of consumers (Pilgrim, Norris and Hackathorn 2017; Bruner, 1990; Yalch and Spangenberg, 1990) especially when they are evaluating store/service environments (Hui et al., 1997). The findings of Cameron, Baker, Peterson and Braunsberger (2003) further supports this view by showing that music, through affective state, affects the evaluation of customers' overall experience.

2.4 Colour and Affective state

Past empirical studies on the use of colour for marketing communication purposes have been carried out since Bellizzi, Crowley and Hasty's (1983) pioneering work that examined its role as symbols of communication in retail store designs. It influences both consumers' evaluation-related affect (affective tone) and activation-related affect (arousal) (Aslam, 2006; Kumar and Kim, 2014; Crowley, 1993). Put simply, colours possess customer 'drawing power' as it creates emotional responses and captures attention (Bellizzi et al., 1983). Similarly, Aslam (2006) suggested that colour induces affective states and emotions affecting consumers' perceptions and behaviour.

More recently, Yildirim, Akalin-Baskaya, and Hidayetoglu (2007) found that colour influences consumers' affective state and shopping decisions. More closely related to the chosen context of our study, Babin, Hardesty and Suter (2003) investigated colour and shopping intentions and found that for fashion-oriented stores, blue interiors are associated with more favourable evaluations, marginally greater excitement and, in turn, produced higher store patronage intentions as well as higher purchase intentions compared to orange interiors. Our study, in turn, adopts a similar conception but on actual in-store behaviour rather than intentions and also within a developing economy setting.

2.5 Store Layout and Affective state

Store layout is a design cue that may influence customers' expectations as a careful layout helps people to orientate besides promoting the feeling of personal control (Backstrom and Johansson, 2006; Turley and Milliman, 2000; Titus and Everett, 1995; Bitner, 1992). Therefore, store layout can be an effective way to manage perceptions, which in turn can influence customers' affective state (Baker and Cameron, 1996). Consistent with such claims, Backstrom and Johansson (2006) and Jones (1999) found that store layout contributes to positive affective state when the store provides an environment where consumers could easily locate products, when the planning of the store seems logical, and when there is sufficient signage. Conversely, customers will develop negative affective state if the store layout is perceived as cluttered or does not follow a 'logical' flow, or overly-crowded (Backstrom and Johansson, 2006).

The direct effects of store layouts can be observed in terms of its influence on in-store traffic patterns, shopping atmosphere, shopping behaviour, and operational efficiency (Lewinson, 1994). More specifically, store layout is positively related to purchase intentions (Grewal and Baker, 1994) as well as time spent within a particular store (e.g. Levy and Weitz, 2001; Donovan, Rossiter, Marcoolyn and Nesdale, 1994). Spies, Hesse and Loesch (1997) conducted an experiment using different store layouts and found that consumers' affective state mediated the influence of store layout on time spent in the store, satisfaction with shopping, and money spent for spontaneous purchase. More specifically, they found that a poorly designed store environment may reduce shopping pleasure leading to the deterioration of customers' affective state (Spies et al., 1997). Lastly, Turley and Milliman (2000) highlighted the need for more empirical studies that investigate the influence of this aspect of store atmospherics on the behaviour of consumers.

2.6 Affective state and In-store Behaviour

Most retailers take cognisance of the fact that store atmospherics influence consumers' overall affective state that, in turn, influences their buying behaviour (Swinyard, 1993). Emotions experienced while shopping are known to affect a variety of specific responses such as approach behaviour (Dagger and Danaher, 2014; Hui et al., 1997), spending levels (Donovan and Rossiter, 1982), retail preferences & choices (Dawson, Bloch, and Ridgway, 1990), willingness to buy (Baker et al., 1992), and shopping satisfaction (Machleit and Eroglu, 2000).

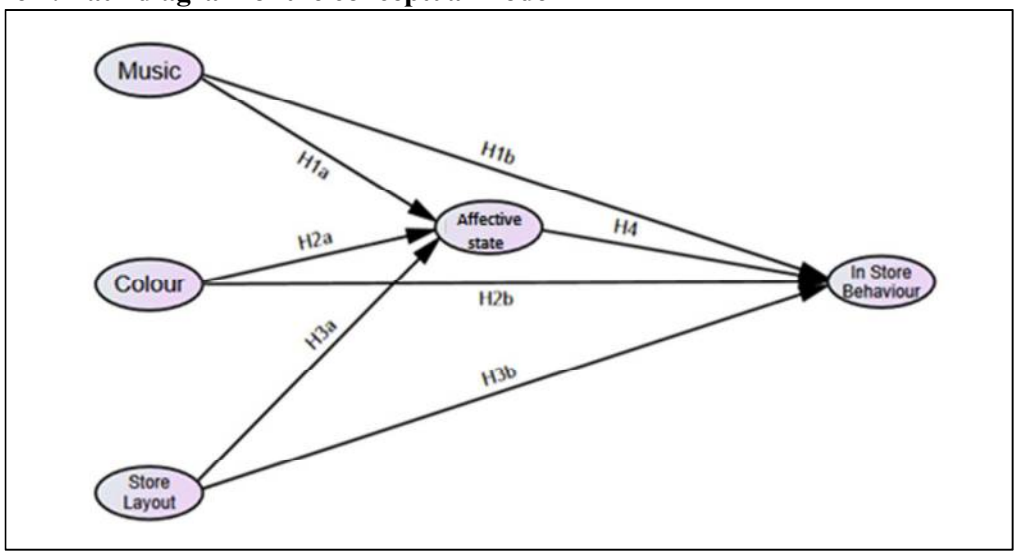
In order to understand the effects of affective state on in-store behaviour, reference is made to valence of affective state. Shopping affective state can be divided into two distinctive valences: positive affective state and negative affective state (Mohan et al., 2013; Baker, Grewal and Parasuraman, 1994; Darden and Babin, 1994; Donovan and Rossiter, 1982; Hui and Bateson, 1991). Researchers found that positive affective state is stored and retrieved differently from memory as compared to negative affective state (Dube and Morgan, 1996). In fact, the observation that positive affective state favourably influences patronage is one of the strongest tenets of environmental marketing (Baker et al., 1992; Bitner, 1992; Donovan et al., 1994; Donovan and Rossiter, 1982). In particular, past research found that (a) positive affective state can be generated by pleasant environments, and (b) positive affective state increases approach behaviour (Eroglu and Machleit, 1990; Hui and Bateson, 1991). For the purposes of our study, therefore, affective state will similarly be operationalised in terms of its valence, i.e., positive or negative affective states (Babin, Darden, and Babin, 1998).

Dagger and Danaher (2014) observed that recent studies tend to focus on the influence of a range of interventions (such as store atmospherics) on consumers' attitudes and intentions (see, for instance, Morin, Dubé, and Chebat, 2007; Wirtz, Mattila, and Tan, 2007). Roy and Tai (2003), in their study on the effects of store environment on the behaviour of mall patrons, found that the response to store stimuli is the consumers' emotional reaction when they are actually shopping inside such stores. In fact, customer reactions to the tangible physical environment may be more emotional than cognitive, particularly when involving hedonic consumption (Darden and Babin, 1994; Hui et al., 1997; Machleit and Eroglu, 2000; Sherman et al., 1997). Similarly, Wakefield and Blodgett (1994) found that the effect of layout on the desire to return is mediated by the level of excitement. If the perception of store layout is favourable, the level of excitement is similarly heightened. The increased level of excitement in turn increases consumers' intention to repurchase. The aforementioned mediating

influence is corroborated by Wakefield and Baker (1998) who found that excitement mediated the influence of store layout on the consumers' desire to remain in a shopping mall. Other empirical studies on store atmospherics that suggest a mediating effect of affective state on consumers' cognition and behaviour (e.g. Kumar and Kim, 2014; Mohan et al., 2012; Michon et al., 2005; Spies et al., 1997). Hence, predict that affective state has a mediating effect on consumer behaviour.
Based on the review of past literature, a conceptual framework was developed for the purposes of this study (Figure 1). Based on this framework, we propose the following hypotheses:

H_1: The more favourable consumer's perception towards Music, the more positive is the (a) Affective state and (b) In-store Behaviour.
H_2: The more favourable consumer's perception towards Colour, the more positive is the (a) Affective state and (b) In-store Behaviour.
H_3: The more favourable consumer's perception towards Store Layout, the more positive is the (a) Affective state and (b) In-store Behaviour.
H_4: The more positive the Affective state, the greater the tendency towards the approach of In-store Behaviour.
H_5: Affective state mediates the relationship between atmospherics (Music, Colour, and Store Layout) and In-store Behaviour.

