

## **ARTICLE REVIEW REQUEST**



Sujono &lt;sujono@budiluhur.ac.id&gt;

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## [JIPD ISSN 2572-7931] (Scopus) JIPD-11242 Article Review Request

elisabeth.aiden@enpress-pub.net <elisabeth.aiden@enpress-pub.net>  
To: sujono@budiluhur.ac.id

Mon, Jan 20, 2025 at 3:46 PM

Dear Respected Scholar,

Hope this email finds you well.

Considering your great achievements within academia, we sincerely invite you to review the manuscript JIPD-11242, which has been submitted to our open access journal Journal of Infrastructure, Policy and Development (JIPD, ISSN 2572-7931). The journal has been indexed in Scopus. We hope that you will consider undertaking this important task for us.

The basic information of the article is as follows:

---

Title: The impacts of distributed lighting in the public space of Chinese shopping centres on customer behaviour

Abstract: Chinese shopping centres are facing operational challenges, and they are resorting to lighting design and effects to attract and retain customers. This study aims to explore how lighting in public space of Chinese shopping centres on customer behaviour. The study used a non-random sampling method to collect and analyse data from 607 participants. The study revealed that distributed lighting influenced customer behaviour and customer synaesthesia (customer emotional and psychological responses to lighting), which further impacted customer behaviour. The results of the study show that customer synaesthesia accounts for 75% of the total impact of lighting and plays a key role in mediating between lighting and customer behaviour. This study filled the gap of lacking researches into lighting in public spaces and its impacts on customer behaviour. Its innovative contribution is linking synaesthesia with customer behaviour via a strong mediating effect. The practical implications, limitations, and areas for further studies are given.

Keywords: light; synaesthesia; customer behaviour; shopping centres; public space

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If you are willing to accept this invitation, the full text will be sent to you in the subsequent email.

Thank you very much for your consideration and we look forward to hearing from you.

Best regards,  
Elisabeth Aiden  
Assistant Editor  
JIPD Editorial Office



Sujono &lt;sujono@budiluhur.ac.id&gt;

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## Re: [JIPD ISSN 2572-7931] (Scopus) JIPD-11242 Article Review Request

**Sujono** <sujono@budiluhur.ac.id>  
To: elisabeth.aiden@enpress-pub.net

Fri, Jan 31, 2025 at 9:59 AM

Dear Elisabeth Aiden

Thank you for the offer to review an article in a journal.  
In principle, we are willing to participate in the review of the article.  
Thus from us, and once again we express our gratitude.

Kind regards  
Sujono

On Mon, Jan 20, 2025 at 3:46 PM <[elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)> wrote:

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Sujono &lt;sujono@budiluhur.ac.id&gt;

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## Re: [JIPD ISSN 2572-7931] (Scopus) JIPD-11242 Article Review Request

Elisabeth Aiden <elisabeth.aiden@enpress-pub.net>  
To: sujono@budiluhur.ac.id

Wed, Feb 5, 2025 at 8:39 AM

Dear Sujono,

Sorry for the late reply, and good day to you!

Thank you for the kind response. It is great that you are willing to review the paper.  
I've included the whole paper and its review form in the attachment for you to review.  
Please send me the report after the review, and I will be honored to complete the submission.  
**If you are still willing to review this manuscript**, please send it back before **12 Feb**. Please let me know if you have any additional questions.

I'm looking forward to hearing from you whenever you get a chance.

Regards,  
Elisabeth

On Fri, Jan 31, 2025 at 10:59 AM Elisabeth Aiden <[elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)> wrote:

Thank you for your email. I am currently out of the office and will not be available until February 6th. During this time, I will have limited access to email and may not be able to respond immediately.  
Please leave a message, and I will get back to you as soon as possible upon my return.  
Thank you for your patience.

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Best regards,  
Elisabeth Aiden  
Assistant Editor  
Email: [elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)

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### 2 attachments

[JIPD11242review.pdf](#)  
532K

[Review Form.pdf](#)  
72K

# **PAPER TO REVIEW**

1 Article Type

2 **The impacts of distributed lighting in the public space of Chinese shopping**  
3 **centres on customer behaviour**

4 **Abstract:** Chinese shopping centres are facing operational challenges, and they are resorting to lighting design and effects to  
5 attract and retain customers. This study aims to explore how lighting in public space of Chinese shopping centres on  
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13 **Keywords:** light; synaesthesia; customer behaviour; shopping centres; public space

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14 **1. Introduction**

15 Along with China's fast economic expansion and urbanization, shopping centres have become a mushrooming  
16 and even dominant retailing format in Chinese cities (Li, Mason and Gan, 2022), and they differ from  
17 conventional retailing formats in that they're able to offer customers a one-stop solution for shopping, leisure,  
18 entertainment, and food and beverages. Customer experience is stressed in designing shopping centres, where  
19 customers not only buy but also experience. As a result of China's economy slowing down, dropping customer  
20 purchase power due to the Covid pandemic, and negative impacts from e-commerce, Chinese shopping centres  
21 are faced with strong competition, declining customer traffic and increasing vacancy rate (Fast Company, 2024).  
22 Thus, they have to devise effective methods to attract customers.

