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Satisfaction Among Domestic Pilgrims with the Design of Semi-Permanent Tents in Mina, Saudi Arabia

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Abstract. Muslims consider Mina an area with high spiritual value. It is where many Hajj rituals are performed, and the associated activities take place over several days. Given the continuous increase in the number of pilgrims, which is associated with the ambitious Vision 2030 project, and the limited space in Mina, providing suitable accommodation and services for pilgrims is a critical problem faced by officials and planners. To increase the capacity of Mina, the level of services provided to pilgrims and their safety and security, and to provide an appropriate and healthy environment, it was deemed vital to develop the tents used in Mina. According to the outcomes of previous Hajj seasons, the tents of domestic pilgrims (Saudis and residents) and their facilities still need to be further developed, particularly the spatial and functional aspects. Therefore, this paper was conducted to evaluate two types of tents for domestic pilgrims such as undeveloped and developed tents from an architectural perspective, focusing on variables such as bed size, movement paths, privacy, noise, thermal comfort, natural lighting, artificial lighting, security of personal belongings, storage of clothing, and the cost of the various services needed by pilgrims during their stay in Mina. The opinions and experiences of pilgrims were also analysed by collecting data via observations and surveys (questionnaires), given that pilgrims are the primary beneficiaries of the accommodation services. The results showed that the satisfaction rate in the developed tents is better than in the undeveloped tents, taking into account some development and improvement considerations in the developed tents such as: vertical expansion such as increase the number of beds by making double beds, include a customised bed for use by people with disabilities, install a foldable table for each bed, install storage lockers, install windows and use sound-isolation materials.

Keywords: Undeveloped tents, Developed tents, Mian, Domestic pilgrims.

1. Introduction

Mina plays a central role in the Hajj ('Pilgrimage'). To accommodate the pilgrims who stay in Mina for several nights (almost five days) during the month of Dhul-Hijjah, starting from the eighth day of Dhul-Hijjah until the end of the thirteenth day of Dhul-Hijjah. An enormous tent city has been constructed in the area that can accommodate up to three million pilgrims (almost two millions are abroad pilgrims and less than one million is domestic pilgrims). Providing tents for pilgrims is a feasible option, as they can be semi-permanent or temporary and are relatively easy to set up. Tents are also used after major disasters such as earthquakes and tsunamis as a temporary accommodation for displaced people [1-2].

One of the many benefits of using tents is that they are suitable for short-term use [3]. In terms of the materials used to construct tents, they must meet certain standards; specifically, they must meet durability and performance standards. Tents must also be designed and constructed in such a way that they can be stored, transported, easily built and deconstructed and integrated with existing structures [4-5]. At the fundamental level, tents must provide protection against the weather [6], provide a sense of privacy, separate individuals (to avoid the spread of illness) and be safe even in cases of overcrowding [7].

However, most of the existing facilities in Mina are declining in terms of their quality, comfort and usefulness, which creates an unsafe and uncomfortable environment for pilgrims [8]. Hence, there is an urgent need to improve the quality of the facilities in Mina such as tents for domestic pilgrims. A goal of the Kingdom of Saudi Arabia is to facilitate the Hajj for the guests of God and the seasonal support workers during the Hajj season, and this is articulated in the Kingdom's Vision 2030, which states that the nation aims to provide pilgrims with high-quality services while preserving the spirituality of the holy sites and their geographical nature.
The aims of this study were as follows: 1) to evaluate the undeveloped and developed tents provided for domestic pilgrims and determine their suitability for future expansion; 2) to identify the positive and negative aspects of the tents by surveying pilgrims (the primary beneficiaries of this work); 3) and to evaluate the architectural elements of the tents, such as their capacity, internal movement paths, privacy levels, noise levels, thermal comfort, lighting, storage areas (for personal items, clothing and luggage) and the cost of the various services needed by pilgrims during their stay in Mina. Based on the findings of this study, a series of recommendations have been made to improve the design of the tents to enhance the pilgrims' safety, health and satisfaction with the provided housing services.

