



The Use of Sustainability Principles and Lighting Technology in Lighting Hotels’ Lobby Area

Sally Fathy El-Sayed

Hotel Management Department,
Faculty of Tourism and Hotels,
October 6 University,

Mohamed Abdel Aziz Abed

Hotel Management Department,
Faculty of Tourism and Hotels,
October 6 University,

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Purpose- Operators are now asking designers to respond to the growing interest from customers in a sustainable environment by using and providing designing elements that are in line with green practices reduce energy. The study aims to study how to employ interior design elements that helps in saving the environment and reduce using of energy. The study focused on using of the new lighting technology and applications as an effective element of hotels interior design in saving energy and increasing customers’ satisfaction. Results of the research showed that there is a growing importance in depending on the natural lighting especially on the hotels’ lobby where customers’ first impression is shaped. The new lighting technology giving the designer the possibility to adopt the greening concept in addition to stimulate the emotional side of customers and their purchasing attitudes and raise their feeling of satisfaction.

Design/methodology/approach– the data was collected through a questionnaire addressed to hotels’ customers and a semi-structured interview addressed to experts and designer in hospitality field.

Research limitations/implications– A sample of five and four stars resorts in Marsa Allam, Red Sea, Egypt.

Introduction

Hospitality is the art of a good reception and a welcoming treatment in an atmosphere of friendliness and generosity. The hospitality experience that customers receive may be influenced by many factors; some of them are tangible like the services that customers may get and others are intangible as; the physical environment, atmosphere and the hotels’ decoration (Naqshbandi and Munir, 2011; Buhalis and Amaranggana, 2015).

Experts in the field of hotels and resorts design believe that the physical environment played a pivotal role in shaping customers’ interaction with the services, influencing their behavior and shaping the image of the brand. International hotel chains keen of giving a special care and priority to the physical environment due to it’s role in

reflecting level of service and quality and as one of the requirements of achieving the green economy (Buhalis and Amaranggana, 2015).

One of reasons that customers may take the decision to shift to another competitor is the inappropriate or unsuitable design especially in the lobby area (reception, lounge, interior entrance of the resort) that make them feel uncomfortable. For this reason, hotel operators are required to clarify and identify to both the architect and interior designer the desirable atmosphere to stimulate and arouse the required behaviors from their target customers and maximized their comfort and loyalty feeling towards the hotel (Rutes, et al. 2001; Thapa, 2007; Naqshbandi and Munir, 2011).

From another perspective, resorts' operators and owners keep searching into elements that minimize costs of energy and save the environment especially with the growing interest from customers in greening hotels and the increasing of their preferences to use it's services (Naqshbandi and Munir, 2011; Abdou et al., 2020).

Literature Review

World Tourism Organization. Sustainable Tourism for Development Guidebook mentioned in (2020) that the development in technology and the changing in customers' social directions and needs in addition to customers' growing awareness of greening concept became critical elements to be considered while designing hotels. Those elements forced hotels' owners especially whose own resort hotels to tide the physical environment of the hotel with the outside environment by using bold colors, high-technology lighting applications, and sculptural furnishings and finishes (Thapa, 2007; Abdou et al, 2020).

Hotels' lobby is one of the most important areas in hotels because of its' impact on creating a memorable impression for customers as they enter the hotel, which requires both the architect and the interior designer to be aware how to employ the interior elements in creating a unique brand character and at the same time responding to guests needs and interest (Davarpanah, 2017).

One of the influential elements of interior design is lighting; that has a great role in creating the atmosphere, the general image of the hotel and the brand character. There is no formula or equivalent that can be applied to suit all hospitality establishments, meanwhile it is important in creating a kind of balance between character, simplicity, functionality, and using of energy efficiency, and at the same time, each facility must have a unique character that is not frequent (Al-ghrabawi, 2019).

Lighting is one of those elements that is challenging because it is responsible for creating and exporting a specific mood to customers. It can be used to influence the guest emotionally and direct his/her activities by stimulating his/her responses in a way that serves the hotels' commercial targets. Therefore, lighting function for the hospitality business is not stuck of providing vision, but also to the ability to influence the individuals' experience and their purchasing directions in addition to facilitate the process of the operation and providing services (Davarpanah, 2017).

Before designing the lobby area it is a must to study the impressions that is required to reach customers; if it is just including warm welcome or the ability to create a tone or a unique character of the hotel in line with the level of the commercial brand, especially for commercial hotels and resorts, which gives the impression of luxury, welcome and friendliness at the same time. During the design process, it is important to have the opportunity to change the overall shape of the reception area at different times of the year (Davarpanah, 2017).