Figure 1: Path diagram of the conceptual model



Apart from the subject matter-related literature in the consumer behaviour tradition that we have reviewed above, a separate review on the use of frequentist as well as Bayesian statistical approaches is required. This is because of our aim to contribute to the extant literature by making use of a distinctive statistical approach (i.e. the Bayesian approach) for a consumer behaviour study.

2.7 Frequentist vs Bayesian Approaches to Deriving Statistical Inferences

The classical frequentist approach derives statistical inferences by making estimates of the probability of an event based on a set or a series of samples. The precision of the estimates is based on how well the samples explain the population at a given time. Put simply, the frequency of any given event occurring is what constitute the concept of probability in this approach. Assuming the true values of the model parameters are fixed, the probability of events occurring will be slightly different as they are dependent upon the magnitude of statistical errors. In short, the presumption is that the true values of the population are fixed but unknown while the estimates from the samples are known but random (Arbuckle, 2009). This discrepancy is regarded as a statistical problem when interpreting probability in a symmetric distribution based on this approach (Woodside, 2013).

Unlike the frequentist approach, practitioners of the Bayesian technique view the true values of model parameters as unknown and random. These unknown values are distributed onto a probability distribution called prior distribution which indicates what we know about the parameters prior to the dataset. Once the parameters are estimated with the dataset using the Bayes' theorem the posterior distribution is converged (Arbuckle, 2009). As the true values of the model parameters are unknown, the probability of events occurring will vary across the probability distribution. This is a fundamental contrast between the frequentist and Bayesian approaches. Overall, proponents of the Bayesian approach contend that this technique is a universally more flexible approach for data analysis (Casella et al., 2009; Muthén and Asparouhov, 2012; Kanapathy et al., 2014).

When the distinctive differences above are considered within the context of our consumer behaviour study, the frequentist approach which assumes that studies are repeatable (i.e. conveying similar probabilities and the corresponding statistical inferences) may not be suitable to be applied to a dynamic retail environment in terms of measuring in-store behaviour. On the contrary, the Bayesian approach represents a far more plausible alternative technique to estimate the impact of atmospherics effects and affective state on in-store behaviour. The prior knowledge of the impact on in-store behaviour allows researchers to converge more practical stochastic models (Khong, Onyemeh and Chong, 2013; Kanapathy et al., 2014).

Hence, in our attempts to make a methodological contribution to the extant literature, we aim to compare and contrast results pertaining to the antecedents of atmospherics effects and affective state on in-store behaviour from both, the frequentist as well as Bayesian approaches. In summary, our study aims to make specific contributions to the extant literature by examining the effects of a range of store atmospherics on shoppers' affective state as well as in-store behaviour in a developing economy setting. More specifically, we investigate the mediating role of affective state of consumers on in-store behaviour using both frequentist and Bayesian statistical approaches.

3 Methodology

3.1 Frequentist Structural Equation Modelling (SEM) and Bayesian SEM (BSEM)

Due to the nature of our study which involve multiple latent constructs and measurement models, we used Structural Equation Modelling to test the developed hypotheses. More specifically, the estimation of the hypothesized model via SEM was conducted using SPSS Analysis of Moment Structures (AMOS) version 21. Maximum likelihood estimation (MLE) was used as the estimation procedure. We used a two-step approach as suggested by Anderson and Gerbing (1988): (i) Confirmatory Factor Analysis (CFA) was first conducted to examine and determine the factor structures of the five measurement models (i.e. Music, Colour, Store Layout, Affective state and In-store Behaviour); and (ii) the model fit was tested by using the variance-covariance matrix (Hair, Black, Babin, Anderson ad Tatham, 2010; Khong, 2009).

As mentioned earlier, when utilizing a frequentist SEM approach, the true values of the parameters in the model are fixed but unknown but estimates of these parameters are random but known (Arbuckle, 2009). In this case, parameters in the SEM model can only be estimated when the model is identified (good model fit). On the contrary, the Bayesian SEM (BSEM) approach views the true values of parameters as random across a probability distribution. In effect, the true values of parameters in a BSEM model ranges across the posterior distribution given the dataset. In this paper, the Markov Chain Monte Carlo (MCMC) method was used to simulate the BSEM estimation to obtain the posterior distributions of parameters in the model.

3.2 Sampling Procedure and Data Collection

The target respondents were shoppers in Malaysia. The study was based on purposive sampling method where respondents were drawn from shoppers at selected major shopping malls within Kuala Lumpur and Petaling Jaya areas in Malaysia. Data were collected from various shopping malls in order to reduce the probability of common method variance (CMV) in our primary dataset (Podsakoff, MacKenzie, Lee and Podsakoff, 2003; Yap and Khong, 2006). The mall intercept approach was employed and trained enumerators were stationed at the exit points of clothing or apparel stores

located in six popular shopping malls: MidValley Megamall, One Utama, Ampang Point, The Curve, KLCC, and Sungai Wang Plaza. For each of the chosen shopping malls, seven apparel stores comprising of a mix of specialty, ethnic, and mix-merchandise stores were identified. These apparel stores have their own atmospheric designs in terms of style of lighting, genre of music, and layout. To ensure accuracy of recall, respondents were intercepted immediately as they exited the store.

For shoppers who agreed to voluntarily participate in the survey, a questionnaire requiring them to provide responses to various items using 5-point interval scales was given. Guidelines for respondent eligibility were given to trained enumerators to capture individuals from different ethnic backgrounds, gender, and age brackets. A total of 382 usable responses were obtained. Table 1 depicts a summary of the demographic profile of the respondents. Consequently, G*Power v3.1 was to test the adequacy of the sample size in this study (Faul, Erdfelder, Lang and Buchner, 2007; Balaji et al., 2016). Based on the number of indicators in Table 5 and a medium effect size of 0.26, the minimum sample size of this study is 148. As a result, the total usable responses exceeds the minimum sample size of this study.

From the survey, 215 (56.3%) of shoppers were female while 167 (43.7%) were male. In terms of racial make-up or ethnicity, 180 respondents (47.7%) are Malay, 124 (32.9%) are Chinese, 78 (19.4%) are Indian and the remaining 5 (0.3%) are classified as Others. Shoppers who were single represented 50.0% of the sample while the rest were married (41.9%) or grouped together as either divorced or separated or widowed (8.1%). Approximately 34.5% of the sample had university degrees while the rest were diploma holders (17.6%) or held lower qualifications (47.9%). There were 47.7% of the respondents who were Malays while 33.3% were Chinese and 19.1% Indians. This is relatively consistent with the overall ethnic proportions of the Malaysian population.

Table 1: Demographic profile of respondents

	Frequency	Percentage (%)
Gender		
Male	167	43.7
Female	215	56.3
Race		
Malay	180	47.7
Chinese	124	32.9
Indian	73	19.1
Others	5	0.3
Marital Status		
Single	190	50.0
Married	159	41.9
Divorced/Separated/Widowed	33	8.1
Educational Background		
No education	12	3.2
Primary	16	4.2
Secondary	154	40.5
Polytechnic/Diploma	67	17.6
Undergraduate	133	34.5
Race		
Malay	195	47.7
Chinese	136	33.3
Indians	78	19.1

3.3 Measurement of Variables

The items in the questionnaire were designed to collect data on all selected variables related to store atmospherics. The specific constructs - Music, Colour, and Store Layout - were measured using established scales with adaptation (Table 2).

Table 2: Indicators for Music, Colour and Store Layout

Label	Items	Source
	Music	
M1	I like the music being played in the store.	Herrington (1996)
M2	I find the background music of the store to be annoying.*	Herrington (1996)
M3	I find the background music of the store to be pleasing.	Herrington (1996)
M4	I wish the store would play this music whenever I shop.	Herrington (1996)
M5	Hearing the background music in this store makes my shopping and browsing more fun.	Herrington (1996)
	Colour	
C1	I think the interior wall and floor colour schemes of this store were attractive.	Wakefield and Baker (1998)
C2	I feel very calm with the colour scheme of the store.	Wakefield and Baker (1998)
C3	I think the colours used in the store appeared to be currently fashionable.	Baker et al. (1994)
C4	I feel pleasant in this store because of its colour.	Authors
C5	Combinations of colour in the store makes me feel refreshed.	Authors
	Store Layout	
LY1	The layout in the store helps me browse the products comfortably.	Authors
LY2	The layout in the store makes it easy for me to get to the shelves or products I want.	Wakefield and Baker (1998)
LY3	The layout in the store assists me in making buying decision.	Authors
LY4	I like the layout of the store.	Authors
LY5	Overall, the layout in the store makes it easy for me to get around.	Wakefield and Baker (1998)

Note: Items were measured using a 7-point Likert scale
* denotes inverted Likert scale used

In order to measure Affective State, we utilized a shorter version of Mehrabian and Russell's (1974) semantic differential measures of emotional state. More specifically, the items included for the present study are as follows:

Happy	-	-	-	Unhappy
Pleased	-	-	-	Annoyed
Satisfied	-	-	-	Dissatisfied
Relaxed	-	-	-	Bored
Comfortable	-	-	-	Uncomfortable
Excited	-	-	-	Calm

Although it may be argued that shoppers' emotional state should be measured in the store (i.e. 'during' the shopping experience), this however would require an experimental design as well as the permission of the respective retailers. In addition, it would also intrude upon and interrupt shoppers' emotional state, causing response artefacts such as irritation or anger. This may explain the reason why studies attempting to measure in-store emotional state have had inconsistent results (e.g.