2. Tents for Domestic Pilgrims in Mina

Mina is a valley located five miles (8 km) southeast of the city of Makkah (Figure 1), in the district of Al-Masha'er, in Saudi Arabia. Mina has an area of approximately 7.7 square miles (20 km^2). To accommodate pilgrims and to ensure that they have an appropriate area in which to stay, in the 1990s the Saudi government invested in the construction of permanent tents in Mina made from fibreglass coated with Teflon. Previously, many pilgrims would bring their

own tents (Figure 2). In 1997, after the terrible ‘Makkah Fire’, the Saudi government constructed around 100,000 tents that were highly resistant to catching fire and did not emit toxic gases; thus, Mina was coined ‘The City of Tents’ (Figure 3). A main aim of the Pilgrim Experience Program within the Vision 2030 project is to host more pilgrims. As part of this effort, more and different types of accommodation are being developed. In addition, undeveloped tents are being converted into developed tents, and these two types of tents were the focus of this research.

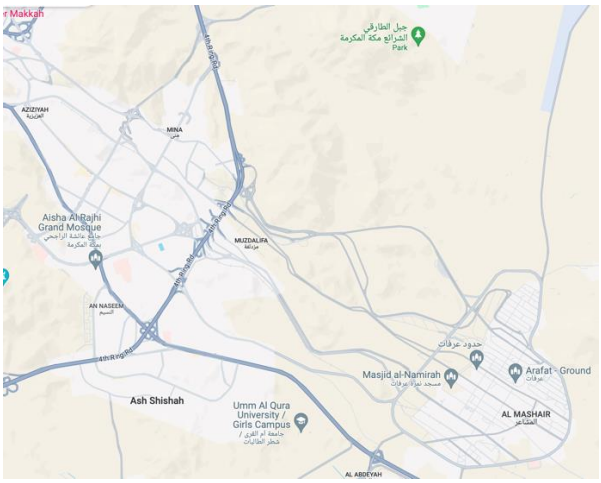

Fig (1). Map showing the sacred sites in Mina (Google map, 2024).

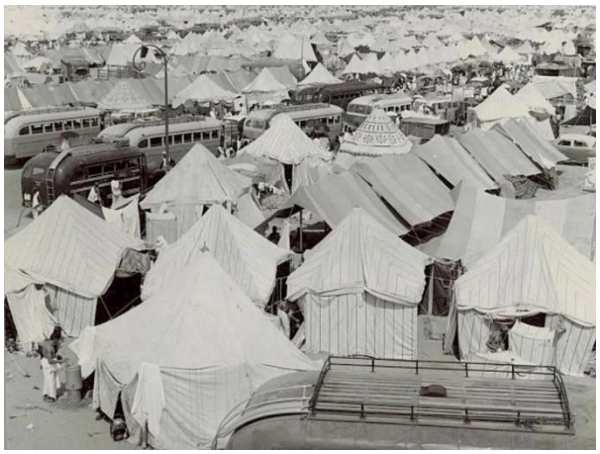

Fig (2). Photo showing some of the different types of tents used by pilgrims before the 1990s (Arabiaweather, 2022) [9].

Fig (3). The ‘City of Tents’ in Mina (Al-Ain News, 2024) [10].

In addition to sleeping quarters, the area contains a variety of facilities, including barber shops, administrative units, bathrooms for both sexes, sanitary units, kitchens, prayer rooms, multi-purpose halls, camps for operators, garbage disposal (compressor) facilities and operational services.

The following factors are taken into account when tents are being designed [8]: code and standard specifications; sustainability requirements; energy efficiency; water conservation; security and safety requirements (for the protection and safety of people and property); durability; steadfastness and reliability; simplification of installation; ease of operation and maintenance; the capacity and design of the site; coordination with existing services (e.g. infrastructure, roads, trees, irrigation network, water network, fire-fighting water network, electricity network, flood and other drainage networks, climate cooling network and chilled water network); continuity of services for all surrounding facilities (e.g. sites and facilities of government, security and other agencies); privacy of each beneficiary; traffic flow; preservation of architectural style; compatibility with surrounding environment; the spirituality of the holy sites; and the architectural identity code approved in the holy sites. Thus, tents are designed according to existing elements, location and needs. Natural and mechanical ventilation and lighting are incorporated into the tents, and all materials used are fire-resistant and meet safety standards.

