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Identifying design performance factors for effective shopping center design

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Abstract
Effective and sustainable design is essential for the survival of shopping centers in a fiercely competitive business landscape. The success of shopping centers is primarily contingent on the retail stores' sales performance. The objective of this manuscript is to pinpoint and rank the design performance variables for an effective shopping center design and effective sales performance of the retail stores. The measurement factors influencing the retail stores' sales performance were identified after a thorough review of literature. To assess the content validity of the identified measurement factors, researchers conducted interviews with seven retail experts and three customers using the expert judgment method. Each factor received an evaluation value based on their responses. During the process, experts identified additional factors through unrestrictive questions, while less significant factors were abolished. The results disclosed a modified list of measurement factors impacting sales performance. Successively, 16 retail store managers with over 15 years of experience evaluated each factor via a questionnaire survey. Respondents ranked the most crucial factors as 'brand variety', 'presence of carpark', 'heating/ventilation/air conditioning (HVAC) comfort', 'shopping center lighting design'. The findings are discussed in detail and compared to the findings of the expert judgement.policies for coastal areas and calls for a broader public discussion.

Keywords
Retail store design performance, Retail store sales performance, Shopping center design criteria, Shopping center design efficiency.

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1. Introduction

Retail developments constitute a major portion of the economy because they are considered as one of the most secure investment models as they promise a long-term and consistent revenue for the investment (Ying & Alias, 2022). Furthermore, the retail sector holds a prominent position in the economy due to its wide-ranging scope, encompassing various sub-sectors like ready-to-wear textiles, food and beverages, services, electronics. Consequently, the imperative of ensuring the effectiveness and long-term viability of the retail sector becomes readily apparent, as its faltering or recessionary trends could significantly curtail the prosperity of numerous affiliated sub-sectors. Shopping center investments majorly govern the retail industry. Effective and sustainable investments in the retail sector play a pivotal role in bolstering the retail industry and its various subdivisions. Therefore, the shopping center investments' performance holds immense significance in the realm of economic development.

In the ever-increasing competitive landscape of the retail industry, characterized by the rise of e-commerce, the proliferation of retail centers, and the reduction in purchase capacity, new challenges have emerged for retail investments. Given these challenges, shopping center investments must evolve and implement new models to achieve heightened efficiency, productivity, feasibility, and sustainability. The success of shopping centers hinges on a multifaceted set of factors, including their location, accessibility, architectural design, tenant mix, size, the conceptual approach of the shopping center, and most notably, the performance of the individual retail establishments, as underscored by Bakhshizadeh et al. in 2017. High-performing retail stores not only remain within the shopping center but also serve as magnets for visitors, thus making substantial contributions to the overall performance of the shopping center.

On the other side, retail stores which do not have sufficient sales performance are subject to close or to be removed from the shopping center. Consequently, the sales performance of the retail stores is crucial for the sustainability of the shopping center.

The primary focus of this paper centers on the sales performance of retail units situated inside a shopping center and it discusses in detail the factors that impact the sales performance of retail stores. At the initial stage, the researchers created a clear frame and scope of work, where the study examines the criteria for evaluating the retail units' sales performance, which may differ for diverse retail stores. This study omits the predetermined criteria for evaluating the sales performance of retail stores, which are established during the investment feasibility phase. These criteria include factors like location, shopping center dimensions, and shopping center category. These factors are fixed design inputs and remain unchanged following the establishment of the shopping center investment. Nonetheless, sales performance factors for retail stores, such as shop dimensions, shop design, lighting design, and vertical circulation, are significant factors that can differ between one retail unit and another. This study seeks to determine the variables that influence the retail units' sales performance and to assess the significance of these measurement factors.

As discussed more in detail in the Methodology section, researchers determined the sales performance factors of retail stores after an intensive review of literature. Following the literature review, researchers realized an expert judgement and a main study about the evaluation of each factor. Consequently, the findings of both studies are discussed in detail, and they are compared to each other. Finally, this paper consolidates a set of retail store sales performance factors.

2. Research background

By means of extensive literature research, researchers have identified the specific criteria for retail store sales performance which will allow the assessment of factors influencing sales performance. The research background is delimited by keywords, including shopping center design, shop performance, and the overall efficiency

of shopping center design. Researchers analyzed in detail twenty-two major scientific papers about the topic and created a list of performance factors through these papers.

Retail store performance factors such as retail store interior design, shopwindow design, retail store lighting design, retail store dimensions and floor height appear in studies by Yılmaz Çakmak and Yılmaz (2018), Kusumowidagdo et al. (2011), Nebati and Ekmekçi (2019), Webber et al. (2018) and. The last 2 authors focused also on the performance factors related to the placement of the retail unit inside the shopping center. Webber et al. (2018) conducted a study on the remodeling of retail units to enhance their performance. This study delves into the numerous criteria that impact the performance of retail stores and presents strategies for modifying them to enhance shop performance. The study has identified several criteria for evaluating retail store performance. These criteria include shop design, location of the retail unit within the retail center, the shopping center's architectural design, the choice of floor covering materials in public premises, heating/ventilation/air conditioning comfort inside retail center, the overall lighting concept, noise levels, indoor signs.

Another notable research realized by Köksal and Tığlı in 2018 involved a descriptive content analysis. This analysis examined a total of twenty master's theses, thirteen PhD dissertations, and twenty research studies focused on consumer behavior within shopping centers in Turkey. The study identified several major retail store performance criteria, including closeness to key areas such as the food hall, kids' playground, supermarket, event area, customer service centers, and center entrances. Additionally, factors such as indoor climate control systems' comfort, noise levels, resting areas' physical comfort, shopping center accessibility, closeness to the car park, the range of services provided within the shopping center, effective sanitation services, brand diversity, the existence of a leisure center, security measures, availability of a cultural performance hall within the retail center were observed as significant criteria in the study. Retail store performance factors related to the placement of the retail unit in the shopping center appear in the study by Köksal and Tığlı (2018) as well as by Lee (2010), which studies the relationship between the cultural and event areas of the shopping center and the retail stores' performance.

Building design performance factors such as intelligent building technologies, effective utilization of energy and water, the shopping center's design, the flooring material used in public spaces, daylight in retail center appear in the studies by Nebati and Ekmekçi (2019), Jalil Abdullah and Jian (2019), Bakhshizadeh et al. (2017) and John et al. (2016). In overall, these studies examine the impact of these building design performance factors on the retail unit performance.