23 Lighting as a critical element of servicescape has been widely adopted in shopping malls and shops to attract and  
24 retain customers via creating agreeable and appealing shopping environment for enabling enjoyable and  
25 unforgettable experiences for customers. Servicescape is the collection of physical elements and cues that  
26 influence customer behaviour where service occurs and is delivered to customers, and it includes store design,  
27 layout, lighting, music and temperature (Mari and Poggesi, 2013). Servicescape including lighting is found to  
28 have significant impacts on customer loyalty for shopping malls (Shashikala and Suresh, 2013). The impact of  
29 lighting has widely examined as a critical cue in servicescape for stores and shops. Quartier, Vanrie and Van  
30 Cleempoel (2014) found that lighting communicated brand image and had subtle impacts on customer emotions.  
31 Currently, most studies about the impacts of lighting on customer behaviour are focused on the in-store  
32 environment. Shopping centres usually have not only varied types of shops and stores but also a large area of  
33 public space connecting these shops, serving varied functions such as providing space for customers to leisure,  
34 socialize, and even rest (Giampino, Picone and Schilleci, 2017). Thus, there is an urgent need for examining the  
35 public area and space in shopping centres. What is more, lighting usually generates varied emotional and  
36 psychological associations or synaesthesia among customers. For instance, some colours are perceived by people  
37 as cold colours and warm colours (Strik Lievers, 2017). Red and yellow colour make people feel warmth (Fenko,  
38 Schifferstein and Hekkert, 2010), which is a form of synaesthesia according to Marks (1990) and Rouw and Root  
39 (2019). Different colours and combinations of colour tend to generate varied impacts on customers emotions and  
40 feelings. Few studies have combine shopping centre lighting, synaesthesia with customer behaviour, which is a  
41 gap that should be examined from the theoretical perspective.

42 Based on these contexts, this study seeks to critically evaluate the impacts of distributed lighting in the public  
43 space of Chinese shopping centres on customer behaviour and test whether synaesthesia exercises a mediating  
44 effect on customer behaviour. The key research questions are given as below:

45 *How does distributed lighting in the public space of Chinese shopping centres on customer behaviour? What are  
46 the role of synaesthesia in the relationship between lighting and customer behaviour for Chinese shopping  
47 centres?*

48 This study has both practical values and theoretical implications. Practically, this study's findings offer guidance  
49 for shopping centres in China to enhance competitive advantage from the perspective of lighting design.  
50 Theoretically, it fills the gap of lacking studies exploring the relationships between lighting and customer  
51 behaviour from the perspective of synaesthesia.

## 52 **2. Literature review**

53 This literature review focuses on key concepts adopted in this study, including lighting design, synaesthesia, and  
54 key models such as Stimulus-Response Theory. Current researches pertinent to this topic are reviewed critically.

### 55 **2.1. Distributed lighting in the public space of shopping centres**

56 Shopping centres are large built environment where varied types of shops and stores from food, drinking,  
57 entertainment and retailing are connected via public space (Howard, 2007, Giampino et al., 2017, Gosseye and  
58 Avermaete, 2020). Public space within shopping centres refer to an open area which could be accessed via  
59 customers and visitors, mainly including passages, hallways, and corridors and atriums (Kusumowidagdo,  
60 Sachari and Widodo, 2013, 2015). Such space does not require permission of entry and is intended for customers to  
61 entertain, meet, rest and socialize (Kusumowidagdo et al., 2013), and such space usually has seats, benches and  
62 chairs for customers to rest. Such space are public and multi-functional, and usually spacious with carefully  
63 designed lighting to create an attractive, comfortable and appealing environment for attracting and retaining  
64 customers.

65 Since public spaces are usually large and spacious, concentrated lighting with one light source and fixture is  
66 usually not sufficient for providing intended lighting effects. So, distributed lighting is usually adopted, where a  
67 set of light sources are strategically designed and positioned across the public space to create a pre-designed  
68 lighting environment and effects (Karlen, Spangler and Benya, 2017). Lighting design is interdisciplinary,  
69 covering engineering, arts and science, and aims at creating a tailored lighting environment and effects via  
70 reasonable combinations light layout, selection of light sources and control technologies (Cuttle, 2015).  
71 Distributed lighting has varied advantages such as offering uniform and sufficient lighting for the entire public  
72 space, and reducing and even eliminating shadows. Cuttle (2015) stresses using the special layout of lighting and  
73 light sources to create the intended 'sharpness' of illumination, which is critical for generating intended feelings  
74 among users and viewers. Sharper lighting usually generates far more distinct and clear boundaries between light  
75 and shadows, while softer lighting tends to produce smoother transition between different lighted areas. Thus, the  
76 sharpness of lighting has significant impacts of visual experiences of users (Cuttle, 2008). Distributed lighting is  
77 fulfilled by a distributed lighting system that consists of carefully positioned light sources and control units used  
78 to coordinate the lighting effects of these sources. Distributed lighting systems appears to users as a single and  
79 coherent system (van Steen and Tanenbaum, 2016), creating intended lighting effects.

### 80 **2.2. Synaesthesia**

81 Synaesthesia is a common sensory perception phenomenon, which refers to the cross-reactivity between human  
82 sensory organs, where one sensory stimulus triggers multiple sensorial responses (Spector and Maurer, 2013).  
83 Normally, a stimulus in one sensory channel should theoretically only elicit a response in the corresponding

channel. However, when synaesthesia occurs, a stimulus in one sensory channel can elicit responses in several other channels (Hubbard and Ramachandran, 2005). Synaesthesia represents a blending and crossing of different human sensory organs. Common examples include seeing colours while tasting flavours, or feeling touch when hearing sounds. For instance, people often feel warmth when they see red or yellow, while they feel coolness and tranquillity when seeing blue or green (Shahidi et al., 2021).

Synaesthesia is usually classified into two forms, namely strong form and weak form (Martino and Marks, 2001). Martino and Marks (2001) compared these two forms, and found that the strong form is usually not common by the weak form is far more common. The strong form is absolute correspondence between sensory organs while the weak form is more contextual. The weak form of synaesthesia could be learned and unlearned.

Currently, the academia is not so uniform about whether regarding the feelings of colour imposed on viewers as a weak form of synaesthesia. Ou et al. (2012) found that customers' emotional and psychological feelings to specific colours are a result of cultural conditioning, and that human reactions to colours are conditioned by learned experiences, which is supported by this study of Hardin (2000). By contrast, Amin et al. (2011) found that "green and warm colours are associated with cheerfulness and energy". This study adopted the general practice of regarding such emotional responses as a form of synaesthesia, which is common among Chinese scholars such as Chen and Xiong (2011). It could be regarded as a weak form of synaesthesia. As demonstrated by Martino and Marks (2001), it is contextual and depends on cultural conditioning and learning. Synaesthesia is framed as customer feelings and responses under specific lighting conditions in this study.