Walls and partitions must be made of suitable, high-quality materials that are resistant to fire, bacteria and fungi [11]. They must be installed correctly. It is permissible to use thermally insulated cement board for the external walls and gypsum for internal partitions. Doors and ventilation openings must be designed with architectural requirements and standards in mind [8]. Such requirements and standards specify items such as the number of users, dimensions and the safety and evacuation requirements. Doors and ventilation openings must be made of high-quality fire-resistant materials, and their shape must be compatible with the architectural identity. Ventilation must be ensured, including when there is a power outage (when natural

ventilation is required). The natural conditions must be taken into account when designing doors and ventilation openings; the wind direction, camp site levels, rainwater drainage and extent of the tent's structural tolerance to ventilation openings must be assessed. Rainfall and its impact on a tent's roof and contents must also be taken into account.

According to the requirements and executive designs provided [8,12], cement board (thickness of 12.5 mm) can be used to construct the internal ceiling. The ceiling must comply with the Saudi building code and civil defence requirements and be made of materials that are compatible with the materials used in tents. Tents must be insulated to protect against heat, rain, wind and other elements. Air conditioners must have an aesthetically pleasing and appearance, and they must be clean and free from wear and tear. Tents must be easy to clean, made of environmentally friendly materials and resistant to bacteria and viruses. They must have a sufficient slope to drain away rainwater. The design must take into account the placement of openings and the fact that natural ventilation is required. The floor must be resistant to fire, bacteria and viruses and conform to the Saudi building code and civil defence requirements. The design of the floor must be compatible with the architectural identity approved by the Kadanah Company. The floor must be comfortable for users, be level, have no dents and be made of non-slip materials.

Hence, the general construction requirements for tents are as follows: existing elements must be respected in terms of tent location and structure, civil defence requirements must be met, natural and mechanical ventilation and lighting must be available, the architectural identity of the camp must be considered, all materials must be fire-resistant and maintenance work must be performed on the metal structure. In this study, two different types of tents provided for domestic pilgrims were evaluated. The first type, undeveloped tents, consist of a metal frame covered with a fibreglass fabric coated with Teflon. They do not have a false ceiling. The walls are made of fire-resistant gypsum board and are resistant to climatic factors. They have carpeted floors, sofa beds with accessories, split-system and desert air conditioning and electrical sockets, as shown in Figure 4.

Fig (4). An example of an undeveloped tent in Mina.

The second type, developed tents, are semi-hotel tents. They consist of a metal frame covered with a fibreglass fabric coated with Teflon. They have false ceilings made of gypsum board that are equipped with LED spotlights, and their walls are made of cement board. The floor is furnished with ceramic tiles. They have beds with accessories, Freon air conditioning, electrical sockets and side lighting next to the bed, as shown in Figure 5.

Fig (5). An example of a developed tent in Mina.

3. Research Methodology

A combined quantitative and qualitative approach was used in this study. Quantitative research involves studying measurable phenomena and the use of statistical and computational programs and techniques. Quantitative research is characterised by its objectivity and precision, and its unbiased, logical and statistical results can be widely circulated and necessary measures can be taken for improvement [13]. On the other hand, Qualitative research is the opposite of quantitative research. Qualitative research involves collecting non-digital data such as text, video, photo, and audio. This approach is used to understand concepts, opinions, and experiences, to form deep insight into a problem, or to generate new ideas for research [14].

Opinions of tent users—specifically, domestic pilgrims—were collected via survey, and field observations were conducted to collect information on various elements of developed and undeveloped tents during the Hajj season 1444 AH. The data was analysed by SPSS. Pilgrims' satisfaction was measured by number and percentage. Cronbach's alpha coefficient to verify the reliability of the questionnaire, averages and standard deviations.t-test to test the significance of the differences between the means of the study population according to the type of tent. In total, 166 (45.2%) domestic pilgrims from three undeveloped tents and 201 (54.8%) domestic pilgrims from three developed tents, from both side female (46.6%) and male (53.4%) and most of them from 30 to 45 years old responded to the study’s questionnaires throw the QR. The majority of them Saudia, from outside Makkah and the first time for them to do Hajj. It was difficult to catch more respondents because of limitation of staying period in Mina (the survey was for two days from 10th to 11th of Dhul-Hijjah) and also the pilgrims were busy with worship.