The research carried out by Chotipanich and Issarasak in 2017 primarily focuses on key performance factors that include the efficiency of fire exit scenarios, the carpark scenario within the shopping center, the security measures and the effectiveness of sanitation services. This study explores facility management operation strategies aimed at improving performance within shopping centers.

Researchers extracted four significant building performance factors from Kısa's master's thesis (2017). These factors include the efficiency of fire escape scenarios, the closeness to fire exit passageways, the existence of a car park within the shopping center complex, and the existence of security personnel and x-ray equipment in the facility.

Another important factor for retail unit performance and shopping center performance is the daylight presence in the building according to the study made by Solovyev (2018). The study argues that spaces flooded by daylight bring more comfort and confidence to the building users. Daylight perception factor appears also in studies by Yılmaz Çakmak and Yılmaz (2018) and Nebati and Ekmekçi (2019). Mayhoub and Rabboh (2022) claim that the daylight perception has a major impact on the customers' satisfaction. El-Abd et al. (2018) also focus on daylighting

performance in shopping centers. Another study about the daylight in retail buildings emphasizes the impact of daylight on energy consumption and thermal performance of shopping centers (Prakash et al., 2021).

Building services performance factors such as brand mix, management service variety, branch mix, service effectiveness, marketing activities appear in the studies by Bakhshizadeh et al. (2017), Burnaz and Topçu (2011), Köksal and Tığlı (2018) and Xu et al. (2022).

As explained in previous paragraphs, studies examined during the literature review do not classify the performance factors according to their variable groups, as shown in Table 1. Therefore, they do not compare the variable groups as a whole. In contrast to the studies covered among literature review, this research endeavors in assessing factors influencing retail unit sales performance through the examination of three distinct groups of dependent variables: building design performance, retail unit design performance, and building services performance. Researchers seek to discuss the interrelationships among the performance factors within these three dependent variables and to compare the importance levels of the dependent variables. Therefore, this study targets to cover a missing analysis point in the previous studies (see Table 1).

3. Methodology

A thorough literature review identified fifty-two performance measurement factors. Researchers grouped this list of factors into three primary domains: 'retail store design', 'building design', 'building services'. The "retail store design" dependent variable is associated with both retail unit interior design and its positioning inside the facility. Factors like "lighting design within the retail unit," "shop window design," and "closeness to center entrances" fall within this variable category. The second dependent variable "building design" is contingent upon architectural, structural, electrical, mechanical design aspects of retail center, established upon the center's design stage and applicable to all retail stores within. Aspects like "shopping center floor height," "heating/ventilation/air conditioning (HVAC) comfort" and "number of entrances" exemplify building design factors. The final dependent variable encompasses criteria for "building services," that pertain to services supplied by shopping center management. Elements like "security services" and "sanitation services" fall under this domain and are consistent across all retail units in the shopping center.

Following the classification of criteria for measuring retail unit perfor-

Table 1. *Performance factors categorized via literature review.*

Performance Factors	References
Retail unit interior design; Shopwindow design	Nebati and Ekmekçi (2019), Çakmak and Yilmaz (2018), Kusumovidagdo et al. (2012), Weber et al. (2018)
Lighting design of retail unit	Nebati and Ekmekçi (2019), Çakmak and Yilmaz (2018), Kusumovidagdo et al. (2012)
Retail unit dimensions; Retail unit floor height	Kusumovidagdo et al. (2012)
Location of the retail unit in shopping center	Nebati and Ekmekçi (2019), Weber et al. (2018)
Visibility of retail unit	Weber et al. (2018)
Closeness of retail unit to main cores of the shopping center, to event area	Köksal and Tığlı (2018), Lee (2010)
Closeness of retail unit to supermarket, to kids playground, to event area	Köksal and Tığlı (2018)
Closeness of retail unit to food court	John et al. (2016), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012)
Closeness of retail unit to delivery yard	Kusumovidagdo et al. (2012)
Closeness of retail unit to customer wet cores	Abdullah and Jian (2019), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012)
Closeness of retail unit to main entrances	Abdullah and Jian (2019), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012)
Smart building technologies used in shopping center; Efficient use of water and energy; Open-air vs enclosed center concept; Floor level of retail unit	Nebati and Ekmekçi (2019)
Architectural design of the shopping center	Abdullah and Jian (2019), Nebati and Ekmekçi (2019), Weber et al. (2018), Bakhshizadeh et al. (2017)
Number of floor levels of the shopping center	John et al. (2016), Kusumovidagdo et al. (2012)
Shopping center corridor width	Abdullah and Jian (2019)
Shopping center common area floor cladding material	Abdullah and Jian (2019), Nebati and Ekmekçi (2019), Kusumovidagdo et al. (2012), Weber et al. (2018)
Building materials used in the shopping center; Shopping center floor height	Kusumovidagdo et al. (2012)
Physical comfort in the shopping center; HVAC comfort in the shopping center	Abdullah and Jian (2019), Nebati and Ekmekçi (2019), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012)
Lighting design concept of the shopping center	Kusumovidagdo et al. (2012), Weber et al. (2018)
Noise level in the shopping center	Köksal and Tığlı (2018), Weber et al. (2018)
Accessibility of the shopping center by handicapped people; Physical comfort of resting areas	Abdullah and Jian (2019), Köksal and Tığlı (2018)
Closeness of the retail unit to the vertical circulation	Abdullah and Jian (2019), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012)
Effectiveness of the fire escape scenario	Kısa (2015), Chotipanich and Issarasak (2017)
Closeness of the retail unit to the fire exit passageways	Kısa (2015)
Existence of carpark	Kısa (2015), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012), Chotipanich and Issarasak (2017)
Closeness of the retail unit to the carpark	Köksal and Tığlı (2018), Kusumovidagdo et al. (2012), Chotipanich and Issarasak (2017)
Whether the carpark is free of charge or not	Kusumovidagdo et al. (2012), Chotipanich and Issarasak (2017)
Daylight perception in the shopping center	Solovyev (2018), Çakmak and Yilmaz (2018), Nebati and Ekmekçi (2019), Wessau et al. (2018)
Effectiveness of the guidance signboards	Abdullah and Jian (2019), Kusumovidagdo et al. (2012), Weber et al. (2018)
Range of management services	Nebati and Ekmekçi (2019), Köksal and Tığlı (2018)
Existence of ATM machines	Abdullah and Jian (2019)
Existence of info desk	Abdullah and Jian (2019), Köksal and Tığlı (2018)
Effectiveness of sanitation services	Köksal and Tığlı (2018), Chotipanich and Issarasak (2017)
Brand range	Nebati and Ekmekçi (2019), Köksal and Tığlı (2018), Kusumovidagdo et al. (2012), Burnaz and Topçu (2011)
Branch mix in the shopping center; Existence of kiosques	Kusumovidagdo et al. (2012)
Existence of an entertainment center; Closeness of the retail unit to the entertainement center	Nebati and Ekmekçi (2019), Köksal and Tığlı (2018)
Existence of x-ray machines and security guards	Kısa (2015), Köksal and Tığlı (2018), Abdullah and Jian (2019), Chotipanich and Issarasak (2017)
Existence of a cultural center; Closeness of the retail unit to the cultural center	Köksal and Tığlı (2018)
Marketing activities	Kusumovidagdo et al. (2012), Bakhshizadeh et al. (2017)