Donovan et al., 1994). Therefore, for the purposes of this study, affective state was measured when shoppers exited the store to ensure their ability to recall their affective state when exposed to the store atmospherics and their in-store experiences.

In-store Behaviour

For in-store behaviour, three dimensions were used: time, exploration, and satisfaction, which were adapted from past research (Turley and Milliman, 2000; Bitner, 1992; Donovan and Rossiter, 1982; Mehrabian and Russel, 1974; Milliman, 1986). In this study, we used 'time spent' (to represent the time dimension), 'money spent' (to replace the exploration dimension), and 'repatronage intention' and 'recommendation to others' (to represent the satisfaction dimension). In the 'time spent' dimension, time spent and shopping enjoyment in the store were measured (Wakefield and Blodgett, 1994). In the 'money spent' dimension, the willingness and intention to spend money in the store were evaluated (Roy and Tai, 2003). For 'repatronage intention' and 'recommendation to others' dimensions, the eagerness and commitment to revisit the store in the future and the willingness to recommend the store to other people were assessed respectively (Wakefield and Baker, 1998; Baker et al., 1992).

Table 3: Indicators for in-store behaviour

Label	Items	Source
	In-store behaviour	
ISB1	I like to stay at this store as long as possible.	Wakefield and Blodgett (1994)
ISB2	I spent more money in the store than I had planned.	Roy and Tai (2003)
ISB3	I would be willing to recommend this store to other people.	Baker et al. (1992)
ISB4	In the future, my shopping at the store will be possible.	Wakefield and Baker (1998)

4 Findings

4.1 Confirmatory Factor Analysis

As mentioned earlier, a two-step approach was conducted. The CFA results depicted the factor structures of distinct measurement models: Music, Colour, Store Layout, Affective state and In-store Behaviour. The chi-square was reported as 289.40 with degrees of freedom (df) of 265. The chi-square p-value which tested the model fit was 0.145; indicating that the CFA model had a good model fit. Other model fit tests also confirmed that the CFA model has a good model fit with Incremental Fit Index (IFI = 0.981), Tucker Lewis Index (TLI = 0.978) and Comparative Fit Index (CFI = 0.980) meeting the threshold of 0.95 and above (Bollen, 1989). The RMSEA (0.021) indicated a good fitting model (Steiger and Lind, 1980; Hu and Bentler, 1999). The CFA model also displayed parsimony where the value of chi-square/df (1.092) met the necessary threshold between 1.0 and 2.0 (Hair et al., 2010). Table 4 summarises the results of the fit measures tests.

Table 4: Summary of the results of Goodness of Fit measures

Construct	Variable Labels	χ^2	df	p-value (p>0.05)	RMSEA (<0.08)	IFI (>0.95)	TLI (>0.95)	CFI (>0.95)	χ^2/df ($1<\chi^2/df<2$)
CFA		289.40	265	0.145	0.021	0.981	0.978	0.980	1.092
SEM		290.95	268	0.160	0.026	0.968	0.962	0.966	1.086

The next series of tests involved the assessments of reliability, common method variance (CMV) and validity. When we specifically looked at the five distinct measurement models, they showed internal consistency with Cronbach's alpha of above 0.70 for these constructs (Nunnally, 1978). The constructs also met the necessary thresholds of 0.7 or above and 0.5 or above for composite reliability and average variance extracted (AVE), respectively (Hair et al., 2010). Therefore, these constructs were reliable as well as fulfilled the requirements for convergent validity (Said, Badru and Shahid, 2011). In testing the CMV, the Harman's one factor test was used (Podsakoff et al., 2003). In this test, we conducted an exploratory factor analysis (EFA) where we loaded the variables' factor loadings

into one fixed factor. Result revealed that the percentage of variance explained by the one fixed factor was approximately 26.8%. Further test on CMV using the Common Latent Factor and Common Marker Variable revealed that the CMV value was approximately 10.2% and 2.5% respectively. These results showed that there was no distinctive factor which caused concerns in CMV (Yap and Khong, 2006; Chen and Chang, 2012). In short, CMV did not cause any issues in the list of variables. The summary of the results are shown in Table 5.

Table 5: Summary of results of reliability tests and AVE

Construct	Variable Labels	Mean	Std error	Standardized λ	Cronbach's alpha	Composite Reliability	Average Variance Extracted (AVE)
Music	M1	3.145	0.047	0.675	0.802	0.879	0.592
	M2	3.183	0.051	0.707			
	M3	3.036	0.045	0.643			
	M4	3.111	0.043	0.582			
	M5	3.067	0.047	0.736			
Colour	C1	3.258	0.042	0.744	0.737	0.886	0.608
	C2	3.296	0.040	0.592			
	C3	3.142	0.040	0.684			
	C4	3.087	0.043	0.589			
	C5	3.048	0.043	0.402			
Store Layout	LY1	3.101	0.043	0.718	0.742	0.870	0.575
	LY2	3.173	0.042	0.618			
	LY3	3.007	0.041	0.541			
	LY4	3.133	0.042	0.659			
	LY5	3.607	0.032	0.491			
Affective state	MD1	3.614	0.040	0.467	0.750	0.863	0.514
	MD2	3.537	0.044	0.432			
	MD3	3.458	0.045	0.482			
	MD4	3.467	0.042	0.406			
	MD5	3.518	0.041	0.406			
	MD6	3.414	0.035	0.402			
In-store Behaviour	SB1	2.938	0.024	0.834	0.737	0.874	0.604
	SB2	2.861	0.021	0.753			
	SB3	2.919	0.014	0.651			
	SB4	2.883	0.019	0.340			

Subsequently, we conducted validity tests to test the convergent and discriminant validity of the constructs. First, the results of all AVE values were above the 0.5 threshold implying all five constructs have convergent validity (Chen and Chang, 2012). In order to test the constructs for discriminant validity, we used the Fornell and Larcker's (1981) approach. In this approach, the discriminant validity is met when the value of the square root of AVE of the respective constructs is higher than the correlation (ϕ) between these respective constructs. For example, the ϕ between Store Layout and Music was 0.713 while the values of the square root of AVEs for these two constructs were 0.758 and 0.770, respectively; implying that Store Layout and Music had discriminant validity. Table 6 shows the summary of the discriminant validity results.

Table 6: Summary of discriminant validity results

	Store Layout	**Music**	**Colour**	**Affective state**	**In-store Behavior**	**Discriminant Validity**
Store Layout	**0.758**					achieved
Music	*0.713*	**0.770**				achieved
Colour	*0.672*	*0.556*	**0.780**			achieved
Affective state	*0.430*	*0.360*	*0.360*	**0.717**		achieved