### 2.3. Customer behaviour and related theories

Customer behaviour has been widely examined because of huge practical implications. Both academia and marketing practitioners are obsessed with studying customer behaviour so that more goods and services can be sold with stronger effectiveness and efficiency. There have been many definitions to this concept. Customer behaviour is defined a set of interrelated actions, decisions, and responses involved when customers including both individuals and groups purchase, use, evaluate and dispose goods and services, including information acquisition before purchasing, information evaluation, purchase decision making, and post-purchase evaluation, re-purchase (Solomon, 2015, Solomon et al., 2016). It is defined as a set of value-seeking activities for meeting personal demands and needs by Babin and Harris (2010).

Schiffman, Kanuk, and Hansen (2012) define customer behaviour as the collection of behaviour that customers demonstrate when they search for, buy, use, evaluate, and dispose of products that could satisfy their needs and demands. From a decision-making perspective, Hoyer, MacInnis and Pieters (2013) define customer behaviour as the collection of decisions made by human decision-making units during obtaining, consuming and disposing of products; such units could be individual customers, families, groups, firms, governments, and even non-profiting organizations. Hoyer, MacInnis and Pieters (2013) stress that customer behaviour involves many facets including products, services, activities, experiences, ideas, and people, and it is far more than the purchase behaviour, and that customer behaviour is not static but highly fluid and changeable. Mothersbaugh and Hawkins (2016) also support that customer behaviour is complex and multi-dimensional.

A variety of models have been developed to theorize and understand customer behaviour. Customer decision making model is widely adopted. This model identifies five major processes involved in consumption, including recognition of need, information search, evaluation of alternatives, purchase decision and post-purchase evaluation (Lunn, 2001). This model has advantages such as a structured framework, insights into customer needs, predictive power evidenced by marketing practices, and certain downsides, such as being too simplistic, and failing to account for individual variability (Solomon, 2015). It presents customer decision making as linear processes, which may conflict with practices.

Solomon et al. (2016) hold that customer behaviour is highly correlated with their emotional states when making

128 consumption decisions, and identify a set of common emotional states, such as arousing, pleasant, exciting,  
129 relaxing, distressing, and gloomy. Customers are more likely to make purchase decisions when they are aroused  
130 and holding positive emotions (Consoli, 2009). This has strong implications for marketing practices. Marketers  
131 and branding practitioners have been making their best efforts to suggest to customers that when they buy certain  
132 goods, they are to have certain emotions (Guo, Wang and Wu, 2020, Magids, Zorfas and Leemon, 2015); they  
133 are seeking to build a mental and emotional connections between brands and positive emotions that are desired  
134 by customers (Manthiou, Hickman and Klaus, 2020). Magids et al. (2015) identify common emotional  
135 motivations, including standing out from the crowd, building confidence in the future, a sense of well-being,  
136 a sense of thrill, and a sense of self-actualization, and security.

137 Apart from these theories, there are a wide variety of theories and models applied to explain and predict customer  
138 behaviour, including Activity Theory, Maslow's Hierarchy of Needs, Self-Determination Theory, Expectancy  
139 Theory, and Stimulus-Response Theory. Activity Theory frames consumption as an activity engaged under  
140 specific social contexts that has a purpose (Kaptelinin and Nardi, 1997), stresses the role of artifact and mediation  
141 in influencing and even determining activities (Engeström, 1999), and the sociality, cultural and historical context  
142 (Bakhurst, 2009) under which consumption is made. Maslow's 'Hierarchy of Needs Theory' suggests that  
143 human needs drive customers to make purchases and therefore basic needs should be met first before higher  
144 needs. (McLeod, 2007). Similarly, self-determination theory emphasises three basic human needs, namely  
145 autonomy, competence and relevance. (Deci and Ryan, 2012). This theory holds that customers are more likely to  
146 consume and purchase when they have options and control over their decisions. Expectancy Theory hold that  
147 customers buy and consume because they believe in that their purchase will create desired outcomes (Lloyd and  
148 Mertens, 2018).

149 Stimulus-Response Theory assumes human behaviour as a result of external stimulus. Individuals can establish a  
150 conditioned responses via learning and conditioning. This theory has wide applications in marketing and  
151 branding (Rescorla, 1988). Brands are seeking to build mental associations in the minds of customers via  
152 sustained and consistence advertising. Marketing elements are perceived as stimulus while customer purchase is  
153 responses under this theory.

#### 154 **2.4. Relationships between lighting, synesthesia and customer behaviour**

155 Studies about the impacts of colour and lighting on customers are divided. This section's review focuses on  
156 colour since public spaces at shopping malls are usually lighted with specific colours to create an ambient  
157 environment for customers. These spaces are generally lighted without disruptions. With brighter lighting,  
158 customers are found to be more likely to handle products but it had no impact on increasing sales, as found by  
159 Areni and Kim (1994), who had studied a large US retailer via doing experiments comparing soft versus bright  
160 lighting conditions. Quartier et al. (2014) found that lighting has no significant impact on customer behaviour,  
161 and they only found that lighting has subtle influences on perceived store atmosphere and experienced emotions.  
162 Similarly, Saeed (2015) found that lighting is effective in directing shopper traffic toward illuminated areas and  
163 products, but this does not necessarily increase sales of illuminated products.

164 By contrast, Bellizzi and Hite (1992) found that customers tend to demonstrate higher purchase intentions under a  
165 blue retain environment. Similarly, Babin, Hardesty and Suter (2003) combined interior colour with lighting in  
166 their study about the relationship between lighting and purchase intentions, and they found that customers prefer  
167 blue interiors for fashion shops and demonstrate higher purchasing intention and that customers experience the  
168 highest pricing fairness in backgrounds of orange interior and soft lighting. Their study demonstrated that  
169 lighting and colour had substantial impacts on both customer experience and purchase intention. White et al.  
170 (2021) confirmed the role of blue colours in driving up positive customer attitude and purchase intentions via  
171 carrying out experiments about colour and customer purchase under web banner advertising. However, Broeder

172 and Scherp (2017) did not find the significant relationships between blue colour and customer purchase intention  
173 after studying 552 participants from the West and Asia with three common colours, namely red, yellow and blue.  
174 They confirmed that yellow is positively correlated with customer purchase intention. Moreover, Martinez et al.  
175 (2021) found that colour alone could not be regarded as a significant determinant of customer purchase intentions  
176 since it has complex relationships with many other variables including product type and contexts. Martinez et al.  
177 (2021) confirmed that the store colour alone does not have significant impacts on customer purchase intention,  
178 but it does when it is combined with the product colour.