4. Results and Discussion

In this study, two types of tents provided for domestic pilgrims were evaluated (undeveloped tents and developed tents), and 10 variables were analysed: bed size, movement paths, privacy, noise, thermal comfort, natural lighting, artificial lighting, security of personal belongings, storage of clothing and cost. When the average level of satisfaction was calculated, it was found that the respondents were generally satisfied across the variables (arithmetic mean = 3.84, standard deviation = 1.03), as shown in Table 1. The results for each variable are described in detail below.

4.1 Bed Size

A bed is a piece of furniture designed for resting and sleeping, although beds are also used for other activities, such as reading and sitting. Beds come in a wide range of shapes and sizes and generally consist of two parts: a mattress and a solid base (e.g. a sofa or a semi-solid base). Other elements are often added, such as a headboard, a footstool, pillows, sheets, a bedspread and covers.

The level of satisfaction among the pilgrims who were staying in undeveloped tents, which have sofa beds, was low (36% were satisfied). Nearly half of the sample was dissatisfied due to the small size of the sofa beds and the difficulties associated with transforming and stabilising them, their close proximity to each other and overcrowding, which causes infection to spread quickly. The level of satisfaction among pilgrims who were staying in developed tents was higher; approximately 70% were satisfied. However, approximately 30% of these pilgrims were dissatisfied due to the small size of the beds, which made it difficult to extend the legs completely.

4.2 Movement Paths

The movement paths within the tents should make it easy for the users to move and access spaces; thus, they should be designed with the use and specificity of each space in mind, as well as the relationships and connectivity among spaces. They should save space and reduce the amount of wasted space, allow easy distribution of furniture and provide comprehensive access for people with special needs.

In the undeveloped tents, the movement paths between the sofa beds were unclear, which may hamper escape during an emergency. Therefore, the percentage of pilgrims in these tents who were satisfied was very small, not exceeding 27%, and almost half of the participants were dissatisfied. Some of undeveloped tents with a large number of sofa beds, the narrow passages between them and how this makes movement difficult, especially when the sofa beds are converted into beds. In this example, the sofa beds are also placed close to the tent door, which means that the pilgrims using these beds are disturbed when the door is opened and closed. In the developed tents, the level of satisfaction was higher, with more than 70% of participants being satisfied with the movement paths due to the presence of corridors between the beds. However, chairs were observed to be placed in the spaces between the beds, hindering movement. This may be an issue during escape in the event of an evacuation.

4.3 Privacy

The concept of privacy differs between Islamic society and Western society. This is because the Islamic religion fundamentally shapes the notion of privacy. In Islamic society, members balance the privacy of the individual and the group. In such societies, privacy does not preclude social communication and does not involve total isolation and separation from society. Thus, privacy can be an organisational tool, and the communication and interactions associated with privacy are guided by religion and societal behaviours.

Regarding the pilgrims who were the focus of this research, privacy is a key need that must be met during their stay in the tents. The participants who were staying in undeveloped tents reported a low level of satisfaction in terms of their privacy (less than 15% were satisfied), more than half were dissatisfied, and about 23% did not experience complete privacy inside the undeveloped tents. The participants who were staying in developed tents reported a higher level of satisfaction in terms of their privacy (60% were satisfied) due to the presence of dividers between the beds.

4.4 Noise

The acoustics of the tents were examined as they directly impact the noise level in the tents and thus the acoustic comfort of the pilgrims within the tents. The acoustics can potentially be improved by the use of sound-insulating materials. The level of satisfaction with the noise in the undeveloped tents did not exceed 31%. In these tents, noise emanated from outside the tents and from inside the tents due to the sofa beds being placed close together. Among the participants who were staying in developed tents, less than half were satisfied with the noise inside the tents due to the lack of sound insulation.

4.5 Thermal comfort

An individual experiences thermal comfort when they are physically and psychologically satisfied with the thermal environment. Among the participants who stayed in undeveloped tents, less than 60% were satisfied with the thermal comfort level inside the tents, which have split-system and desert air conditioning. However, the temperature rose at noon due to sunlight entering through the roof openings, as shown in Figure 16. The level of satisfaction with the thermal comfort level was higher among the participants who stayed in developed tents. More than 90% were satisfied due to the presence of four or more split-system air conditioners inside each developed tent and the use of heat-insulating cement-board panels.