mance, researchers converted these factors into declarations aiming at assessing the significance of every factor. These declarations designed for examining the domains reflect the significance of the dependent variables. In total, the final list includes three dependent variables with fifty-two factors.

To verify the validity of content for "retail unit sales performance," researchers employed the expert judgment method by conducting interviews with a panel of experts. This expert group comprised professionals with more than a decade of experience in different facets of the retail industry. The expert group initially involved seven individuals such as one distinguished architect, one shopping center manager, one shopping center operations director, one deputy general manager serving as leasing director and three retail store managers. In addition to the professionals, three shopping center customers also took part in this expert group to provide insights from a customer perspective. These participants assessed the retail unit sales performance measurement factors by utilizing a Five-Point Likert scale, where 5 represented "strongly agree," and 1 represented "strongly disagree." The responses to each factor were assigned a factor loading, indicating the influence degree for every factor. In this expert judgement, the retail unit design performance dependent variable is assessed using twenty-one factors; the building design performance dependent variable measured by using nineteen factors; finally, the building services performance dependent variable measured by using twelve factors. Towards the conclusion of the questionnaire, researchers also included four open-ended questions, allowing respondents to offer new performance measurement factors based on their valuable insights and experiences.

Following ten experts' interviews, researchers computed the importance rankings for each dependent variable and each factor through the calculation of the arithmetic mean. Subsequently, they assessed the new performance measurement factors proposed by the participants through the open-ended questions and incorporated them into the existing list. Meanwhile they eliminated less important factors. As a result, a refined and comprehensive list of instruments for measuring retail store sales performance was established, demonstrating content validity.

After the content validation of retail unit sales performance factors via expert group judgement method and the evaluation of the expert group judgement, as shown in Figure 1, the studies for the main study initiated in August 2020. The main study aimed to test and consolidate the results of the expert judgement and to enhance the list of factors influencing the retail store's sales performance. The main study group consisted of sixteen retail store managers from the shopping center in Gaziantep, Turkey. The sixteen retail stores belong to diverse retail branch mix such as textile, prêt-à-porter, cosmetics, food & beverage, personal care, electronics. This diversity of retail branch mix enriches the evaluation of the answers and the findings of the main study.

Following the expert judgement results, researchers made some adjustments in the performance factors' list for the main study questionnaire. In the retail store design performance dependent variable group, they subtracted the lowest ranked four factors. Contrarily to the retail unit design performance factors, in the building services performance variable they added two more factors suggested by the expert judgement committee. For building design performance dependent variable, the expert group suggested three more factors and the researchers added these three factors into the factors group. Finally, the questionnaire comprised of seventeen retail store design performance factors, fourteen building services performance factors and twenty-two building design performance factors.

Subsequently, researchers created a questionnaire. In the questionnaire, they revised and improved the statements consolidated by the expert judgement and measuring the rank of significance of the factors influencing the three dependent variables: retail unit design performance, building

services performance, building design performance. Following these three sections, they created a new section for measuring the retail unit sales performance factors because the expert group emphasized the necessity of a separate section consisting of retail unit sales performance factors. Consequently, researchers sorted out from the literature the key performance indicators for retail stores, and they inserted them into the questionnaire in the section of the retail unit sales performance.

Additionally, an expert panel of five experts (with +15 years' experience) evaluated the list of performance factors and the whole questionnaire, and they suggested some new questions to further develop the questionnaire. The new questions comprised of four following topics:

- The effect of the sociological background in the city to the retail store performance,
- Online sales versus traditional sales,
- The customer habits which have been changed after the Covid-19 pandemic,
- The retail sector/shopping center trends which attract customers most.

After the addition of these four questions, the final questionnaire of the main study consisted of seventy-three statements/questions. Seventeen statement/questions belong to retail store design performance factors, fourteen to building services performance factors, twenty-two to building design performance factors, eighteen to retail store sales performance factors. Finally, the last two questions are general open-ended questions which are not categorized under a specific dependent variable group. The whole final questionnaire is presented via a questionnaire link. Every factor received a loading score, indicating influence extent, by utilizing the Five-Point Likert scale (with 5 representing "strongly agree" and 1 representing "strongly disagree"). The final questionnaire was sent to sixteen retail store managers with over 15 years of experience in the shopping center in Gaziantep City, followed by the sequences explained in Figure 1 (see Figure 1).

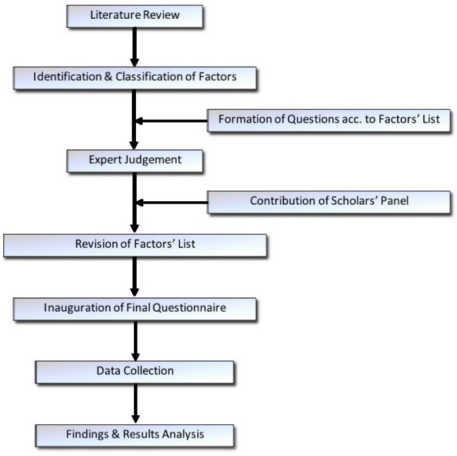

Figure 1. *Methodology flow chart of the study.*

4. Findings

Numerous factors, classified into three primary domains – retail unit design, building design, and building services, have an impact on the retail unit's sales performance. In the expert judgement among the 52 factors measuring the performance, 21 factors measured the retail store design performance dependent variable, 19 factors measured the building design performance dependent variable, and 12 factors measured building services performance dependent variable. The findings of the study will be presented according to these three categories. First, the importance level of factors will be evaluated within their own categories, then they will be compared in the overall factors' list.