179 Tantanatewin and Inkarojrit (2016) found that colour and lighting had significant impacts on customer  
180 impression of space and perception of retail identity. Moreover, Barli et al. (2012) examined the influences of  
181 five common colours, and found that green colour is positively correlated with a product purchase, and that with  
182 soft lighting conditions, customers generally have longer time stay in stores. Red indoor colour is found to drive  
183 customers away. Bilgili, Ozkul and Koc (2020) found that when restaurants adopt green colours, customers tend  
184 to feel that their waiting time is shorter compared to other colours. By contrast, Zielke and Schielke (2016) found  
185 that brightness in lighting resulted in high purchase intention, which is contracting with Barli et al. (2012).

186 As for store satisfaction, Reddy, Reddy and Azeem (2011) found that store lighting influences store images  
187 perceived by customers, and thus influence store satisfaction. This agrees with Schielke and Leudesdorff (2015),  
188 who found that store lighting has strong impacts on how customers perceive a store's brand image from  
189 perspectives of social status and value orientation and its brand personality. Leudesdorff and Schielke (2012)  
190 found that store lighting is highly correlated with the store's brand image perceived by customers.

191 From these reviews, research hypothesis H1 is developed as:

192 *H1: Distributed lighting at the public space in Chinese shopping centres has significant impacts on customer  
193 behaviour.*

194 As for the impacts of lighting and colour on customer emotions and feelings, Pullman and Gross (2004) argued  
195 that lighting and colour of environment could be designed to elicit specific customer emotions and responses.  
196 Park and Farr (2007) found that customers are aroused and satisfied by certain lighting effects under retained  
197 environment. Similarly, Bigdeli and Bigdeli (2014) confirmed that lighting has positive impacts on customer  
198 emotions. Gharib and Shohdy (2023) summed up the complex relationship between lighting and emotions. This  
199 results in Research Hypothesis H2.

200 *H2: Distributed lighting at the public space in Chinese shopping centres has significant impacts on customer  
201 synaesthesia, including feeling pleasant, aroused and warm.*

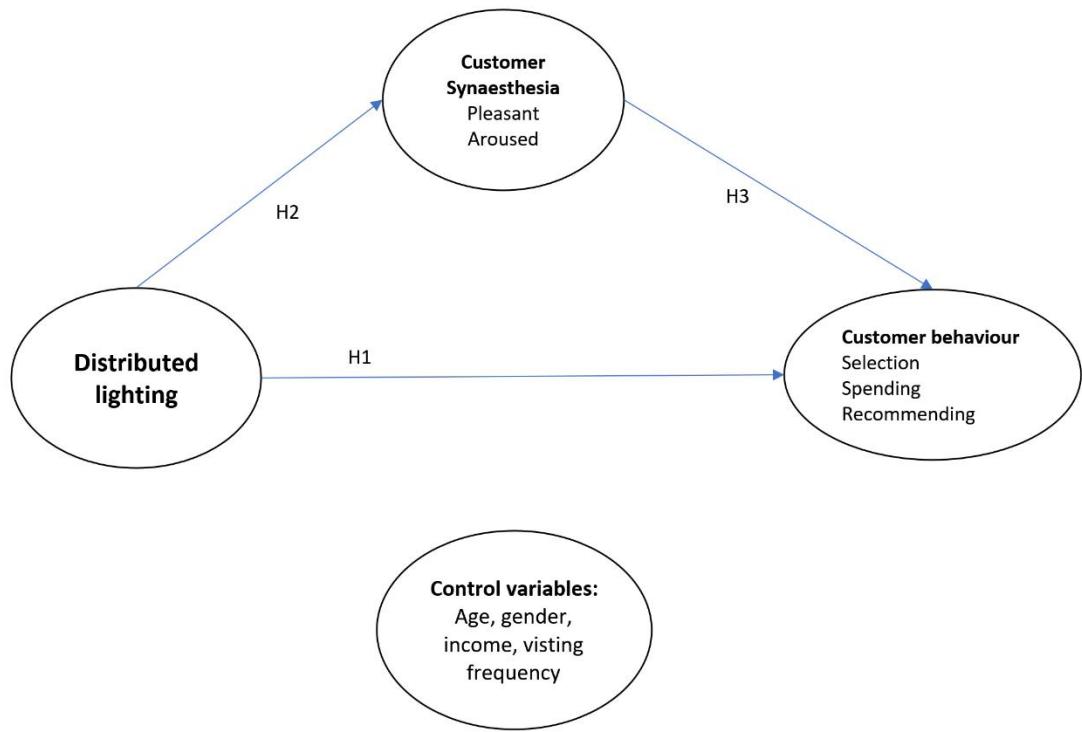
202 As for the influences of warm colour and cold colours, Beneke et al. (2015) examined how packaging colour  
203 influences purchase intentions of bottled water, and found that colour is not relevant, and that customers may  
204 prefer neutral colours slightly. By contrast, Zielke and Schielke (2016) found that warm orange colour incurs  
205 higher purchase intentions via adding pressure, which is applicable for colours that are saturated rather than  
206 pastel colours. Ozkul et al. (2019) confirmed that colour and lighting are critical atmospheric elements, and that  
207 they influence customer attention, interest, liking and satisfaction. However, Shah (2018) found that ambient  
208 colour does not significantly influence both customer purchase intention and satisfaction. From these conflicting  
209 studies, Research Hypothesis H3 is developed.