4.6 Natural Lighting

Lighting from natural sources (e.g. the Sun) is considered the best type of lighting because it is continuous, relies on renewable energy and does not cause environmental pollution. Natural lighting is also the most physiologically appropriate for humans, and it varies with the time of day, the season and location. A benefit of using natural light and ventilation is that they

continue in the event of a power outage. It should be noted that there are no windows in the developed tents. Among the participants who stayed in the undeveloped and developed tents, 60% were satisfied with the natural lighting. The remaining participants highlighted the lack of windows and thus the lack of natural light and ventilation.

4.7 Artificial Lighting

Artificial lighting is provided in the tents because the natural lighting does not meet the needs of the pilgrims, who conduct their activities at all times of the day. The level of satisfaction with the artificial lighting was high in the undeveloped tents, where fluorescent LEDs are used; however, in some tents, the lighting was dim. The level of satisfaction was also high in the developed tents, where spotlight LEDs are used.

4.8 Security of Personal Belongings

Valuable personal belongings, such as money, important documents and women's jewellery, should be kept in special boxes. The satisfaction rate was very low, below 30%, in the undeveloped tents, where pocket organisers are placed next to each sofa bed for the storage of personal belongings. The satisfaction of participants who stayed in developed tents was also low; less than 30% were satisfied. Some developed tents had temporary solutions in place, such as the placement of pocket organisers next to the beds for the storage of personal belongings.

4.9 Storage of Clothing

Wardrobes are essential for the storage and organisation of clothing. They have different designs and come in different sizes to suit various storage needs. To be useful, a wardrobe must be practical and have sufficient capacity. Less than 10% of the participants staying in undeveloped tents were satisfied with the places available to store clothes. The only available places for storing clothes are the tent's metal frame and the corridors. It is unsafe to place items on the metal frame, as they can easily fall on people, and some people have difficulty reaching them. Similarly, less than 15% of the participants staying in developed tents were satisfied with the storage of clothing. Clothes hangers were provided; however, they were in inappropriate places and insufficient in number—there were two in a tent that was accommodating approximately 23 pilgrims.

4.10 Cost

More than half (approximately 60%) of the participants were dissatisfied with the cost of the housing services provided in the undeveloped tents. However, the level of satisfaction was higher (50% satisfied) among the participants who stayed in developed tents. Some pilgrims shared that the information and images they received prior to their visit were completely different from the actual situation.

Table (1). Level of satisfaction with the quality of the tents in Mina (n = 367).

Variable	Type of tent	Mean	SD	Satisfied	Somewhat Satisfied	Dissatisfied	Unavailable	No need
Bed size	Developed	4.57	0.698	138 (69%)	39 (12%)	24 (19%)	-	-
	Undeveloped	3.89	0.904	59 (36%)	29 (17%)	78 (47%)		
Movement paths	Developed	4.63	0.674	149 (74%)	30 (15%)	22 (11%)		0%
	Undeveloped	3.61	0.971	44 (27%)	27 (16%)	81 (49%)		14 (8%)
Privacy	Developed	4.26	1.001	116 (58%)	37 (18%)	33 (16%)	1 (1%)	14 (7%)
	Undeveloped	3.15	0.957	26 (16%)	12 (7%)	89 (54%)	0%	19 (23%)
Noise	Developed	4.31	0.827	109 (54)%	45 (23)%	47 (23)%		0%
	Undeveloped	3.84	0.883	52 (31%)	36 (22)%	77 (46)%		1%
Thermal comfort	Developed	4.9	0.392	186 (93%)	9 (4%)	6 (3%)		0 (0%)
	Undeveloped	4.34	0.857	97 (58%)	29 (17%)	39 (24%)		1 (1%)
Natural lighting	Developed	3.52	1.718	108 (54%)	9 (5%)	4 (2%)	41 (20%)	39 (19%)
	Undeveloped	3.85	1.567	95 (75%)	17 (10%)	19 (12%)	31 (19%)	4 (2%)
Artificial lighting	Developed	4.92	0.337	189 (94%)	8 (4%)	4 (2%)		
	Undeveloped	4.79	0.559	143 (86%)	11 (7%)	12 (7%)		
Security of personal belongings	Developed	3.06	1.434	60 (30%)	16 (8%)	17 (8%)	92 (46%)	16 (8%)
	Undeveloped	2.95	1.192	32 (19%)	15 (1%)	33 (20%)	84 (51%)	2 (0%)
Storage of clothing	Developed	2.57	1.152	30 (15%)	8 (4%)	19 (9%)	10 (5%)	134 (67%)