In the retail store design performance dependent variable, the expert committee identified 'shop visibility' and 'retail unit interior design' as two most crucial factors influencing retail unit sales performance. Regarding the standard deviation values, respondents are mostly consolidated around these two factors' importance rank. However, respondents have diversified views on 16 factors out 21 retail store design performance factors as these factors have standard deviation values higher than 1 ($\sigma > 1$). Among the 5 statistically significant factors, respondents ranked the 'floor height of the shop' at the bottom line.

Within the realm of building de-

sign performance, survey respondents pinpointed 'the existence of a car park' as the most critical factor influencing retail store sales performance. Respondents' views are totally consolidated around this factor. On the other hand, 7 out of 19 building design performance factors are not statistically significant as their standard deviation values are greater than 1. Among the statistically significant factors, 'the floor height of shopping center' and 'the construction materials used' received the lowest score.

In the context of building services performance, the expert group unanimously designated 'the variety of brands in the shopping center' as the most significant factor impacting retail unit sales performance, with complete consensus among the experts ($\sigma = 0$). Amidst the 12 factors assessing the building services performance dependent variable, 5 factors' standard deviation values show that the respondents' views are diversified. 'The presence of security guards and x-ray machines' got the lowest importance rank.

Irrespective of the category of dependent variables, the expert group consistently identified the pinnacle as follows: 'existence of carpark' and 'range of brands' (both with mean scores: 5.00). Additionally, they considered 'retail store visibility' (mean score: 4.90), 'shop interior design' (mean score: 4.90) 'marketing activities conducted in the shopping center' (mean score: 4.80), 'retail store lighting design' (mean score: 4.80), and 'the effectiveness of sanitation services' (mean score: 4.80) as the most significant contributors to the retail unit sales performance. The ranking of all the three category performance factors (retail unit design performance, building design performance, building services performance) by the expert judgement are listed in Table 2. Researchers did not take into consideration the factors with standard deviation values greater than 1 (marked as bold), as respondents have diversified views about these factors (see Table 2).

Following the expert judgement results, researchers made some adjustments in the performance factors' list (as explained in the methodology section) for the main study questionnaire. According to the revision made after the expert judgement method, 17 factors measure the retail store design performance dependent variable, 14 factors measure the building services performance dependent variable, and 22 factors measure the building design performance dependent variable.

In the main study results, among the retail store design performance dependent variable group, respondents rank the following factors as the most important ones with mean scores of 4.80 each: 'the retail unit's lighting design', 'the shop window design' and 'the location of the retail unit in the shopping center'. Respondents have mostly consolidated views on these factors. However, respondents have diversified views on 7 factors (out of 17) with standard deviation values greater than 1.

The main study reveals the most significant factors' ranking of the building design performance dependent variable as following: 'the presence of carpark', 'the HVAC comfort' and 'the shopping center's lighting design concept' with 4.90 mean score each. Respondents consolidated their views around these factors with standard deviations $\sigma = 0{,}34$ and 0,25 successively.

Among the building services perfor-

Table 2. *Expert judgement results of dependent variables.*

Shop Design Performance			Building Design Performance			Building Services Performance		
Factors	Mean	SD	Factors	Mean	SD	Factors	Mean	SD
Visibility of the retail unit	4,9	0,32	Existence of carpark	5	0,00	Brand range	5	0,00
Shop interior design	4,9	0,32	HVAC comfort in the shopping center	4,6	0,70	Effectiveness of sanitation services	4,8	0,42
Lighting design of the retail unit	4,8	0,63	Architectural design of the shopping center	4,6	0,52	Marketing activities	4,8	0,42
Shop window design of the retail unit	4,7	0,95	Shopping center corridor width	4,4	0,70	Whether the carpark is free of charge or not	4,6	0,52
Location of the retail unit in the shopping center	**4,4**	**1,26**	Physical comfort in the shopping center	4,4	0,70	**Branch mix in the shopping center**	**4,4**	**1,07**
Closeness of the retail unit to the vertical circulation	**4,3**	**1,06**	Noise level in the shopping center	4,4	0,70	**Existence of ATM machines**	**4,4**	**1,26**
Retail unit dimensions	**4,2**	**1,03**	Physical comfort of resting areas	4,3	0,82	Existence of info desk	4,3	0,67
Floor level of the retail unit	**4,1**	**1,45**	Lighting design concept of the shopping center	4,2	0,92	Range of management services	4,2	0,92
Closeness of the retail unit to the entrances	**4**	**1,05**	Effectiveness of the guidance signboards	4,1	0,99	Existence of x-ray machines and security guards	4,1	0,99
Closeness of the retail unit to the main cores	**3,9**	**1,20**	Open-air vs enclosed center concept	4	0,94	**Existence of a cultural center**	**4**	**1,25**
Closeness of the retail unit to the carpark	**3,8**	**1,14**	Shopping center floor height	3,9	0,99	**Existence of an entertainment center**	**3,9**	**1,29**
Floor height of the retail unit	3,6	0,70	**Number of floor levels of the shopping center**	**3,9**	**1,37**	**Existence of kiosques**	**3,8**	**1,14**
Closeness of the retail unit to the entertainment center	**3,3**	**1,64**	Building materials used in the shopping center	3,9	0,88	-----	-----	-----
Closeness of the retail unit to the supermarket	**3,1**	**1,52**	**Accessibility of the shopping center by handicapped people**	**3,9**	**1,29**	-----	-----	-----
Closeness of the retail unit to the cultural center	**3,1**	**1,45**	**Smart building technologies used in the shopping center**	**3,7**	**1,34**	-----	-----	-----
Closeness of the retail unit to the kids playground	**3**	**1,25**	**Shopping center common area floor cladding material**	**3,6**	**1,17**	-----	-----	-----
Closeness of the retail unit to the fire exit passageways	**3**	**1,63**	**Efficient use of water and energy**	**3,1**	**1,20**	-----	-----	-----
Closeness of the retail unit to the event area	**2,7**	**1,16**	**Daylight perception in the shopping center**	**3,1**	**1,20**	-----	-----	-----
Closeness of the retail unit to the delivery yard	**2,7**	**1,25**	**Effectiveness of the fire escape scenario**	**3**	**1,63**	-----	-----	-----
Closeness of the retail unit to the food court	**2,5**	**1,43**	-----	-----	-----	-----	-----	-----
Closeness of the retail unit to the customer wet cores	**2,5**	**1,35**	-----	-----	-----	-----	-----	-----