210 *H3: Customer synaesthesia experienced under the public space in Chinese shopping centres has a significant  
211 impacts on customer behaviour.*

## 212 **2.5. Research gap and framework**

213 From the above review, it could be seen that most current studies are not focused on the public space of shopping  
214 centres, though they are studies lighting, colour, customer emotions and responses due to lighting and colour, and  
215 customer purchase behaviour. This is the major gap this study aimed to fill. Figure 1 presents the theoretical

216 framework adopted with three research hypotheses developed.



217 **Figure 1.** The theoretical framework adopted in this study.

### 218 **3. Methodology**

219 This study adopted an online questionnaire survey as the core strategy for data collection. Shopping centres were  
220 selected from Zhengzhou, a major city in northern China. The survey participants were customers for these  
221 shopping centres, and they were accessed via online shopping communities such as WeChat groups and QQ  
222 groups, where customers exchanged local news and information about shopping. In total, 607 valid responses  
223 were collected from participants who were accessed via purposive and volunteer sampling. According to  
224 Saunders, Lewis and Thornhill (2019), when the population is large, the non-random sample size should be above  
225 400 to have reasonable representativeness. This study had 607 participants to enhance representativeness as  
226 possible.

227 The quality of data collected via questionnaire survey depends on the quality of measurement scales  
228 used in the survey design (Snijkers et al., 2013). The measurement scales are developed and adapted  
229 from mature scales from published studies for enhancing data validity and reliability. The measurement  
230 scale of customer behaviour is adapted from Bitner (1992), Solomon (2015) and White et al. (2021),  
231 including items such as "*as a consumer, I prefer to spend more time in well-lit shopping centres.*". The  
232 measurement scale of distributed lighting is adapted from Odabaşıoğlu and Olguntürk (2015), featuring  
233 items such as "*upon entering a shopping centre, the lighting in public areas is spacious and bright*". The  
234 scale of customer synesthesia is adapted from Lee and Gong (2022) and Odabaşıoğlu and  
235 Olguntürk (2015), featuring items such as "*in a shopping centre, the lighting effects make me happy and  
236 often remind me of my family or friends*". All these scales adopted the Likert's five-point scale for  
237 quantifying customer attitudes and responses. These measurement scales are presented in Appendix 1.  
238 After data collection, invalid data with incomplete responses were deleted and then data was loaded into SPSS  
239 and Amos for quantitative analysis. The sample's demographical major descriptive results are given in Table 1.

The sample is slightly biased toward female shoppers, with 54.9% females. The majority of the sample is aged below 41, featuring young shoppers. The most common income range is 5000-8000 RMBs, accounting for 37.1% of the sample. Only 38.1% frequently visited shopping centres, and the sample is most likely to visit shopping centres in the afternoon (40.9%) and at night (38.1%). From the demographic perspective, the sample was generally representative of shopping centre shoppers at Zhengzhou.

**Table 1.** Demographics of the sample..

Questions	Items	Percent %
1. Please indicate your gender.	A) Male B) Female	45.1% 54.9%
	A) 18-24 B) 25-30 C) 31-40 D) 41 and above	16.5% 32.3% 39.4% 11.9%
2. Please indicate your age	A) Below 3000 B) 3000-5000 C) 5000-8000 D) Above 8000	11.2% 24.7% 37.1% 27.0%
3. Please indicate the range of your monthly income in RMBs?	A) Rarely B) Occasionally C) Frequently	7.1% 54.9% 38.1%
4. How often do you visit shopping centres?	A) Morning B) Noon C) Afternoon D) Evening	8.7% 12.4% 40.9% 38.1%
5. What is the most common time period for you to visit shopping centres?		

As for data reliability, Cronbach's alpha was calculated for distributed lighting, customer synaesthesia and customer behaviour respectively at 0.861, 0.856 and 0.899, all of which are bigger than 0.8, indicating good internal consistency (Vaske, Beaman and Sponarski, 2017).

#### 4. Results and discussions

The mean values of distributed lighting(LD), customer synaesthesia (CS) and customer behaviour(CB) are 3.944, 3.757 and 3.782, respectively on a scale of 1 to 5, where 3 indicates "neither disagree nor agree" to the given statements. Thus, the group generally have positive evaluations of the shopping centres' distributed lighting design and effects, and they have positive emotions feeling moderately pleasant, aroused and warm, demonstrating positive shopper behaviour.

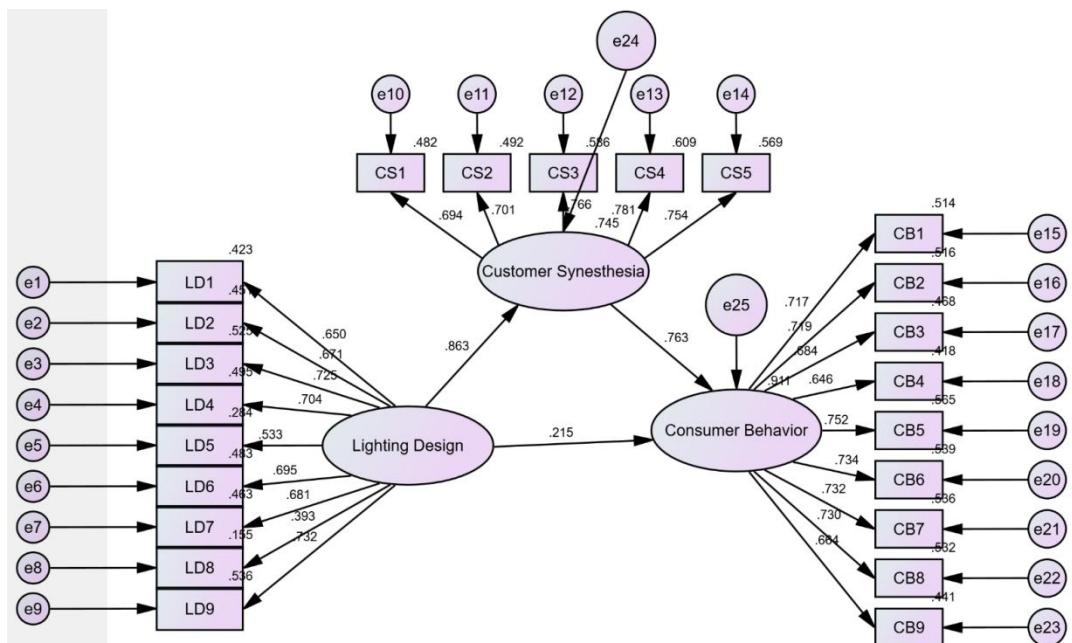
These variables are correlated in a statistically significant manner, and the coefficients of correlation are from 0.73 to 0.83, indicating moderate to strong correlation among these variables. However, these correlations are not sufficient to verify the research hypotheses, which were confirmed by structural equation modelling(SEM) analysis carried out with Amos 24.