The importance of the lobby area is that it is primarily responsible for creating the first and the last impression among customers whether that are residents of the hotel or those who review the hotel photo gallery on its official website or booking sites. The reception area (hotel lobby) has a unique nature as it is full of activity all over the day for both employees and customers. There is a need to clarify the movement lanes and easy to navigate, so it must be illuminated by using different sources of lighting with different characteristics. Different types of lighting are used so that attention can be directed towards the key activities such as the reception desk or registration office, which is mostly crowded with customers (Gordon, 2015; Davarpanah, 2017; Al-ghrabawi, 2019).

Light and shade is one of the most important elements of interior design that could be used to giving different effects and strengths customers' feelings of comfort and accordingly the feeling of belongingness and loyalty. The sources of natural light that can illuminate the place and its quantities must be studied in order to achieve the required balance in the internal space. The use of architectural slots in buildings as a source of natural light is an important factor in achieving a change in the level of natural illumination, which gives the required dynamic inner space that reflects the connection with the external environment and achieves a kind of indirect contact with it. Thus, architectural slots can be used to achieve different functions, namely construction functions, Visual Function and lighting the space, thermal insulation and acoustic insulation in addition to social functions in creating a kind of privacy while achieving visual communication with the surrounding environment and highlighting the beauty of the design of this area (Salah Eldin, 2009).

Role of lighting and its' importance to hospitality properties

1. Visual function.
2. Achieving functional benefits and improving staff performance.
3. Psychological importance represented in creating psychological balance and sense of security (Gordon, 2015; Davarpanah, 2017).

Al-ghrabawi (2019) mentioned that there are many factors that should be considered while design lighting of hotels as; size and shape of the space, traffic corridors, height and shape of the ceiling, walls' color, areas that need to be highlighted, sources of light and the architectural slots in buildings shape and size. He also added that putting those points into consideration during the designing phase affect customers' satisfaction and purchasing attitudes as well as reducing the rate of using energy, reducing pollution and reducing costs.

Natural lighting is the primary source of light and it is the most suitable light for human physiology and activity as it changes according to the time of day, year, location and distance from the equator. Studies have shown that human behavior is positively influenced by natural light in the place. Thus, it could be employed from the beginning to serve both functional and commercial targets. This could be achieved by taking into account the architectural building slots whether; in walls, doors or ceiling and employing the new technology to maximize the amount of the natural lighting into the place (Ulubeylia, et al. 2014; Buhalis and Amaranggana; 2015; Retzel et al., 2015; Davarpanah, 2017; Sedarati and Baktash, 2017; Al-ghrabawi, 2019).

Artificial lighting is the second source of lighting helping in providing the necessary lighting at night, possible to be used at different times of the day according to the users' desire. It could be designed and used in different shapes, size and colors. It can be used in different ways and directions so that it can be placed on the ground, on the walls or roofs creating different visual features and atmospheres (Buhalis and Amaranggana; 2015; Retzel et al., 2015; Al-ghrabawi, 2019).

Lighting patterns and functions

1. General lighting; that aim to illuminate all the spaces and the angle of the emitted light is large so that it illuminates the entire reception area and with one level of light.
2. Focused lighting; aims at focusing on highlighting specific elements such as panels, sculptures, shelves and this type of lighting can be directed or moved and the angle of light is narrow and may vary by different size of the desired target. This type of lighting sites the reception counter and the counter of the lobby bar.
3. Decorative lighting; designed to highlight the beauty of the place. This could be used all over the place to add aesthetic touch.
4. Task lighting; is a type of lighting that is directed to a specific part of the place in order to increase its lighting rate, which helps to get the work done, such as the reception counter (Buhalis and Amaranggana; 2015; Gordon, 2015; Retzel et al., 2015).

Technology and Applications of Using Natural Lighting

Constructing of new intelligent buildings depends on improving ways that offer different and better solutions for designers about the use of natural lighting through a large scale of materials. **Light transmitting concrete** is one those solutions that depends mainly on using large numbers of optical fibers which is considered a main factor in it. The small fibers transmit light from outside to inside the building as it is a combination of a granular material that mix glass and concrete. Using this type of concrete serve practices of greening in hospitality operations and develop the energy efficiency of architectural lighting and at the same time it has a beautiful artistic value and increase the visual appearance in hotels' design (Kadam, 2017; Navabi et al. 2021).