mance dependent variable's factors, the respondents in the main study regard 'the brand range in the shopping center' as the most critical factor influencing retail unit sales performance, assigning it a mean score of 5.00. Also, this factor reflects a total consolidation of respondents' views (σ=0). 'The effectiveness of sanitation services' (mean score: 4.80) and 'the branch mix in the shopping center' (mean score: 4.70) come as the 2nd and the 3rd most important factors. None of the building services performance factors reflect diversified views, all these factors have standard deviation values below 1 (σ <1).

As per the main study, the rankings of factors across all three performance categories (shop design performance, building design performance, and building services performance) can be found in Table 3. The factors marked as bold reflect the factors where respondents have diversified views with (σ >1) (see Table 3).

Table 3. *Main study results of dependent variables.*

Shop Design Performance			Building Design Performance			Building Services Performance		
Factors	**Mean**	**SD**	**Factors**	**Mean**	**SD**	**Factors**	**Mean**	**SD**
Lighting design of the retail unit	4,8	0,45	Existence of carpark	4,9	0,34	Brand range	5	0,00
Shop window design of the retail unit	4,8	0,58	HVAC comfort in the shopping center	4,9	0,25	Effectiveness of sanitation services	4,8	0,58
Location of the retail unit in the shopping center	4,8	0,58	Lighting design concept of the shopping center	4,9	0,25	Branch mix in the shopping center	4,7	0,48
Floor level of the retail unit	4,7	0,48	Accessibility of the shopping center by handicapped people	4,8	0,40	Whether the carpark is free of charge or not	4,6	0,81
Visibility of the retail unit	4,6	0,62	Physical comfort in the shopping center	4,6	0,63	Range of management services	4,6	0,63
Closeness of the retail unit to the main cores	4,6	0,50	Physical comfort of resting areas	4,6	0,50	Existence of an entertainment center	4,6	0,50
Retail unit interior design	4,4	0,51	Shopping center corridor width	4,5	0,63	Existence of ATM machines	4,4	0,62
Closeness of the retail unit to the vertical circulation	4	0,97	Noise level in the shopping center	4,5	0,89	Existence of info desk	4,4	0,63
Floor height of the retail unit	4	0,73	Shopping center floor height	4,5	0,63	Existence of x-ray machines and security guards	4,4	0,89
Closeness of the retail unit to the entrances	**3,8**	**1,05**	Effectiveness of the guidance signboards	4,4	0,63	Existence of a cultural center	4,4	0,89
Retail unit dimensions	**3,7**	**1,20**	Building materials used in the shopping center	4,4	0,81	Marketing activities	4,3	0,60
Closeness of the retail unit to the entertainment center	**3,6**	**1,02**	Smart building technologies used in the shopping center	4,4	0,81	Marketing billboards in the center	4,3	0,93
Closeness of the retail unit to the carpark	**3,4**	**1,45**	Shopping center common area floor cladding material	4,4	0,72	Existence of kiosques	4	0,97
Closeness of the retail unit to the kids playground	**3,3**	**1,18**	Effectiveness of the fire escape scenario	4,4	0,73	Social responsibility projects, social activities	3,9	0,72
Closeness of the retail unit to the cultural center	**2,9**	**1,12**	Flexible architectural design acc.to weather conditions	4,4	0,62	-----	-----	-----
Closeness of the retail unit to the supermarket	2,7	0,87	Direct relationship of the center with the public spaces	4,4	0,73	-----	-----	-----
Closeness of the retail unit to the fire exit passageways	**2,7**	**1,01**	Architectural design of the shopping center	4,3	0,77	-----	-----	-----
-----	-----	-----	Abundant use of landscape in the shopping center	4,3	0,86	-----	-----	-----
-----	-----	-----	**Open-air vs enclosed center concept**	**4,1**	**1,09**	-----	-----	-----
-----	-----	-----	**Daylight perception in the shopping center**	**4,1**	**1,36**	-----	-----	-----
-----	-----	-----	Efficient use of water and energy	4	0,82	-----	-----	-----
-----	-----	-----	**Number of floor levels of the shopping center**	**3,9**	**1,18**	-----	-----	-----

5. Discussion

The purpose of this study is to pinpoint the design-related factors that influence the sales performance of retail units and to determine the significance of these factors via expert judgement and main study questionnaire. The expert judgement measured the retail store design performance dependent variable by 21 factors. However, the results showed that four factors received scores under 3.00. Therefore, researchers subtracted these four factors from the list, leaving 17 factors for retail store design performance for the main study questionnaire. The experts eliminated the factors below:

- retail store's closeness to the event area
- retail store's closeness to the delivery yard
- retail store's closeness to the food court
- retail store's closeness to customer restrooms

Findings indicate that eliminated factors are related to the placement of the retail unit in the shopping center. This implies that the customer circulation through event space, delivery yard, food hall and customer restrooms do not have an important effect on the sales performance of the retail unit.

The expert judgement measured the building design performance dependent variable by 19 factors. However, the expert group added 3 more factors according to their experience in the retail sector. These factors are listed below as:

- flexible architectural design according to weather conditions
- direct relationship of the center with the public spaces
- extensive utilization of landscaping within the shopping center

Similarly, the initial expert judgement measured the building services performance dependent variable factors by 12 factors. Moreover, the expert group suggested the following factors to the questionnaire, summing up to 14 factors:

- marketing billboards in the center
- social responsibility projects and social activities

Regarding the deep experience and knowledge of the expert group in the diverse sections of the retail sector, researchers took these additional factors into consideration, and they added them into the final questionnaire of the main study.