Figure 2 presents the SEM results with standardized loadings of each path for the research framework presented in Figure 1, and all paths are statistically significant(see Appendix 3). This SEM model captures the relationships among three core variables and their measurement items. The indicators demonstrated the model has good

fitness(Appendix 2); CMIN/DF is 3.456, lower than 5; RMR is 0.049, less than 0.05; AGFI is 0.861, bigger than 0.8. The total effects, direct effects and indirect effects are presented in Table 2. The path coefficients have been standardized and quantified the strength of the relationships between two variables.

**Table 2.** Standardized effects among LD, CS and CB.

Total Effects			Direct Effects			Indirect Effects				
	LD	CS	CB	LD	CS	CB	LD	CS	CB	
CS	.863	.000	.000	CS	.863	.000	.000	CS	.000	.000
CB	.873	.763	.000	CB	.215	.763	.000	CB	.658	.000



**Figure 2.** SEM model results.

As the for impacts of lighting on customer behaviour, this model found that the direct impact of lighting is 0.215, and the indirect impact is 0.658. This verified research hypothesis H1. This agrees with certain previous studies supporting the effects of colour and lighting on customer behaviour, including Bellizzi and Hite (1992), Babin, Hardesty and Suter (2003) and White et al. (2021). This finding may be explained from the perspective of the consumption pattern transformation Chinese urban customers have been experiencing. Conventionally, Chinese customers stressed quality and pricing, but now modern and growingly rich urban Chinese customers have been stressing “experience” in consumption. Shopping centres enable them to experience modern urban life with leisure and entertainment, especially by offering them attractive lighting effects. In fact, many shopping centres have become landmarks for local cities attracting customers to experience modern urban life and leisure. The public space with lighting effects and strong interior design is found highly attractive to customers and visitors (Bernadetta, 2022). Li, Cheung and Tse (2023) found that the shopping centre’s retail environment should be designed with a customer-centric approach to attract and retain customers.

H2 is verified since distributed lighting is found to have direct effects of 0.863 on customer synaesthesia with SEM analysis. The influences of lighting, especially distributed lighting, on customer synaesthesia and emotions, have been identified via a set of studies, including Bigdeli and Bigdeli (2014) and Gharib and Shohdy (2023). This study’s finding agrees with them.

Similarly, H3 is confirmed since customer synesthesia is found to have direct effects of 0.763 on customer behaviour. When customers have positive emotions upon seeing beautiful and amazing lighting effects at shopping centres, it is highly likely that they will stay longer to see and enjoy such lighting effects, and buy more. Das and Varshneya (2017) confirmed when customers are in a highly aroused and pleasant emotional states, they are more likely to consume. As found by Rahadhini, Wibowo and Lukiyanto (2020), positive emotions enhance hedonic shopping by customers.

With data presented in Table 2, it is easy to calculate that customer synesthesia plays a critical role in the relationship between distributed lighting and customer behaviour. Around 75.3% ( $=0.658/0.873$ ) of the distributed lighting's total effects on customer behaviour is exerted via customer synesthesia. Only 24.6% is direct effects as demonstrated by Table 2. This demonstrates that customer synesthesia has a strong mediating effect. This is the major innovation and contribution of this study. This find stresses the central role of customer emotions in influencing customer shopping behaviour.

Positive emotions incurred by viewing beautiful lighting effects influence how customers perceive the shopping malls offering such lighting effects. When customers have positive emotions because of lighting effects at a shopping centre, they tend to have higher and improved evaluations of this shopping centre, including improved brand image and higher trust. Customer trust is critical for customers to spend, especially for expensive goods and services (Djan and Adawiyyah, 2020). Without trust, consumption, especially of high-value products, is risky due to product quality, post-sales services and even pricing. When customers are in a state of positive emotions, it is likely that they are less alert and more likely to be influenced by marketing campaigns and develop trust in both shopping centres and stores within, thus staying longer and buying more.

What is more, customers tend to evaluate a shopping centre via its interiors. Lighting effect is a critical element of interiors. Attracting and engaging lighting effects demonstrates the strengths and resourcefulness of the shopping centre, which enhances customer trusts. Designing, installing, operating and maintaining engaging lighting effects incurs various types of costs (Gaston et al., 2015), which could be not undertaken by weak shopping centres. This is partly why shopping centres are increasingly using lighting effects to differentiate themselves and attract customers. Lighting effects at public space along with other interiors demonstrate the power and trustworthiness of shopping centres. This is highly beneficial for building customer trusts. Moreover, engaging lighting effects may promote impulsive consumption (Massie, 2006, Ilicic and Baxter, 2021). Iyer et al. (2020) have identified lighting as a contributing factor to impulsive consumption.

## 5. Conclusion, Implications and Limitations

Under the context that Chinese shopping centres are facing operational challenges, they are resorting to lighting design and effects for attracting and retaining customers. All research questions are answered effectively with SEM analysis. This study fills the gap about the influences of distributed lighting at public space in shopping centres on customer behaviour. It confirms that distributed lighting has positive impact on both customer behaviour and customer synesthesia, which further impacts customer behaviour. This study enriches the literature pool about lighting and colour and customer behaviour.