Transparent Roof Slab is another new methods that allow the natural light. It is an economical sustainable method to build a roof in an attractive and aesthetics way that support the engagement with the exterior environment and allows the natural light to spread in the space and finally it is considered suitable for all the environmental and natural conditions (Ulubeylia, et al; 2014).

SPD Smart Glasses, also called switchable glasses. This technology switches windows from transparent to opaque by utilizing a low-voltage electrical current and an embedded layer of liquid crystal (LC) particles. This all could be done by touching a button, using of voice or hand gesture to transfer the environment and giving a space or privacy. The liquid crystal molecules form a pattern makes the glass transparent when it is on and turns it to a random pattern when it is turned off, causing the light to diffuse and the glass to become opaque to give more privacy or reduce the amount of light. It is considered one of smart technology that preferred to be used in hotels and other commercial places by architecture and interior designers. It could be applied in windows, doors and skylight. Maximizing the comfort feelings, privacy, providing outdoor views are the main advantages of using such technology (SmartGlass International, 2009; gauzy.com, 2019; Gouzy, 2021).

Research Methodology

Aim of the study

Research aims at studying using of the new lighting technology and applications as an effective element of resorts interior design in saving energy and in creating the appropriate framework in order to support customers feeling of satisfaction and loyalty towards repeating their experience in the same resort.

Problem of the Study

Based on the theoretical background presented, the study suggested to examine the following questions:

1. How far customers accept the mixture of using natural lighting besides the artificial one?
2. What are the new lighting technology and applications that could be applicable with hotels aims in reception area?
3. What are the benefits of using the new lighting technology and applications from operators and owners point of view?

Research design

Researchers in the field of hospitality studies follow several methods to collect data. However, the chosen method need to be matched with the research aims and its type. Hospitality researches classified as an academic and applied research as it is addressed to study issues and problems which are of most concerned to practitioners and it is much applicable in solving problems faced the operations (Yusof and Fadil, 2005).

To maximize benefits; both qualitative and quantitative methods were used. A questionnaire addressed to customers in addition to a semi structured interview

with experts in hospitality field and designer with a background works in hospitality projects were conducted.

Sample of the research

The total number of four and five stars resorts in Marsa Allam is seventeen resorts and all of them were under the study. A self-administrated questionnaire was designed and distributed to a random sample of hotel customers all over Egypt. Many factors determines the appropriate sample size for research among of them; the population size, the type of research, research hypotheses and the accuracy required in the research. In any case, choosing the appropriate sample for the research requires some experience to limit all these factors, so researchers used one the most famous sites to calculate the sample size from the study population with confidence level 95% (Sample Size Calculator).

About 370 samples of the electronic questionnaire were sent to 370 by sending them an e-mail invitation with a link to the electronic guest survey. Researchers received only 340 valid responses of the guests who had been invited to participate. The results obtained from the valid forms were statistically analyzed whenever needed by using SPSS Program version (20) with good forms. The questionnaire was distributed from the 20th of January 2021 to 30th of April 2021. The questionnaire is designed to consist eight questions that is formulated by using a simple and easy linguistic style for hotel customers to facilitate filling out the questionnaire. Questions are designed by using yes/no style in addition to use ranking questions to choose from (1) to (5) as; (1) is the least preferences while (5) is the highest preferences.

Also a semi structured questionnaire with a number of operational managers and executives in addition to a number of architectures and interior designers who are specialized in designing hotels were essential to accomplish this study. Thirty five semi structured interview were conducted. Interviewee selection based upon their position and their experience in hospitality field/ projects.

The purpose behind conducting semi structured interview was to find out opinions of hospitality operators and executives as well as designers with experience in designing hotels about lighting design in hotels' lobby. Twenty five minutes were the average duration of the discussion with the interviewees and was focusing on some main points regarding lighting and how to use it to achieve functional and aesthetic targets.

The following points were under discussion;

- Lighting role in improving guest' experience.
- Benefits of using natural lighting in hotels' lobby.
- Using of lighting technology to save power.
- The need to distingue lobby areas with different lighting design due to functions of this area and the needed mood (Entrance-reception counter-lounge-lobby bar-corridors).
- Colored lighting in the lobby area.