In-store Behaviour	*0.415*	*0.441*	*0.409*	*0.397*	**0.951**	achieved

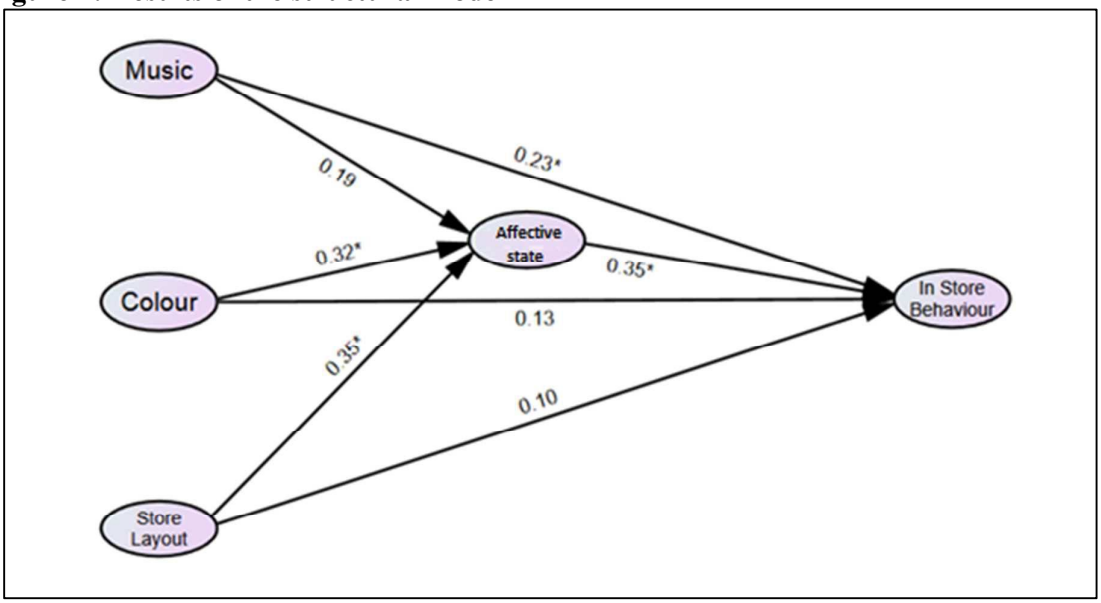
Note: Values in bold denote square root of AVE while values in italics denote correlation (ϕ)

Next, a test on multivariate normality of the data was conducted. Using AMOS, an assessment of the multivariate normality depicted that the Mardia's kurtosis coefficient was significant at 32.37, implying that the data was non-normal (Arbuckle, 2009). Consequently, a Bootstrap Maximum Likelihood (ML) and Bollen-Stine bootstrap tests of 200 samples was conducted. With a 95% bias corrected confidence interval, the Bollen-Stine bootstrap test yielded 0.075 implying that the model did had a good fit despite the non-normality (Arbuckle, 2009; Hallak et al., 2012).

4.2 Structural Model

The second step of the two-step approach was to estimate the causal relationships amongst the constructs. First, the model fit results of the structural model is discussed. Based on Table 4, the chi-square of the structural model was 290.95 (with df at 268). Consequently, the chi-square p-value was 0.160 indicating that the structural model has a good fit. Other fit measures like RMSEA (0.026), IFI (0.968), TLI (0.962) and CFI (0.966) met the necessary thresholds (Bollen, 1989; Steiger and Lind, 1980; Hu and Bentler, 1999). The structural model also displayed parsimony when the value of chi-square/df (1.086) fell in the range of 1.0 to 2.0 (Hair et al., 2010). Once the model fit measures were in accordance with the stipulated thresholds, the causal relationships of constructs were tested. Figure 2 shows the results of the structural model.

Figure 2: Results of the structural model



Note: * denotes significance at α=0.05

All constructs were tested on a significance level (α) of 0.05. Results revealed that all associations were significant. The exogenous constructs, Colour (γ = 0.0.324; p-value = 0.024) and Store Layout (γ = 0.350; p-value = 0.015), were positively associated with Affective state (Table 6). Meanwhile Music (γ = 0.234; p-value = 0.029) and Affective state (γ = 0.345; p-value = 0.033) were positively associated with In-store Behaviour. The overall results to test the hypotheses were presented in Table 7.

Table 7: Summary of Hypotheses Testing

	Hypothesis	Γ	Standard Error	p-value	Inference
Affective state ← Music	H_{1a}	0.192	0.07	0.122	Unsupported

In-store Behavior ← Music	H_{1b}	0.234*	0.45	0.029	Supported
Affective state ← Colour	H_{2a}	0.324*	0.10	0.024	Supported
In-store Behavior ← Colour	H_{2b}	0.133	0.57	0.265	Unsupported
Affective state ← Store Layout	H_{3a}	0.350*	0.09	0.015	Supported
In-store Behavior ← Store Layout	H_{3b}	0.095	0.53	0.422	Unsupported
In-store Behavior ←Affective state	H_5	0.345*	0.82	0.033	Supported

Note: * denotes significance at α=0.05; ** denotes significance at α=0.01

We tested the mediation of Affective state on the relationship between atmospherics (Colour and Store Layout) and In-store Behaviour (H5) by conducting a bootstrap mediation. The bootstrap mediation simultaneously estimated the complex mediations depicted in H5 (Kenny, 2012; Ng, Butt, Khong and Ong, 2013). Bootstrapping with a 95% bias-corrected confidence interval was performed and a total of 2000 bootstrap samples were drawn from the existing dataset. The results of the direct and indirect associations between the atmospherics on affective state and In-store Behaviour is shown in Table 8. The results demonstrated that the direct effects of Colour and Store Layout was not significantly associated with In-store Behaviour. Meanwhile, the indirect effects of Colour and Store Layout, which were mediated by Affective state, were significantly associated with In-store Behaviour. This meant that the associations between Colour and Store Layout on In-store Behaviour were completely mediated by Affective state. Consequently, we can conclude that Affective state is a mediator between the atmospherics, i.e. Colour and Store Layout, and In-store Behaviour.

Table 8: Significance of Associations between Atmospherics on Affective state and In-store Behaviour (H_5)

Association	Indirect effects p-value	Direct effects p-value	Mediator	Mediation
In-store Behaviour ← Colour	.000**	.104	Affective state	Complete
In-store Behaviour ← Store Layout	.001**	.382	Affective state	Complete

Note: * denotes significance at α=0.05
** denotes significance at α=0.01

4.3 Bayesian Structural Equation Modelling

One of the major difference between the frequentist approach in SEM and the BSEM is the true values of the parameters in the latter are fixed but unknown (Arbuckle, 2009; Khong et al., 2013). In order to manage the unknown phenomenon using BSEM, the true values are diffused on the probability distribution called the posterior distribution using the MCMC algorithm. In this paper, the posterior distributions via MCMC were diffused using SPSS AMOS and it took approximately 83,500 drawn analysis samples, with an initial 500 burn-in samples, to converge. Convergence of the BSEM model was met with an acceptance rate of 0.26, which meant that the MCMC algorithm is effectively generating 26% of the time new parameters while 74% of the rest repeats the previous parameters. This is an acceptable acceptance rate as it was within the threshold of 0.2 to 0.5 (IBM Support Portal, n.d.; Arbuckle, 2009). The credible intervals (Bayesian confidence interval) depicted in Table 9 suggest that we are 95% certain that the true values of these parameter estimates (associations between constructs) are above zero except for two (In Store Behaviour ← Colour and In Store Behaviour ← Store Layout). These two parameters, in the frequentist approach, were not significantly association thus reinforcing the hypothesis. Additionally, further analysis supported that affective state completely mediated the relationship of these two parameters. The S.E. showed that the parameter estimates of the posterior mean generated by MCMC were not too far from the true values of the posterior mean, implying the precision of the MCMC algorithm when generating analysis samples from the dataset (Arbuckle, 2009). The values of the parameter estimates from the SEM appeared to be similar to the posterior mean of BSEM.

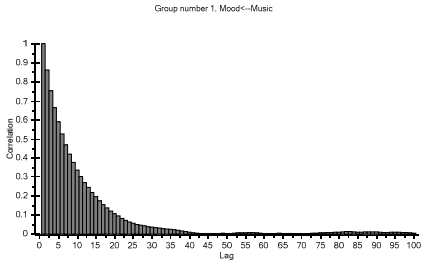
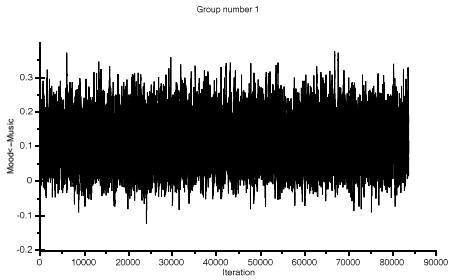
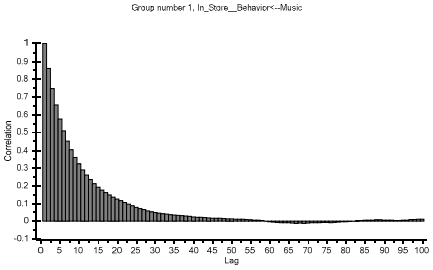
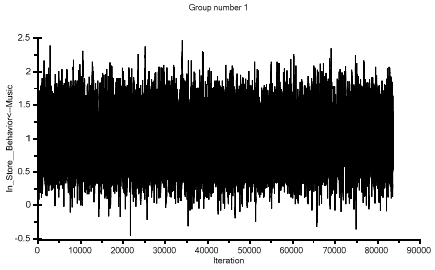
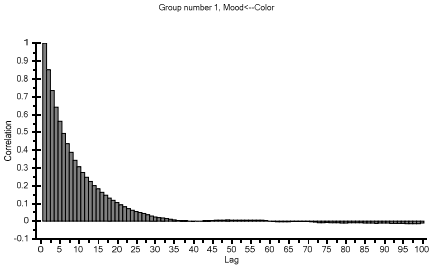
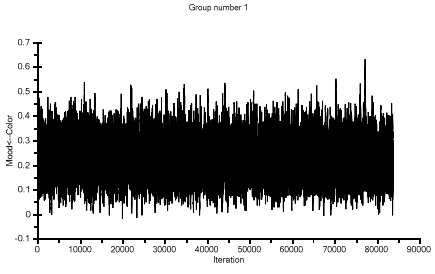
Table 9: BSEM of associations between constructs