This study is innovative in that it confirms the strong mediating role of customer synesthesia, namely customer emotional and psychological responses to lighting, in the relationships between lighting and customer behaviour. This is the major theoretical contribution of this study. This study explains this mediating effect from perspectives such as customer decision making processing, customer trust, and impulsive consumption. This study stresses the role of emotions in customer purchasing and recommendation, and identifies that lighting effects at shopping centre public space as a major effective tool for creating and shaping customer emotions.

Apart from theoretical contributions, it has various practical implications. First, lighting should receive sufficient attention, especially for public space at shopping centres. Most retailers have put sufficient attention and energy

327 in in-store lighting design, and many of them ignores lighting design in the public space. Second, lighting usually  
328 does not functions alone, and it should be adopted and well-integrated with various other servicescape elements  
329 such as colour, music, and decorations to attract and retain customers. Third, marketing practitioners should place  
330 influencing customer emotions at their first priority. Customers are highly emotional rather than reasonable under  
331 most cases. Marketing and retailing should create environments where customers could relax and arouse, and  
332 enjoy.

333 This study has various advantages. It has a sufficiently big sample and it adopted SEM analysis, increasing the  
334 validity and reliability of its findings. It still has certain limitations. First, the concept of customer synesthesia is  
335 controversial. Certain scholars disagree that customer responses to certain colours as warm colours are a form of  
336 synesthesia, such as Ou et al. (2012) and Hardin (2000). They hold them as the result of cultural and social  
337 conditioning. Second, this study is over-simplified since it does not further explore the various dimensions of  
338 these three key variables. For instance, it does not explore which elements of distributed lighting such as  
339 brightness, warmth, and pleasantness, have most impact on customer synesthesia and behaviour. Third, this  
340 study is based on quantitative data alone. It lacks details about how and why lighting influences customer  
341 synesthesia and purchase behaviour.

342 These limitations point out areas for further studies. Future studies could further focus on specific dimensions of  
343 lighting design and customer behaviour, or a type of customer emotions incurred by lighting. Further studies may  
344 adopt a qualitative approach to explore and interpret why lighting influences customer feelings and purchase  
345 behaviour via gathering data with in-depth interviews and focus groups.

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## Appendix 1: Survey instruments

Questions	Variables
1. Please indicate your gender.	Gender
2. Please indicate your age	Age
3. Please indicate the range of your monthly income in RMBs?	Income
4. How often do you visit shopping centres?	Frequency of visiting shopping centres
5. What is the most common time period for you to visit shopping centres?	Time of visiting shopping centres
6. Upon entering a shopping centre, the lighting in public areas is spacious and bright.	
7. Upon entering a shopping centre, the lighting in the product display area is uniform and distinctive.	
8. Upon entering a shopping centre, I am often attracted by the lighting effects in the public space.	
9. Upon entering a shopping centre, I often subconsciously walk or stroll along the illuminated paths.	
10. Upon entering a shopping centre, I try to avoid places with obviously dim lighting.	Distributed Lighting
11. Upon entering a shopping centre, I prefer warm and cozy lighting colours.	
12. Upon entering a shopping centre, products illuminated by lighting attract my attention.	
13. Upon entering a shopping centre, I quickly avoid constantly flickering lights.	
14. Upon entering a shopping centre, seeing exquisite and unique lighting makes it unforgettable.	
15. In a shopping centre, the lighting effects often make me feel at home.	
16. In a shopping centre, the lighting effects make me happy and often remind me of my family or friends.	
17. In a shopping centre, the lighting effects make me happy and often trigger my impulse to spend.	Customer Synesthesia
18. In a shopping centre, the lighting effects make me happy and create a leisurely feeling from consumption.	
19. In a shopping centre, the lighting effects make me happy and continually enhance and enrich my shopping experience.	
20. As a consumer, I prefer to follow the guidance of lighting to find merchants and shops.	
21. As a consumer, I am more likely to choose products at booths focused and highlighted by lighting.	
22. As a consumer, I prefer to spend more time in well-lit shopping centres.	
23. As a consumer, the longer I stay in well-lit shopping centres, the more likely my spending will exceed my budget.	
24. As a consumer, my shopping behavior is often closely related to the leisure and entertainment lighting show in the shopping centre.	
25. As a consumer, I am willing to increase the frequency and number of times I consume in shopping centres with attractive lighting effects.	Consumer Behavior
26. As a consumer, my shopping experience is often inseparable from the lighting experience in the shopping centre.	
27. As a consumer, I am happy to introduce shopping centres with unique and characteristic lighting effects to friends.	
28. As a consumer, I am willing to share my shopping centre consumption experience on social media.	

490 **Appendix 2: Model fitness summary**

491 **CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	49	784.471	227	.000	3.456
Saturated model	276	.000	0		
Independence model	23	7617.387	253	.000	30.108

492 **RMR, GFI**

Model	RMR	GFI	AGFI	PGFI
Default model	.049	.882	.857	.726
Saturated model	.000	1.000		
Independence model	.447	.184	.109	.168

493 **Baseline Comparisons**

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.897	.885	.925	.916	.924
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

**Appendix 3: Path Regression Weight**

			Estimate	S.E.	C.R.	P	Label
CS	<---	LD	.927	.057	16.385	***	par_21
CB	<---	CS	.800	.081	9.863	***	par_22
CB	<---	LD	.242	.075	3.232	.001	par_23
LD1	<---	LD	.746	.049	15.294	***	par_1
LD2	<---	LD	.800	.050	15.932	***	par_2
LD3	<---	LD	1.000				
LD4	<---	LD	.975	.058	16.810	***	par_3
LD5	<---	LD	.723	.058	12.518	***	par_4
LD6	<---	LD	.801	.049	16.318	***	par_5
LD7	<---	LD	.809	.050	16.056	***	par_6
LD8	<---	LD	.567	.062	9.157	***	par_7
LD9	<---	LD	.957	.055	17.372	***	par_8
CS1	<---	CS	.893	.051	17.426	***	par_9
CS2	<---	CS	.990	.056	17.691	***	par_10
CS3	<---	CS	1.000				
CS4	<---	CS	.950	.047	20.140	***	par_11
CS5	<---	CS	.896	.047	19.260	***	par_12
CB1	<---	CB	.893	.050	18.007	***	par_13
CB2	<---	CB	.787	.044	17.884	***	par_14
CB3	<---	CB	.770	.046	16.871	***	par_15
CB4	<---	CB	.868	.053	16.296	***	par_16
CB5	<---	CB	1.000				
CB6	<---	CB	.821	.045	18.445	***	par_17
CB7	<---	CB	.886	.048	18.587	***	par_18
CB8	<---	CB	.936	.051	18.435	***	par_19
CB9	<---	CB	.880	.053	16.566	***	par_20