Before examining in detail each performance factor's ranking in the dependent variables' groups, researchers focused on how the ranking positions of the dependent variables in the expert judgement and in the main study have changed. Therefore, they analyzed the mean score of each dependent variable both in the expert judgement and in the main study. It should be noted that some factors have been added or subtracted after the expert judgement to be able to create a more accurate list of factors as explained in previous paragraphs (see Table 4).

According to the expert judgement results, the mean score, averaged across 12 factors of the building services dependent variable is 4.36, which is the highest average among the 3 dependent variable groups (building service dependent variable, building design dependent variable and retail store design dependent variable). The 2nd highest score belongs to the average of 19 factors of the building design dependent variable with 4.01 mean score. The shop design dependent variable's 17 factors received the lowest average mean score as 3.95. For an adequate comparison of the average mean scores between the expert judgement and the main study these four factors are left aside as explained above.

The main study measured the building services performance dependent variable by 14 factors listed in Table 3. The building services performance dependent variable received the highest average mean score among the 3 dependent variables in the main study as 4,52 (whereas 4,36 in the expert judgement). Similarly, the second highest score belongs to the building design performance factors with an average score of 4.01 in the expert judgement and 4,45 in the main study. The third importance rank shows the retail store design performance dependent variable's 17 factors with average score 3,95 in the expert judgement and 3,93 in the main study. Table 4 shows these results clearly. Researchers made the reliability t-test for the results in Table 4 and got p-value α =0,44, which means that the results are not statistically significant (α<0,05: statistically significant). Therefore, there is no significant difference between the dependent variables results' means in expert judgement versus the main study.

Table 4. *Comparison of the results for dependent variables.*

Dependent Variables	Expert Judgement Mean	Main Study Mean
Shop design performance	3,95	3,93
Building design performance	4,01	4,45
Building services performance	4,36	4,52

Findings from the main study clearly point out that the building services and the building design dependent variables' performance factors, which are factors belonging to the shopping center itself and which are stable for all the retail stores, are more important than the retail store design performance factors for the sales performance of the retail units in the shopping center. This fact implies that customers care more about the shopping center building itself and the shopping center services they encounter in this building and this behavior impacts on the retail unit sales performance directly. The retail store design performance factors which are variable on each retail store have less impact on the sales performance of the retail unit.

According to the expert judgement results, the highest-ranking factors are ' carpark existence' and 'brand variety', both of which received a full score of 5.00. Also, respondents are consolidated on the importance of these factors (σ=0). Both factors influencing the sales performance of a retail unit are not directly related to the retail unit; instead, they seem contingent on dependent variables of building services and building design. The most significant influences on retail unit sales performance are rooted in the shopping center's environment and the retail store's location within the center. Furthermore, the 'existence of a car park' factor underscores that easy car accessibility serves as a significant incentive for customers to visit the shopping center, aligning with findings in the research by İpekçi (2014) and Kusumowidagdo et al. (2011). In the main study results, 'the existence of car park' factor has received 4.90 mean score, and the standard deviation is σ=0.34, which shows that respondents have consoli-

dated views on this major factor.

Regarding the results of this study, taking into consideration the relevant importance level of the 'existence of carpark' in the shopping centers would be very beneficial to the building design architectural layouts in the sense of the retail units present in the shopping center. A good example of an effective design of shopping center integrated with the carparks is Primemall Gaziantep (designed by Erginoğlu & Çalışlar Architects), the plans of which are shared in Figure 2. As presented in the schematic plans and sections below (see Figure 2 and Figure 3), the carparks of the shopping center are truly integrated into the building design from 3 levels, with the support of topographic features. The shopping center presents 3 levels of carparks to its customers such as the underground carpark (as usual), the ground floor open carpark and the roof carpark (as less usual). The 3 levels of carparks (on the basement, second and fourth floors) enhance the customer circulation into all shopping floors, thus beneficial for the retail units' sales performance. As a result of this customer circulation enhancement, the retail units close to these entrances and the ones situated at these levels are more demanded by successful brands/anchors and their rental unit price is higher (see Figure 2 and 3).

A factor in 'the building services' dependent variable group, top-ranked both in the expert judgement and in the main study, the 'brand range in the shopping center' generates a combined effect and draws people through the shopping center, thereby significantly impacting the sales performance of retail units. The results of this research, in line with the research conducted by Burnaz and Topçu (2011), demonstrate that the concept of offering a diverse range of products in one location has a strong appeal to customers.

In the expert judgment results, the second-highest ranking is shared by two retail store design-related dependent variables, namely 'the shop interior design' and 'the shop visibility' both achieving a mean score of 4.90. The shop interior design plays a dual role: it serves to draw in customers to the shop

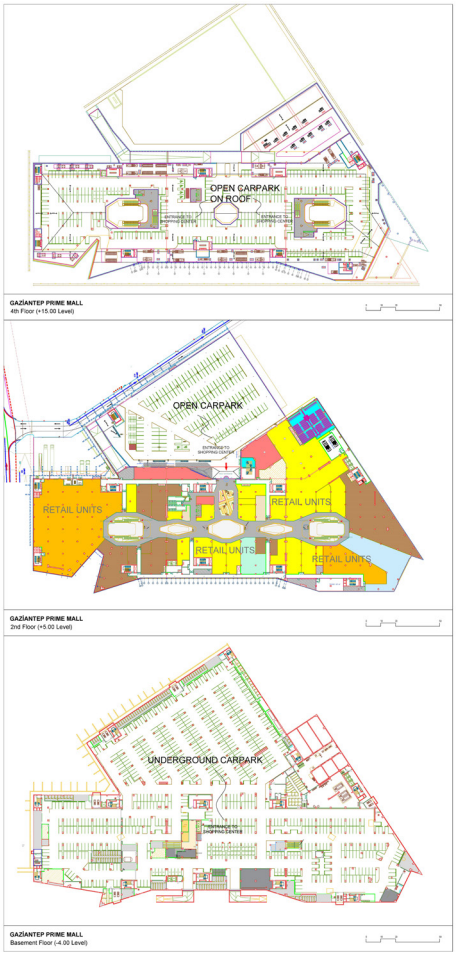

Figure 2. *Plan layouts of primemall Gaziantep (Basement, Second, Fourth Floors)*

and encourages them to spend additional time there. Both aspects have a direct impact on the sales performance of the retail unit, which aligns with the findings mentioned in Webber et al.'s study (2018). Considering the principle that individuals are guided by their visual perception, the factor of "shop visibility" is deemed one of the most significant factors influencing a store's sales performance, aligning with findings from a study carried out by Webber et al. in 2018. Nevertheless, the results indicate that "shop window design" is a relatively less important factor, with a mean score of 4.70, ranking

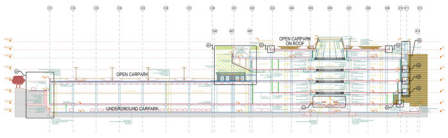

Figure 3. *Architectural section of primemall Gaziantep*

it 4th in importance.