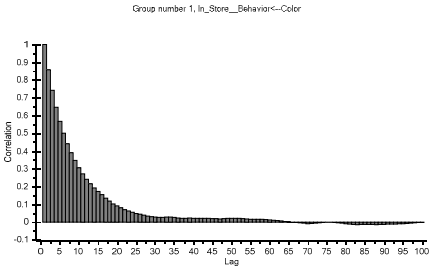
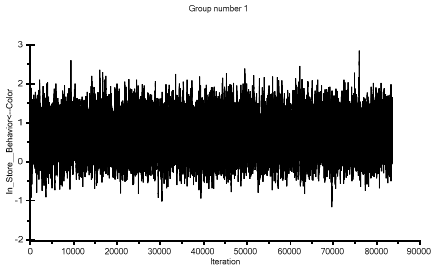
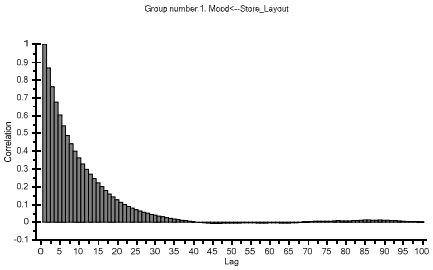
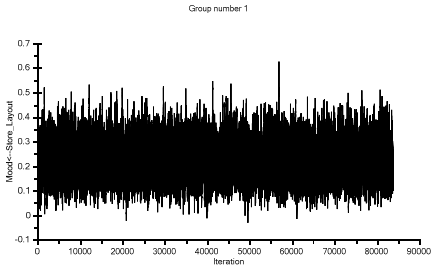
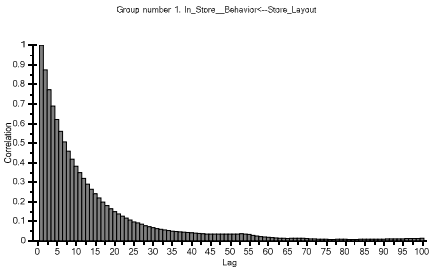
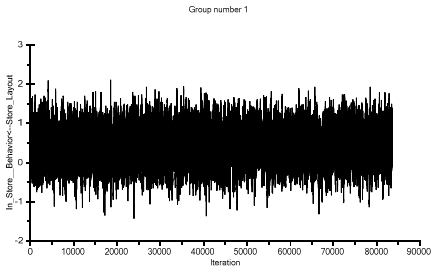
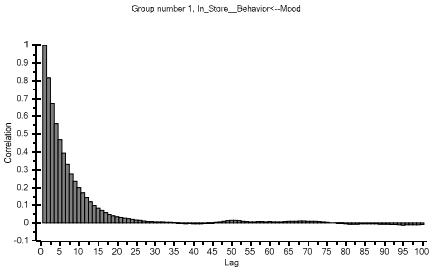
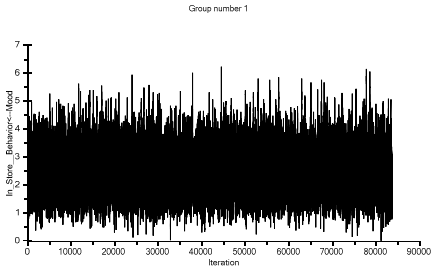
	Parameter Estimates MLE SEM	Posterior Mean	S.E.	S.D.	95% Lower bound	95% Upper bound	Skewness	Kurtosis	Min	Max
Affective state ← Music	0.12	0.12	0.00	0.06	0.01	0.23	0.19	0.15	-0.12	0.37
In Store Behaviour ← Music	0.99	1.01	0.00	0.33	0.38	1.68	0.07	0.05	-0.46	2.47
Affective state ← Colour	0.23	0.23	0.00	0.07	0.10	0.37	0.29	0.26	-0.02	0.63
In Store Behaviour ← Colour	0.64	0.68	0.01	0.41	-0.12	1.51	0.06	0.15	-1.16	2.84
Affective state ← Store Layout	0.23	0.23	0.00	0.07	0.10	0.37	0.26	0.18	-0.03	0.63
In Store Behaviour ← Store Layout	0.42	0.43	0.01	0.41	-0.38	1.24	0.04	0.17	-1.43	2.11
In Store Behaviour ← Affective state	2.38	2.49	0.01	0.70	1.22	3.99	0.40	0.50	0.00	6.23

Note: shaded area depicts that the true values of these parameters can be zero

Figure 3 exhibits the results of the trace plots and depicted the stability of the posterior mean values when the MCMC algorithm was generating analysis samples. The autocorrelation curves saw a rapid asymptotic decline of the independence in the analysis samples drawn. The decay of the autocorrelation started to stabilise in lag 35. At this point henceforth, the correlation of drawn samples generated with the last drawn analysis samples were close to 0 (Khong et al., 2013; Kanapathy et al., 2014). These figures shown implied that the results of the BSEM were rather consistent and had no problems of reaching convergence.

Figure 3: BSEM Autocorrelation and Trace of associations between constructs

Association between Constructs	Autocorrelation	Trace
Affective state ← Music		
In Store Behaviour ← Music		
Affective state ← Colour		

In Store Behaviour ← Colour		
Affective state ← Store Layout		
In Store Behaviour ← Store Layout		
In Store Behaviour ← Affective state		

5 Discussion and Conclusion

Our study focused on understanding the effects of store atmospherics (i.e. the influence of music, colour, and store layout) on shoppers' affective state as well as in-store behaviour. In this regard, a series of tests were conducted using both frequentist and Bayesian approaches and results show that both approaches had consistent outcomes. More specifically, results from the SEM and bootstrapping method for testing complex mediations showed the positive effect of store atmospherics (music, colour, and store layout) on affective state. The positive affective state generated in turn brought about in-store approach behaviour: shoppers tended to spend more time, more money, and indicated intention to patronize the store again. The empirical evidence of this study affirms that atmospheric cues, such as the presence of music, colour and good store layout applied in retail setting, influences the consumption experience in terms of emotional and behavioural responses. In terms of our contribution to the extant literature, our empirical findings add to the relatively sparse evidence available that is specific to consumers patronizing the outlets of clothing retailers in shopping malls. This is very much in line with the recent exhortation of various researchers (see, for instance, Dabija and Babut, 2014; Heung and Gu, 2012; Davis and Hodges, 2012; Kumar and Kim, 2014; Mohan et

al., 2013) that the behaviour of consumers must be rationalized within the distinctive context where the 'consumption experience' takes place, be it a particular subsector, industry or even retail format.

Apart from the specific retail context experienced by consumers under scrutiny, the wider contextual aspects such as country setting also matters. In this regard, researchers such as Hussain and Ali (2015) and Dabija and Babut (2014) have highlighted the need to explore key behavioural differences between consumers who belong to cultures that are distinctly different from the West where most past empirical studies have been conducted. Therefore, by focusing on consumers in a developing country such as Malaysia, our study also contributes to a better understanding of consumer behaviour along this dimension.

Moving on to key observations derived from our study's findings, we found that in terms of colour and store layout, a well-planned and designed layout manages to promote positive affective state, but on their own, has no effect on in-store behaviour. Nevertheless, the positive affective state generated by these two constructs was enough to enhance positive in-store behaviour. This lends credibility to our earlier contention that, even though it may be intuitively appealing to presume that many 'typically researched' aspects of atmospherics do significantly influence consumer behaviour, this may not necessarily be the case. In this sense, our findings that colour and store layout has no direct effect on in-store behaviour is similar to those by Hussain and Ali (2015) who found that the use of music and colour by retailers have insignificant impact on Pakistani consumers' purchase intention. Coupled with the finding that affective state mediates such relationships, the exploration of more complex relationships within the consumer behaviour tradition seem to be a fruitful avenue for future research. Hence, our focus around mediated relationships forms yet another distinctive contribution to the extant literature, in line with recent studies such as Loureiro and Roschk (2014) and Ha and Jang (2012).