# **REVIEW REPORT**

# Review Report

1. How do you rate the **significance** of the research (in a scale of 1 to 5 with 5 being the most significant)? 3
2. How do you rate the **originality** (in a scale of 1 to 5 with 5 being the highest)? 4
3. How do you rate the experimental **design** and quality of **data** (in a scale of 1 to 5 with 5 being the highest)? 4
4. Is the **organization** of the article appropriate? 4
5. Did you find any **language** problem? No
6. Your **decision** for this manuscript: ~~accept, minor, major or reject~~
7. **Comments to the Editor** (Confidential):

Dear Editor. This research topic is quite interesting and has been well written and structured. I recommend improvements to be made according to the notes I provided. Thank you

8. **Comments to the Author:**

The topic of the paper is quite interesting and the paper is well presented. However, I recommend some improvements to the presentation of the paper as follows:

- a. The research contribution expressed in the paper is lacking. We found only in the abstract section stating that the innovative contribution is to link synesthesia with customer behavior through strong mediation effects. The description of the contribution can be presented in the introduction section so that it can be described in detail and completely.
- b. Recent references are still lacking. It is necessary to add references with appropriate topics and published within the last 3 years.
- c. The literature review has not shown the novelty of the research conducted. It is better to present an explanation of the summary of previous publications so that the novelty of the research becomes very clear. Presentation of a summary of the literature review in a table will greatly assist the reader in understanding the novelty of the research conducted.



Sujono &lt;sujono@budiluhur.ac.id&gt;

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## Re: [JIPD ISSN 2572-7931] (Scopus) JIPD-11242 Article Review Request

Sujono <sujono@budiluhur.ac.id>  
To: Elisabeth Aiden <elisabeth.aiden@enpress-pub.net>

Tue, Feb 11, 2025 at 12:11 PM

Dear Elishabet Aiden  
In accordance with the request for review of the paper JIPD-11242 with the title :

**The impacts of distributed lighting in the public space of Chinese shopping centres on customer behaviour**

I hereby submit the results of the review.  
Thank you

Kind regards  
Sujono

On Wed, Feb 5, 2025 at 8:39 AM Elisabeth Aiden <elisabeth.aiden@enpress-pub.net> wrote:  
Dear Sujono,

Sorry for the late reply, and good day to you!

Thank you for the kind response. It is great that you are willing to review the paper.  
I've included the whole paper and its review form in the attachment for you to review.  
Please send me the report after the review, and I will be honored to complete the submission.  
**If you are still willing to review this manuscript, please send it back before 12 Feb.** Please let me know if you have any additional questions.

I'm looking forward to hearing from you whenever you get a chance.

Regards,  
Elisabeth

On Fri, Jan 31, 2025 at 10:59 AM Elisabeth Aiden <elisabeth.aiden@enpress-pub.net> wrote:  
Thank you for your email. I am currently out of the office and will not be available until February 6th. During this time, I will have limited access to email and may not be able to respond immediately.  
Please leave a message, and I will get back to you as soon as possible upon my return.  
Thank you for your patience.

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Best regards,  
Elisabeth Aiden  
Assistant Editor  
Email: [elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)

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 06 Review report.pdf  
9K



Sujono <sujono@budiluhur.ac.id>

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## Re: [JIPD ISSN 2572-7931] (Scopus) JIPD-11242 Article Review Request

**Elisabeth Aiden** <elisabeth.aiden@enpress-pub.net>  
To: Sujono <sujono@budiluhur.ac.id>

Tue, Feb 11, 2025 at 12:40 PM

## **ACKNOWLEDGEMENT**

Dear Sujono,

Thanks for taking the time to review the article in our journal. Your comments are very valuable to the authors and I am sure they will revise the article carefully to improve the quality. We hope to complete the review of this article as soon as possible to present the best academic content to our readers.

I will be sure to contact you if I have any suitable manuscripts in the future if you are still willing to review them.

Thank you again for your valuable time and professional advice, and we wish you all the best in your work!

Regards,  
Elisabeth

On Tue, Feb 11, 2025 at 1:11 PM Sujono <[sujono@budiluhur.ac.id](mailto:sujono@budiluhur.ac.id)> wrote:

Dear Elishabet Aiden

In accordance with the request for review of the paper JIPD-11242 with the title :

**The impacts of distributed lighting in the public space of Chinese shopping centres on customer behaviour**

I hereby submit the results of the review.

Thank you

Kind regards  
Sujono

On Wed, Feb 5, 2025 at 8:39 AM Elisabeth Aiden <[elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)> wrote:

Dear Sujono,

Sorry for the late reply, and good day to you!

Thank you for the kind response. It is great that you are willing to review the paper.

I've included the whole paper and its review form in the attachment for you to review.

Please send me the report after the review, and I will be honored to complete the submission.

**If you are still willing to review this manuscript**, please send it back before **12 Feb**. Please let me know if you have any additional questions.

I'm looking forward to hearing from you whenever you get a chance.

Regards,  
Elisabeth

On Fri, Jan 31, 2025 at 10:59 AM Elisabeth Aiden <[elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)> wrote:

Thank you for your email. I am currently out of the office and will not be available until February 6th. During this time, I will have limited access to email and may not be able to respond immediately.

Please leave a message, and I will get back to you as soon as possible upon my return.

Thank you for your patience.

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Best regards,  
Elisabeth Aiden  
Assistant Editor  
Email: [elisabeth.aiden@enpress-pub.net](mailto:elisabeth.aiden@enpress-pub.net)