Unlike the expert judgement, in the main study the top 2nd rank consists of three factors with 4.90 mean score each, which are 'the presence of carpark', 'the shopping center's heating/ventilation/air conditioning (HVAC) comfort' and 'the shopping center's lighting design concept'. These factors all belong to the building design dependent variable group. The top two rankings are quite different in the expert judgement and in the main study. Although in the expert judgement, the first two top ranks are evenly distributed between three dependent variable groups, in the main study 'the building services' dependent variable and 'the building design' dependent variable fully cover these ranks and leave the retail store design dependent variable to the 3rd rank. This implies that respondents of the main study considered 'the retail design performance' dependent variable as less important and this finding is parallel to the mean score finding, which states the shop design performance dependent variable as the least important among all the dependent variables, as explained in the previous paragraphs.

The top 3rd rank score is 4.80 in the expert judgement, and it is shared by three performance factors such as 'marketing activities', 'effectiveness of sanitation services' and 'retail store's lighting design'. The first two factors belong to the building services dependent variable and the last one belongs to 'the shop design' dependent variable. At this degree of ranking, "building services" factors outrank the "shop design" factors. The shopping center's management, through its periodic marketing activities and the effectiveness of its sanitation services, draws customers and thereby positively impacts the sales performance of retail stores. Additionally, the shop lighting design, including factors like efficacy, light intensity, and light color, significantly influences shoppers' behavior, as aligned with the study by Nebati and Ekmekçi in 2019. Likewise, the participants in the main study ranked "the shop lighting design" as third most significant factor influencing the retail unit's sales performance. Also, within main study, the 'lighting design concept of the shopping center' score has 4.90 score (2nd top rank). Correspondingly, Chebat et al. (2014) and Prakash et al. (2021) emphasize the importance of the lighting design concept of the shopping center factor. Following the results of this study and the literature, one must state clearly that a well-designed shopping center lighting concept with divers lighting fixtures in specific areas (see Figure 4), will contribute very positively to the turnover performance of retail stores (see Figure 4).

In the main study, the 3rd position is jointly occupied by 4 factors: 'shop lighting design', 'shop front design', 'placement of retail store within shopping center,' and 'the effectiveness of sanitation services.'. It is clearly observable that the top 3rd rank mostly consists of 'the shop design performance' factors.

The factor about the carpark payment system (free vs. payable) within the building service performance variable obtained a mean score of 4.60 in both the expert judgment and the main study. Thus, respondents, mostly consolidated with σ=0.52, consider this factor as a factor more significant one. This factor clearly shows that free carpark service affects positively the shopping behaviors of customers.

The expert judgement results place 'the shopping center architecture' and 'the climate control systems' comfort' as the fifth most significant factors influencing sales performance of retail stores. Customers are inclined to shop and linger in environments that are both well-designed and well-climatized, a finding that aligns with the study conducted by Costa Webber et

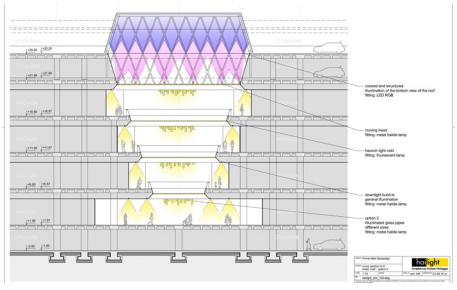

Figure 4. *Effective shopping center lighting design in primemall Gaziantep*

al. in 2018. Moreover, this outcome reinforces the notion that shopping center design should encompass a well-integrated approach that combines architectural design efficiency and electromechanical systems as a whole. The study by Ferreira et al. (2023) consolidates this finding. However, in the main study, the 'the shopping center's architectural design' factor's score decreased to 4.30, although 'the shopping center's HVAC comfort' factor gained points to 4.90 score. This implies that the significance of the building design is still consistent in the main study, but the respondents gave more importance to the detailed scopes rather than the general idea of design.

In the expert judgment, the factors that occupy the 6th position, with a mean score of 4.40, encompass three distinct factors: 'the shopping center's physical comfort', 'sound intensity inside retail center,' and 'retail center's aisle span'. Notably, the first two factors have been identified as significant for the prosperity of a shopping center in numerous previous research, such as those by Bakhshizadeh et al. (2017), Yılmaz Çakmak and Yılmaz (2018), and Köksal and Tığlı (2018). However, the 3rd factor, 'the shopping center corridor width,' offers unique insights into the significance hierarchy of factors influencing the sales performance of retail units. The expert judgement and the main study find out that the proper center corridor width plays a significant role for 'the building design performance' variable. The effective mall corridor width for good customer circulation is shown in Figure 5 below. The effective mall corridor width is driven from the idea that the corridor should be wide enough to let customers circulate easily but narrow enough to enable customers to see the shopwindows closely enough. The study by Büyükşahin, S. (2023) consolidates this result. Another point sorted out from the main study results compared to the expert judgement results is that 'the physical comfort of the center' gained more importance and was ranked in 5th line with 4.60 score. This result aligns with the study of Kusumowidagdo et al. (2011). Therefore, these results are consolidated by both studies (see Figure 5).

In a manner consistent with the conclusions drawn from the expert judgement, participants in the main study placed 'the existence of cultural performance hall' as 7th factor influencing sales performance of retail units among the building services variable. It received a mean score of 4.40. This ranking level comprises of three other factors of building services dependent variable such as existence of 'info desk', 'ATM machines', 'x-ray machines and security personnel'.