Moving on to our methodological contribution to the consumer behaviour literature, the BSEM that we utilized via MCMC served as a confirmation of our results as the posterior mean of the impact of atmospherics effects and affective state on in-store behaviour quickly converged after lag 35 as seen in Figure 3. In addition, the posterior means of these associations are not too dissimilar and the mediation effect of the affective state on music and colour was partial. Put simply, results from both frequentist and Bayesian approaches complement each other. The frequentist approach to SEM via MLE generally confines researchers to a series of stringent and rigorous model fit tests; often affected by very large sample size (Khong et al., 2013; Bentler and Bonnet, 1980; Jöreskog and Sörbom, 1993). Consequently, researchers are solely concerned with how the goodness of model fit tests are met. Given that the true values of the population are not fixed as opposed to the frequentist approach where the true values are, BSEM via MCMC offers a more flexible and substantive approach to measure the impact of atmospherics effects and affective state on in-store behaviour (Casella et al., 2009; Muthén and Asparouhov, 2012; Kanapathy et al., 2014). As a result, the BSEM using the MCMC algorithm enabled us to diffuse the posterior mean values across a posterior distribution thus allowing us to determine the probable true values of the parameter estimates (which in this study the associations among constructs). This was something which cannot be performed when using the frequentist approach. Another aspect which we can highlight is the fact that BSEM results on the associations between constructs have lower standard error of the mean compared to CBSEM (see Table 7 and Table 9). In BSEM, the MCMC diffused the associations between constructs on the posterior distribution based on the number of analysis samples drawn. As the analysis samples drawn increases, the dispersion of the analysis sample means move closer around the posterior mean thus reducing the standard error of means in the BSEM process. In essence BSEM is a more 'user-friendly' approach as it does not need to go through the stringent model fit tests of CBSEM. Consequently, the BSEM approach is an alternative approach to CBSEM approach. Furthermore, in the BSEM approach we can deduce that all posterior mean values were nonzero except for the two associations shown in Table 9 (*In Store Behaviour* ← *Colour* and *In Store Behaviour* ← *Store Layout*).

Even though the overall results for both Bayesian SEM and the frequentist approach (i.e. SEM via MLE) is similar for our study, this does not necessarily mean that such an outcome should be expected across different studies. This is especially true for studies that examine variables within a

dynamic wider 'context' (for instance, our study was conducted within the context of the fast-paced apparel retail sector). In this regard, we suggest that much more research is required to establish whether or not the purported benefits of taking into account the probable true value of parameter estimates would make a significant difference in enhancing the robustness of empirical findings. Put simply, it may be beneficial for future studies to utilize both approaches in SEM.

In terms of practical implications, our findings suggest that clothing retailers in Malaysia should devote more attention to aspects of store atmospherics that trigger positive affective states in their customers. In addition, designing and managing store atmospherics without a good understanding of the target customers' profile may be ineffective since different consumers have different preferences (for colour, music, etc.) as indicated in the extant literature. Hence, retailers must take cognizance of the possible effects on the cognitive, emotional and behavioral responses of customers in creating, integrating and applying the different store atmospherics (Heung and Gu, 2012; Turley and Chebat, 2002; Kumar and Kim, 2014; Nicholls et al., 2000; Kusumowidagdo et al., 2012; Gardner, 1985).

While our empirical findings seem highly relevant, it was important to highlight a few limitations. Although the current sample size is adequate, it would be interesting to examine how a bigger sample size can affect the comparison between the frequentist approach in SEM and BSEM. It is difficult to completely remove CMV during the data collection phase but we tried to address this issue by collecting data from a number of shopping malls. While the store atmospherics covered in this study were limited to music, colour and store layout, there are other ambient factors such as fragrance, visual displays, and temperature that could be similarly applied for synergistic effect. Salespersons and crowding are also factors that have been found to impact on shopper behaviour. We would recommend that future studies include other store atmospheric cues and environment for a more in-depth understanding of the effect of these factors. In addition, besides money and time spent, other behavioural responses such as shoppers' perception of store image would also be of interest to professionals and researchers. Since different people may react differently to atmospherics, future studies could also look at the effect of age and gender on cognitive, emotional and behavioural responses to stimuli within the store.

References

Anderson, J. C. and Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological bulletin*. *103*(3), 411-423.

Arbuckle, J. (2009). *AMOS 18 User's Guide*. New York, USA: AMOS Development Corporation

Areni, C. S. and Kim, D. (1993). The Influence of Background Music on Shopping Behavior: Classical versus Top-Forty Music in a Wine Store. *Advances in Consumer Research*. 20(1), 336-340.

Ashley, C., Ligas, M. and Chaudhuri, A. (2010). Can Hedonic Store Environments Help Retailers Overcome Low Store Accessibility?. *Journal of Marketing Theory and Practice*. 18(3), 249-262.

Aslam, M. M. (2006). Are you Selling the Right Colour? A Cross-Cultural Review of Colour as a Marketing Cue. *Journal of Marketing Communications*. 12(1), 15-30.

Babin, B. J., Darden, W. R., and Babin, L. A. (1998). Negative Emotions in Marketing Research: Affect or Artifact? *Journal of Business Research*. 42(3), 271-285.

Babin, J. B., Hardesty, D. M., and Suter, T. A. (2003). Color and Shopping Intentions: The Intervening Effect of Price Fairness and Perceived Affect. *Journal of Business Research*. 56(7), 541-551.

Backstrom, K. and Johansson, U. (2006). Creating and Consuming Experiences in Retail Store Environments: Comparing Retailer and Consumer Perspectives. *Journal of Retailing and Consumer Services*. 13(6), 417-430.

Balaji, M.S., Khong, K. W. and Chong, A. Y. L., (2016). Determinants of negative word-of-mouth communication using social networking sites. *Information & Management.* 53(4), 528-540.

Baker, J., Levy, M. and Grewal, D. (1992). An Experimental Approach to Making Retail Store Environmental Decisions. *Journal of Retailing.* 68 (Winter), 445-460.

Baker, J. and Cameron, M. (1996). The Effects of the Service Environment on Affect and Consumer Perception of Waiting Time: An Integrative Review and Research Propositions. *Journal of the Academy of Marketing Science*. 24(4), 338-349.

Baker, J., Grewal, D., and Parasuraman, A. (1994). The Influence of Store Environment on Quality Inferences and Store Image. *Journal of the Academy of Marketing Science*. 22(4), 328-339.

Ballantine, P. W., Jack, R. and Parsons, A. G. (2010). Atmospheric Cues and Their Effect on Hedonic Retail Experience. *International Journal of Retail and Distribution Management*. 38(8), 641-653.

Bellizzi, J. A., Crowley, A. E., and Hasty, R. W. (1983). The Effects of Color in Store Design. *Journal of Retailing*. 59(1), 21-45.

Bentler, P.M. and Bonnet, D.C. (1980). Significance Tests and Goodness of Fit in the Analysis of Covariance Structures, Psychological Bulletin. 88(3), 588-606.

Bitner, M. J. (1992). Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *Journal of Marketing*. 56(2), 57-71.

Bollen, K. A. (1989). A New Incremental Fit Index for General Structural Equation Models. *Sociological Methods and Research*. *17,* 303–316.

Borges, A., Babin, B. J. and Spielmann, N. (2013). Gender Orientation and Retail Atmosphere: Effects on Value Perception. International *Journal of Retail & Distribution Management*. 41(7), 498-511.

Broekemier, G., Marquardt, R. and Gentry, J. W. (2008). An Exploration of Happy/Sad and Liked/Disliked Music Effects on Shopping Intentions in a Women's Clothing Store Service Setting. *Journal of Services Marketing*. 22 (1), 59-67.

Bruner II, G. C. (1990). Music, Affective state and Marketing. *Journal of Marketing*. 54(4), 94-104.

Cai, Y. and Shannon, R. (2012). Personal Values and Mall Shopping Behaviour: The Mediating Role of Attitude and Intention among Chinese and Thai Consumers. *Australasian Marketing Journal*. 20(1), 37-47.

Cameron, M. A., Baker, J., Peterson, M., and Braunsberger, K. (2003). The Effects of Music, Wait-Length Evaluation, and Affective state on a Low-Cost Wait Experience. *Journal of Business Research*. 56(6), 421-430.