3.2. Results and analysis or discussion
- Analysis of guests' questionnaire

Table 1

Customers' preferences about lighting importance in the designing of the Lobby Area

Attributes	1	2	3	4	5	Mean V.	S.D.
Lighting is the most important element in the hotel design	1.4		8.5	46.5	43.7	4.31	0.748
Lighting play an important role in reflect the hotel's degree				66.2	33.8	4.34	0.476
Lighting design could be differ according to the hotel's type			19.7	71.8	8.5	3.89	0.522
Lighting design could be differ according to the hotel's brand name			17.2	55.2	27.2	4.10	0.667
Lighting could be used to effect customers mood and hi/her purchasing directions			1.4	33.8	64.8	4.63	0.514
Lighting has an effect on customers' feeling of wideness, friendness and comfortness				66.2	33.8	4.34	0.476
Customers' opinions about reasons of using natural lighting							
Linking the surrounding environment and the interior design of the hotel			19.7	71.8	8.5	3.89	0.522
Saving energy				66.2	33.8	4.34	0.476
Create different lighting effects for different times of the day			17.2	55.2	27.2	4.10	0.667
Increase customers satisfaction and their loyalty feelings towards the hotel			9.9	46.5	43.7	4.31	0.748

Table 2

Customers'' opinion and references about lighting design

	Freq. (N=340)	%	Mean V.	S.D.
Customers' opinions regarding using different lighting technology to serve different activities in the lobby area				
Yes	274	80.7	1.8	0.401
No	66	19.3		
Customers' opinions regarding the need to distingue lobby areas with different lighting design due to functions of this area and the needed mood (Entrance-reception counter-lounge-lobby bar-corridors)				
Yes	279	82	1.18	0.398
No	61	18		
Customers' opinions using colored lighting in the lobby area				
Yes	202	59.3	1.4	0.495

Continued

No	138	40.6		
Customers' opinions about using of lighting units with different effects				
Yes	340	100	1	0.000
No	0	0		
Customers' opinions about mixing the interior landscape with the natural and artificial lighting				
Yes	331	97.4	1.93	0.201
No	9	2.64		

Findings from customers' questionnaire:

First question is concerned about customers' pinions regarding the lighting importance to the hotel reception area (lobby area). The question designed by asking customers to rank their acceptance to numbers of statements about lighting importance and its' role in hotels' lobby area. Through the previous analysis and according to the average calculation it could be noticed that; Customers' opinion are positive towards all elements of the question although their acceptance degree varied. They showed a very strong positive assessment to the use of lighting in influencing customers purchasing attitudes followed by their assessment to the differentiation of lighting according to the hotels' degree. Also, customers showed a positive attitude while assessing the importance of lighting among hotels interior design elements. They showed acceptance with less degree to the correlation between lighting design and the hotels' brand name. Customers' responses and opinions reflect a degree of awareness about the roles and functions of lighting in terms of hotel interior design.

The second question is investigating reasons behind the importance of using the natural lighting in hotels' lobby area. A number of statements were showed to give customers the chance to rank them according to their personal point of view. By reviewing answers and its' analyses it could be noticed that; most of customers showed a special interest to use natural lighting to save energy. Also, big percentage showed their positive assessment to the role of natural lighting in increasing their level of satisfaction and loyalty feelings towards the hotel. Also, the role of natural lighting in creating different feelings along the day were positively assessed from respondents while it's role in linking customers with the surrounded environment were the least in assessment.

Results of the third question showed a great acceptance among customers regard using different lighting technology to serve different activities in the lobby area. Most of customers agreed that there is a must to distingue every area in the hotel's lobby with different lighting design according to its need functionally and aesthetically. With less level of agreement customers showed their acceptance to using colored lighting in the hotel's lobby. However, there is a total agreement about the necessity of using lighting units with different effects. Also, a very big percentage of customers agreed on mixing the interior landscape with the natural and artificial lighting

Findings from Semi Structured Interview:

According to interviewees' point of view, lighting is playing a very important role in improving guests' experience in hotels' lobby by creating an ambience and

welcoming atmosphere. Lighting of the lobby area have a vital role in shaping the first impression of customers' and it could last in minds forever. The perfect lighting design for this area needed to be functionally, aesthetically pleasing, and efficient. It is also, need to be well matched and paired with the decor of the whole hotel's design and reflect the brand name.

Guests' experience is started to be shaped as soon as they arrived to the hotel. The design of the lobby should reflect the welcoming and warm feelings. Lighting is considered one of the main elements that is responsible in reflecting this feelings and also in reflecting the image of the hotel.

Cooperation among the architect, the interior designer, the operator and the owner along the process of designing the hotel with a special care to the lobby area is a must. It is important for the architect and the interior designer to fully understand the needed impressions and feelings that customers should feel. And in the same time there is an interdepartmental communications and connections that is needed to be understood by both the architect and the interior designer in order to insure achieving the functional role of the design.