In the main study, the factor related to the center's accessibility for individuals with disabilities garnered a mean score of 4.80 and secured the 5th position among factors of all the dependent variables. This clearly states that this factor affects 'the retail store sales performance' as much as 'the retail store's lighting design,' 'the shopwindow design' or 'the sanitation services' efficiency'. This shows that the consciousness of universal design and the spatial justice for all customers are upraising concepts as similarly indicated in the study by Can and Kılıç Delice (2018).

Among 'the building design performance' factors, the following ones received the same 4.40 mean score in the main study, and they got the 22nd rank out of 53 factors: 'the efficiency of the guidance signboards', 'the building materials used', 'the smart building technologies used' and 'the common area floor cladding material', 'the fire escape scenario effectiveness', 'flexible architectural design' and 'direct relationship of the center with public spaces'. These building design-related factors, which are uniform across all retail stores, have a moderate impact on the sales performance of the retail unit. In

Figure 5. *Effective mall corridor width*

the expert judgement these factors received less points and their scores were not identical. 'The common area floor cladding material' factor had only 3.60 mean score, while 'the smart building technologies used' received 3.70 mean score. 'The effectiveness of the guidance signboards' and 'the building materials used' factors slightly ranked higher with 4.10 and 3.90 mean scores consecutively.

Numerous research (Nebati & Ekmekçi, 2019; Yılmaz Çakmak & Yılmaz, 2018) have highlighted the positive influence of daylight on customer shopping behaviors. Nevertheless, the factor concerning 'daylight perception in the shopping center' obtained the 17th position out of 19 ranks in both the expert judgment study and the main study. Moreover, the respondents have diversified views on this issue (σ=1.20 in expert judgement, σ=1.36 in main study).

The fire escape regulation stands out as one of the most crucial regulations that shopping center designs must adhere to. Consequently, shopping center building designs consistently adhere to fire escape regulations to obtain the necessary building permits. That being stated, in the main study, the factor relating to the 'closeness of the retail store to the fire exit passageways' remains at the lowest rank, with a mean score of 2.70. However, 'the effectiveness of the fire escape scenario' attains a higher level of importance in the main study, with a mean score of 4.40.

Although 'the location of the retail unit' factor stands at the 1st top level among the retail store design dependent variable's factors in the main study, respondents do not attribute importance to 'the closeness of the retail unit to the major interest areas' factor when it comes to its impact on retail unit sales performance. Factors like 'closeness to supermarket, service yard, playground, leisure event center, food hall, and customer restrooms' are rated between sixteenth and nineteenth positions out of 19. These are regarded as per the least influential factors influencing retail unit's sales performance. Thus, researchers considered leaving these factors out of the questionnaire in the main study.

6. Conclusion

In this paper, a comprehensive examination of the literature revealed the key design factors that impact the sales performance of retail units inside a retail center. This study's primary objective was to ascertain the essential design factors for creating an efficient shopping center design and to establish their respective levels of importance. Researchers categorized these factors into three distinct dependent variables: 'building design performance', 'shop design performance', 'building services performance'. At the outset, the expert judgment method involved a panel consisting of seven retail industry experts and three retail customers who assessed a list of 52 assessment parameters with a Five-Point Likert scale, accompanied by open-ended questions. Researchers subsequently deliberated on the evaluation scores assigned to each factor in terms of their impact on the sales performance of retail units. Following this, the study considered additional factors proposed by participants through unrestrictive questions, as well as removed factors with mean scores falling below 3.00 points. This process resulted in a refined list of assessment parameters that demonstrated substantive validity. Finally, the research determined the rating of fifty-two factors influencing sales performance of shop units. Moreover, this study discussed the ranks between the dependent variables.

Following the expert judgement, researchers prepared the main study for the consolidation of the expert judgement. The main study group consisted of sixteen retail store managers with more than 15 years' experience from the shopping center in Gaziantep, Türkiye. The sixteen retail stores belong to diverse retail branch mix such as textile, prêt-à-porter, food & beverage, cosmetics, personal care, electronics. The main study used the same methodology such as the Five-Point Likert scale for evaluation. Researchers discussed the statistically significant findings of the main study in detail, and they compared these results to the findings of the expert judgement. This paper only takes into consideration and compares the common factors in both the

expert judgement and the main study via accurate statistical methods. The researchers provided a comprehensive and detailed explanation of the measurement grade for each factor.

'The brand variety' and 'the presence of carpark' factors are the only two factors that received full score 5.00 with standard deviation value (σ=0). The respondents are consolidated around the utmost importance of these two factors for an effective and successful shopping center design. 'The presence of carpark' factor is presented via effective shopping center design layouts and discussed as an important issue. Following these two factors, 'the HVAC comfort' and 'the shopping center's lighting design concept' come as most significant factors influencing sales performance of shop units. Effective examples of shopping center design layouts are presented to highlight the importance of these factors. An unexpected discovery is that none of these factors are related to the performance of shop design. According to the findings, building design and building services performance factors come over the shop design performance factors. Notably, the average score of the building service performance factors is the highest among the average score of the three dependent variables (building design performance, shop design performance and building service performance). Researchers found this as a surprising result because the general tendency in the literature (as cited in the previous sections) is that the primary performance factors that significantly influence the sales performance of the retail unit are those related to both building design and retail store design. Moreover, 'the lighting design concept' appears to be particularly important both in the building design and in the retail store design performance. Respondents ranked both lighting design factors with high scores. This is a particularly important finding in the sense that it leaves behind the architectural design factors such as building materials, space dimensions or interior design.

This research focused on a special shopping center and its experienced professionals with a limited number of respondents. In future research studies, there is potential to broaden the sample size and apply the proposed measurement scale to shop managers in various shopping centers, both at local and international levels. This could facilitate a comparison of differences in shop performance indicators, considering both local and global perspectives. More detailed data analysis and evaluation may be accomplished. Future studies could explore a comparative analysis across different shopping centers in various locations. Identifying both the similarities and differences in these results could prove invaluable in developing a data model for shopping center design management in the retail industry. Such a model would offer practical insights for retail investors, aiding them in realizing and enhancing retail investments with greater viability and competitiveness.

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