Variable	Type of tent	Mean	SD	Satisfied	Somewhat Satisfied	Dissatisfied	Unavailable	No need
	Undeveloped	2.51	0.977	15 (9%)	9 (5%)	26 (16%)	4 (2%)	112 (68%)
Cost	Developed	4.19	0.864	94 (47%)	55 (27%)	50 (25%)	1 (1%)	1 (0%)
	Undeveloped	3.58	0.826	32 (19%)	35 (21%)	97 (58%)	1 (1%)	1 (0%)
Average general satisfaction		3.84	1.03					

As shown in Figure 6, the average level of satisfaction with each of the variable was high, especially for artificial lighting and thermal comfort, and except for privacy, natural lighting, security of personal belongings and storage of clothing.

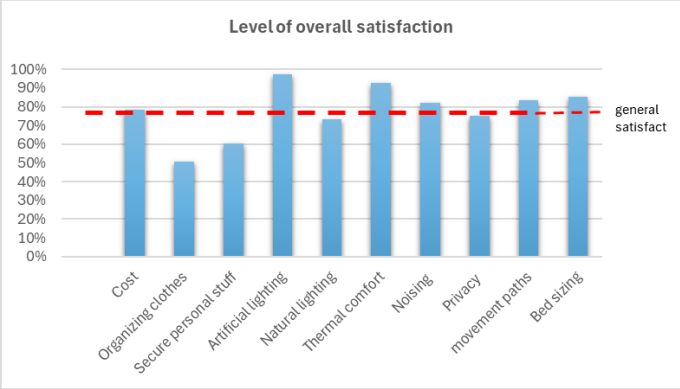

Fig (6). The average level of overall satisfaction across all the variables.

5. Conclusion and Recommendations

The goals of the Pilgrim Experience Program, which is part of Saudi Arabia's Vision 2030 project, are to provide as many Muslims as possible with the opportunity to perform the Hajj and to honourably serve these guests of God. This has resulted in considerable interest in developing and providing high-quality accommodation services in Mina to ensure the comfort of pilgrims. According to the results of this study, which focused on pilgrims' satisfaction with 10 variables (bed size, movement paths, privacy, noise, thermal comfort, natural lighting, artificial lighting, security of personal belongings, storage of clothing and cost), those who stayed in developed tents were more satisfied than those who stayed in undeveloped tents, especially with the bed size, movement paths, privacy and noise. However, their satisfaction with the privacy, natural lighting, security of personal belongings and storage of clothing was below the average satisfaction level. Therefore, the developed tents should be improved in

terms of their design. Based on the findings of this study, it is recommended that the following changes be made to the developed tents:

- Increase the number of beds from 22 beds to 43 beds (Figure 7); this will facilitate the hosting of more pilgrims, which is a major goal of the Pilgrim Experience Program.
- Include six beds that are two metres in length, as shown in Figure 8.
- Include a customised bed for use by people with disabilities that is 45–55 cm in height and place the bed next to the door (Figure 9).
- Install a foldable table for each bed that can fold down at the side of the bed when not in use (Figure 10); this will eliminate the need for separate tables, which are placed in the spaces between the beds and obstruct movement.
- Install storage lockers (Figure 11) that pilgrims can use to safely store their personal belongings and provide more space for pilgrims to hang their clothes.
- Install two windows above the doors in each tent (Figure 12) to provide natural light and ventilation.
- Use sound-isolation materials to decrease the noise and echo in the tents, such as soundproof vinyl on the floor (Figure 13) and 3D polyester acoustic panels or perforated gypsum boards on the walls and ceiling (Figure 14). Also, all beds should be fitted with a soft, padded cover (Figure 15).