Casella, G., Fienberg, S. and Olkin, I. (2009). Statistics Texts in Statistics.

Chebat, J. C. and Michon, R. (2003). Impact of Ambient Odors on Mall Shoppers' Emotions, Cognition, and Spending: A Test of Competitive Causal Theories. *Journal of Business Research*. 56(7), 529-539.

Chen, Y.-S. and Chang, C. H. (2012). Greenwash and Green Trust: The Mediation Effects of Green Consumer Confusion and Green Perceived Risk. *Journal of Business Ethics, DOI* 10.1007/s10551-012-1360-0

Crowley, A. E. (1993). The Two-Dimensional Impact of Color on Shopping. *Marketing Letters*. 4(1), 59-69.

Dabija, D. C. and Băbuţ, R. (2014). Enhancing Consumers' Satisfaction and Loyalty of Retailers in Romania Through Store Ambiance and Communication. *Procedia Economics and Finance*, 15, 371-382.

Dagger, T. S. and Danaher, P. J. (2014). Comparing The Effect of Store Remodeling on New and Existing Customers. *Journal of Marketing*. 78(3), 62-80.

Darden, W. R. and Babin, B. J. (1994). Exploring the Concept of Affective Quality: Expanding the Concept of Retail Personality. *Journal of Business Research*. 29(2), 101-109.

Davis, L. and Hodges, N. (2012). Consumer Shopping Value: An Investigation of Shopping Trip Value, In-Store Shopping Value and Retail Format. *Journal Of Retailing And Consumer Services*. 19(2), 229-239.

Dawson, S., Bloch, P. H. and Ridgway, N. M. (1990). Shopping Motives, Emotional States, and Retail Outcomes. *Journal of Retailing*. 66(4), 408-427.

Donovan, R. J. and Rossiter, J. R. (1982). Store Atmosphere: An Environmental Psychology Approach. *Journal of Retailing.* 58(1), 34-57.

Donovan, R. J., Rossiter, J. R., Marcoolyn, G. and Nesdale, A. (1994). Store Atmosphere and Purchasing Behaviour. *Journal of Retailing*. 70(3), 283-294.

Dube, L. and Morgan, M. S. (1996). Trend Effects and Gender Differences in Retrospective Judgments of Consumptions Emotions. *Journal of Consumer Research*. 23(2), 156-162.

Eroglu, S. A. and Machleit, K. A. (1990). An Empirical Study of Retail Crowding: Antecedents and Consequences. *Journal of Retailing*. 66(2), 201-221.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*. 39(2), 175-191.

Fornell, C. and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*. 18(1), 39-50.

Gardner, P. M. (1985). Affective state and Consumer Behaviour: A Critical Review. *Journal of Consumer Research.* 12 (December), 281-300.

Garlin, F. V. and Owen, K. (2006). Setting the Tone with the Tune: A Meta-Analytic Review of the Effects of Background Music in Retail Settings. *Journal of Business Research*. 59(6), 755-764.

Grewal, D. and Baker, J. (1994). Do Retail Store Environment Factors Affect Consumers' Price Acceptability? An Empirical Examination. *International Journal Research in Marketing*. 11(2), 107-115.

Gulas, C. and Schewe, C. (1994). Atmospheric Segmentation: Managing Store Image with Background Music (pp. 325-330). In Acrol, R. and Mitchell, A. (eds.). *Enhancing Knowledge Development in Marketing*. Chicago, IL: American Marketing Association.

Ha, J. and Jang, S. (2012). The Effects of Dining Atmospherics on Behavioral Intentions Through Quality Perception. *Journal of Services Marketing*. 26(3), 204-215.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. and Tatham, R. L. (2010). *Multivariate Data Analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Hallak, R., Brown, G. and Lindsay, N. (2012). The Place Identity – Performance relationship among tourism entrepreneurs: A structural equation modelling analysis, *Tourism Management*, 33(1), 143-154.

Haque, A. and Rahman, S. (2009). Exploring Customers' Shopping Experience Through Shopping Centre Branding in Malaysia. *Journal of Management Research*. 9 (3), 167-181.

Herrington, J. D. (1996). Effects of Music in Service Environments: A Field Study. *Journal of Services Marketing*. 10(2), 26-41.

Heung, V. C. and Gu, T. (2012). Influence of Restaurant Atmospherics On Patron Satisfaction and Behavioral Intentions. *International Journal of Hospitality Management*. 31(4), 1167-1177.

Hirschman, E. C. and Holbrook, M. B. (1982). Hedonic Consumption: Emerging Concepts, Methods and Propositions. *The Journal of Marketing*. 92-101.

Hu, L., and Bentler, P. M. (1999). Cut-off Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. Structural Equation Modeling, 6(1), 1e55.

Hui, M. K. and Bateson, J. E. G. (1991). Perceived Control and the Effects of Crowding and Consumer Choice on the Service Experience. *Journal of Consumer Research*. 18(2), 174-184.

Hui, M. K., Dube, L. and Chebat, J. (1997). The Impact of Music on Consumers' Reaction to Waiting for Services. *Journal of Retailing*. 73(1), 87-105.

Hussain, R. and Ali, M. (2015). Effect of Store Atmosphere on Consumer Purchase Intention. International Journal of Marketing Studies. 7(2), 35-43.

IBM Support Portal (n.d.). Acceptance Rate in AMOS Bayesian SEM. Retrieved from http://www-01.ibm.com/support/docview.wss?uid=swg21653976

Jones, M. A. (1999). Entertaining Shopping Experience: An Exploratory Investigation. *Journal of Retailing and Consumer Services*. 6(3), 29-139.

Jones, M. Y., Vilches-Montero, S., Spence, M. T., Eroglu, S. A. and Machleit, K. A. (2010). Do Australian and American Consumers Differ in Their Perceived Shopping Experiences? A Bi-Cultural Analysis. *International Journal of Retail & Distribution Management*. 38(8), 578-596.

Jöreskog, K. and Sörbom, D. (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*. Chicago, IL, USA: Scientific Software International Inc.

Kaltcheva, V. D. and Weitz, B. A. (2006). When Should a Retailer Create an Exciting Store Environment?. *Journal of Marketing*. 70(1), 107-118.

Kanapathy, K., Khong, K. W., and Dekkers, R. (2014). New Product Development in an Emerging Economy: Analysing the Role of Supplier Involvement Practices by Using Bayesian Markov Chain Monte Carlo Technique. *Journal of Applied Mathematics*, *2014*.

Kellaris, J. J. and Kent, R. J. (1992). The Influence of Music on Consumers' Temporal Perceptions: Does Time Fly when you're having Fun? *Journal of Consumer Psychology*. 1(4), 365-376.

Kenny, D. A. (2012). Learn How You can do a Mediation Analysis and Output a Text Description of Your Results: Go to Mediational Analysis Using Data to Text. Available at: http://www.davidakenny.net/cm/mediate.htm (19th Dec 2012).

Khong, K. W. (2009). Service Quality Index: A Study on Malaysian Banks. *Contemporary Management Research*. 5(2), 109-124.

Khong, K. W. and Ong, F. S. (2014). Shopper Perception and Loyalty: A Stochastic Approach to Modelling Shopping Mall Behaviour. *International Journal of Retail & Distribution Management*. *42*(7), 626-642.

Khong, K. W., Onyemeh, N. C. and Chong, A. Y. L. (2013). BSEM Estimation of Network Effect and Customer Orientation Empowerment on Trust in Social Media and Network Environment. *Expert Systems with Applications*. *40*(12), 4858-4870.

Kotler, P. (1974). Atmospherics as a Marketing Tool. *Journal of Retailing.* 49(4), 48-64.

Kumar, I., Garg, R. and Rahman, Z. (2010). Influence of Retail Atmospherics on Customer Value in an Emerging Market Condition. *Great Lakes Herald*. 4(1), 1-13.

Kumar, A. and Kim, Y. K. (2014). The Store-as-a-Brand Strategy: The Effect of Store Environment on Customer Responses. *Journal of Retailing and Consumer Services*. 21(5), 685-695.

Kusumowidagdo, A., Sachari, A. and Widodo, P. (2012). The Impact of Atmospheric Stimuli of Stores on Human Behavior. *Procedia-Social and Behavioral Sciences*. 35, 564-571.

Lewinson, D. M. (1994). *Retailing* (5th ed.). New York: Macmillan College Publishing Company.

Levy, M. and Weitz, B. A. (2001). *Retailing Management* (4th ed.). USA: McGraw-Hill, IRWIN.