Fig (7). Increase the number of beds from 22 to 43 by installing bunk beds.

Fig (8). Install six beds that are two metres in length.

Fig (9). Install a special bed for use by people with disabilities.

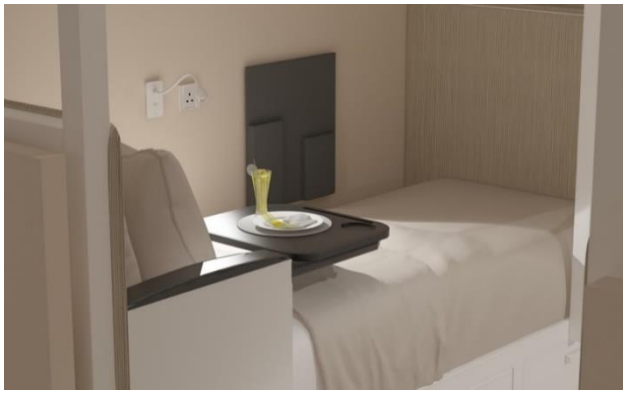

Fig (10). Provide bed tables that fold down along the side of the bed.

Fig (11). Provide storage lockers and space to hang clothes.

Fig (12). Example of a soundproof flooring material.

Fig (13). Example of soundproof ceiling and wall materials

Fig (14). Example of a soundproof bedcover

6. Reference

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رضا حجاج الداخل عن تصميم الخيام في منى بالمملكة العربية السعودية

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ملخص البحث. يقضي الحجاج في مشعر منى أطول وقت في أثناء أدائهم لفريضة الحج؛ ولذلك كان إسكان الحجاج في منى موضع اهتمام المسؤولين والقائمين على إدارة شؤون الحج في المملكة العربية السعودية لفترة طويلة، وقد تلقى إسكان الحجاج في منى عناية خاصة مؤخرًا في ظل الرؤية الطموحة للملكة ٢٠٣٠، التي تهدف إلى زيادة عدد الحجاج، وتحسين تجربتهم في أداء المناسك، وتجاوز التحديات التي يواجها الحجاج والقائمون على تنظيم الحج في كل عام، ومن هنا تسهم الدراسة الحالية في هذه الجهود، حيث تقدم دراسة تقويمية لإسكان الحجاج في منى؛ لاستكشاف التحديات الراهنة والتعرف على فرص التطوير المستقبلية، وقد بنيت نتائج الدراسة على معلومات ميدانية حديثة؛ جُمعت من خلال توظيف عدد من الأدوات العلمية لجمع البيانات الخاصة بانطباعات وتوجهات حجاج الداخل نحو نوعين من المساكن في منى وهما: الخيام المطورة وغير المطورة. واعتمدت الدراسة على النظر في مدى مراعاة هذه المساكن لمبادئ التصميم المعماري، وركزت على تحليل عدد من المتغيرات في المساكن مثل حجم السرير، ومسارات الحركة، والخصوصية، والضوضاء، والراحة الحرارية، والإضاءة الطبيعية، والإضاءة الصناعية، وأمن المتعلقات الشخصية، وتخزين الملابس، والتكلفة، والخدمات المختلفة التي يحتاجها الحجاج أثناء إقامتهم في مشعر منى. وتهدف الدراسة كذلك إلى استكشاف آراء وتوجهات الحجاج باعتبارهم الفئة المستفيدة والمستهدفة في هذه المساكن، وأظهرت النتائج أن معدل الرضا بين حجاج الداخل في الخيام المطورة بشكل عام أفضل بالمقارنة مع الخيام غير المطورة، وقدمت كذلك عددًا من المقترحات والتوصيات التطويرية والتحسينية للخيام المطورة مثل: التمدد الرأسي كزيادة عدد الأسرة عن طريق عمل أسرة ذات دورين، وتضمين سرير مخصص لذوي الاحتياجات الخاصة، وإضافة طاولة قابلة للطي لكل سرير، وإضافة خزائن (لحفظ المتعلقات الشخصية ووضع الملابس) وإضافة النوافذ، وكذلك استخدم مواد العزل في الأماكن الملائمة لها.