Loureiro, S. M. C. and Roschk, H. (2014). Differential Effects of Atmospheric Cues on Emotions and Loyalty Intention with Respect to Age Under Online/Offline Environment. *Journal of Retailing and Consumer Services*. 21(2), 211-219.

Machleit, K. A. and Eroglu, S. A. (2000). Describing and Measuring Emotional Response to Shopping Experience. *Journal of Business Research*. 49(2), 101-111.

McKinney, L. N. (2004). Creating a Satisfying Internet Shopping Experience via Atmospheric Variables. *International Journal of Consumer Studies*. 28(3), 268-283.

Mehrabian, A. and Russell, J. A. (1974). *An Approach to Environmental Psychology*. Cambridge, MA: Massachusetts Institute of Technology.

Michon, R., Chebat, J.-C., and Turley, L. W. (2005). Mall Atmospherics: The Interaction Effects of the Mall Environment on Shopping Behavior. *Journal of Business Research*. 58(5), 576-583.

Milliman, R. E. (1986). The Influence of Background Music on the Behavior of Restaurant Patrons. *Journal of Consumer Research*. 13(2), 286-289.

Mohan, G., Sivakumaran, B. and Sharma, P. (2012). Store Environment's Impact on Variety Seeking Behavior. *Journal of Retailing and Consumer Services*. 19(4), 419-428.

Mohan, G., Sivakumaran, B. and Sharma, P. (2013). Impact of Store Environment on Impulse Buying Behavior. *European Journal of Marketing*. 47(10), 1711-1732.

Morin, S., Dubé, L. and Chebat, J. C. (2007). The Role of Pleasant Music in Servicescapes: A Test of the Dual Model of Environmental Perception. *Journal of Retailing*, 83(1), 115-130.

Morrison, M., Gan, S., Dubelaar, C. and Oppewal, H. (2011). In-Store Music and Aroma Influences on Shopper Behavior and Satisfaction. *Journal of Business Research*. 64(6), 558-564.

Muthén, B. and Asparouhov, T. (2012). Bayesian Structural Equation Modeling: A More Flexible Representation of Substantive Theory. *Psychological Methods*. *17*(3), 313.

Ng, P. F., Butt, M. M., Khong, K. W. and Ong, F. S. (2013). Antecedents of Green Brand Equity: An Integrated Approach. *Journal of Business Ethics*. 1-13.

Nicholls, J. A. F., Li, F., Mandokovic, T., Roslow, S. and Kranendonk, C. J. (2000). US-Chilean Mirrors: Shopping in Two Countries. *Journal of Consumer Marketing.* 17(2), 106-119.

Nunnally, J. C. (1978). *Psychometric Theory (2nd Ed)*. New York: McGraw–Hill.

Oh, J., Fiorito, S. S., Cho, H. and Hofacker, C. F. (2008). Effects of Design Factors on Store Image and Expectation of Merchandise Quality in Web-Based Stores. *Journal of Retailing and Consumer Services*. 15(4), 237-249.

Ong, F. S., Khong, K. W., Faziharudean, T. M. and Xin, D. (2012). Path Analysis of Atmospherics and Convenience on Flow: The Mediation Effect of Brand Affect and Brand Trust. *The International Review of Retail, Distribution and Consumer Research.* 22 (3), 277-292.

Pham, M. T., Cohen, J. B., Pracejus, J. W. and Hughes, G. D. (2001). Affect Monitoring and the Primacy of Feelings in Judgment. *Journal of Consumer Research*. 28(2), 167-188.

Pilgrim, L., Norris, J. I. and Hackathorn, J. (2017). Music is Awesome: Influences of Emotion, Personality, and Preference on Experienced Awe. *Journal of Consumer Behaviour*.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*. 88(5), 879-903.

Rayburn, S. W. and Voss, K. E. (2013). A Model of Consumer's Retail Atmosphere Perceptions. *Journal of Retailing and Consumer Services*. 20(4), 400-407.

Roy, A. and Tai, S. T. C. (2003). Store Environment and Shopping Behavior: The Role of Imagery Elaboration and Shopping Orientation. *Journal of International Consumer Marketing*. 15(3), 71-99.

Said, H., Badru, B. B. and Shahid, M. (2011). Confirmatory Factor Analysis (CFA) for Testing Validity and Reliability Instrument in the Study of Education. *Australian Journal of Basic and Applied Sciences*. 5(12), 1098-1193.

Sánchez-Fernández, R. and Iniesta-Bonillo, M. Á. (2007). The Concept of Perceived Value: A Systematic Review Of The Research. *Marketing Theory*, 7(4), 427-451.

Schellinck, D. A. (1980). Determinants of Cue Choice Behavior. Doctoral Dissertation, University of Illinois at Urbana Champaign, Illinois.

Sherman, E., Mathur, A. and Smith, R. B. (1997). Store Environment and Consumer Purchase Behaviour: Mediating Role of Consumer Emotions. *Psychology and Marketing.* 14(4), 361-378.

Spangenberg, E. R., Grohmann, B. and Sprott, D. E. (2005). It's Beginning to Smell (and Sound) a Lot Like Christmas: The Interactive Effects of Ambient Scent and Music in a Retail Setting. *Journal of Business Research*. 58(11), 1583-1589.

Spies, K., Hesse, F. and Loesch, K. (1997). Store Atmosphere, Affective State and Purchasing Behavior. *International Journal of Research in Marketing*. 14(1), 1-17.

Steiger, J. H. and Lind, J. C. (1980). Statistically Based Tests for the Number of Common Factors. In *annual meeting of the Psychometric Society, Iowa City, IA* (Vol. 758).

Sweeney, J. C. and Wyber, F. (2002). The Role of Cognitions and Emotions in the Music-Approach-Avoidance Behavior Relationship. *Journal of Services Marketing*. 16(1), 51-69.

Swinyard, W. R. (1993). The Effects of Affective State, Involvement and Quality of Store Experience on Shopping Intentions. *Journal of Consumer Research*. 20(2), 271-280.

Titus, P. A. and Everett, P. B. (1995). The Consumer Retail Search Process: A Conceptual Model and Research Agenda. *Journal of the Academy of Marketing Science*. 23(2), 106-119.

Turley, L. W. and Chebat, J. C. (2002). Linking Retail Strategy, Atmospheric Design and Shopping Behaviour. *Journal of Marketing Management*. 18(1-2), 125-144.

Turley, L. W. and Milliman, R. E. (2000). Atmospheric Effect on Shopping Behaviour: A Review of the Experimental Evidence. *Journal of Business Research.* 49(2), 193-211.

Voss, K. E., Spangenberg, E. R. and Grohmann, B. (2003). Measuring the Hedonic and Utilitarian Dimensions of Consumer Attitude. *Journal of Marketing Research*. 40(3), 310-320.

Wakefield, K. L. and Baker, J. (1998). Excitement at the Mall: Determinants and Effects on Shopping Response. *Journal of Retailing*. 74(4), 515-540.

Wakefield, K. L. and Blodgett, J. G. (1994). The Importance of Servicescapes in Leisure Service Settings. *Journal of Services Marketing*. 8(3), 66-76.

Wirtz, J., Mattila, A. S. and Tan, R. L. (2007). The Role of Arousal Congruency in Influencing Consumers' Satisfaction Evaluations and In-Store Behaviors. *International Journal of Service Industry Management*, 18(1), 6-24.

Woodside, A. G. (2013). Moving Beyond Multiple Regression Analysis to Algorithms: Calling for Adoption of a Paradigm Shift from Symmetric to Asymmetric Thinking in Data Analysis and Crafting Theory. *Journal of Business Research*. 66(4), 463-472.

Yalch, R. and Spangenberg, E. (1990). Effects of Store Music on Shopping Behaviour. *The Journal of Consumer Marketing*. 7(2), 55-63.

Yalch, R. F. and Spangenberg, E. R. (2000). The Effects of Music in a Retail Setting on Real and Perceived Shopping Times. *Journal of Business Research*. 49(2), 139-147.

Yap, B. W. and Khong, K. W. (2006). Examining the Effects of Customer Service Management (CSM) on Perceived Business Performance via Structural Equation Modelling. *Applied Stochastic Models in Business and Industry*. *22*(5-6), 587-605.

Yildirim, K., Akalin-Baskaya, A. and Hidayetoglu, M. L. (2007). Effects of Indoor Color on Affective state and Cognitive Performance. *Building and Environment*. 42(9), 3233-3240.

Zeynep, E. and Nilgun, G. (2011). Congruence between Atmospheric Cues and Store Image in Fashion Retailing. Turkey: Izmir University of Economics.