Natural lighting is playing an increasing role in maximizing hotels' customer satisfaction. It is usually preferred by customers over artificial lighting as they prefer to experience the variation of natural lighting effect all over that day and over the different times of the year. It is helped in supporting the biological system and improve the circulation system and heart rate in addition to the production of many hormones as melatonin hormone that is responsible for improve human sleeping. For workers natural lighting stimulating brain and increasing their productivity and at the same time it has the ability to take them out of the working routine in a closed place.

From another prospective using new lighting technology encourage the greening concept by using natural lighting and reduce energy consumption and support sustainable solutions in hotel design. Interior designers stated that using new technology as lighting transmitting concrete, transparent roof slap and SPD Smart Glasses are examples of technology methods that could be used to transfer natural lighting into the space and reduce the use of artificial lighting that lead to increase guests' spacious feelings and aesthetics.

Experts in the field of hospitality mentioned that customers need to be correlated with the space by expire different effects and moods. This could be achieved by using lighting technology that could change lighting mood and imports the external natural lighting. From another point of view hotels' lobby is consisting of many areas (Entrance-reception counter-lounge-lobby bar-corridors) that differ in functions and services. This made it necessary to differ the lighting design and the lighting methods to achieve the goals. Both interior designers and hospitality experts support using of colored lighting only in the entrance and the lobby bar.

Limitations

When dealing with the results of this research some limitations should be considered as it depends on measuring if customers' accept natural lighting in hotels lobby and the benefits from using the new lighting technology and applications that allows a big amount of natural lighting in the interior space of the hotel lobby as an effective element on saving energy and in creating the appropriate framework to increase their satisfaction and their loyalty towards the hotel.

To increase the credibility of the study, a questionnaire directed to customers to measure their acceptance to use natural lighting and to adopt new lighting applications that transfer the natural lighting to the interior space and support the greening practices. Also, an interview with experts in hospitality operations and experts in the field of designing exterior and interior design of hotels were conducting.

Future studies could examine the benefits from hotels' investment in adopting the new technology and applications that save power and keep the concept of sustainability in designing or renovate their hotels and

3.3 Conclusions and Recommendations

Hospitality operations are stragling in a competitive environment, and this forced both the owners and operators to search in various elements that help them to stay on track, maintain a good relationship with their regulars and increase their market share. Customers' awareness is improved day after day regarding the development in the hospitality services and they are becoming tends to stay in hotels who go with the greening practices and those who tide the hospitality experience to the exterior environment of the hotel. For customers the lobby of the hotel is considered the main image that gives them impressions about the hotel facilities, the brand name, and accordingly the quality of services. That is why a very special care is given for designing this area.

The importance of natural lighting in highlighting the beauty and the ingenuity/originality of the design is in increasingly. At the beginning of the design phase, the reception counter should be defined followed by seating areas and the lounge or lobby bar and according to this the lighting sources and type could be designed so that the lighting is directed to serve a desired function for each area, which contributes and serve the main targets of the hospitality operation. It help in achieving the harmony of the place as a whole. So that the design does not depend mostly on one type of lighting, especially with regard to the reception area where the lighting functions and effects are numerous. Lighting technology giving the designer the possibility to maximize using of natural lighting and benefit from it in reducing energy and adopting the greening concept in addition to stimulate customers emotionally to raise their satisfaction and stimulate the targeted purchasing trends.

Finally, using of lighting technology such as; SPD Smart Glasses, Transparent Roof Slab, Light transmitting concrete proved to allow the designer and the operator to bring outdoor beauty and natural lighting indoors, providing customers a sense of openness along with ambient daylight that lead to increase their satisfaction feelings

especially in resorts and hence to increase their feeling of loyalty to repeat their visits and be accommodated at the same resort.

Recommendations

1. Using light to create an impressive impression, a memorable and welcoming experience. Lighting design for the lobby area has an effect in setting the tone for the rest of customers' stay. Lighting design should support the warmness and friendly atmosphere.
2. Hotels should invest in lighting technology and arrangements that are energy efficient as possible to attract customers who have greening awareness and are looking for protecting the environment. At the same time however those arrangements could be expensive at the begging of the designing and establishing phase, it is effective in saving energy and reduce operating costs.
3. Adjust the lighting of the lobby in order to create a cooling mood in the morning and warmer and cozier atmosphere in the evening. This is very helpful and maximizing the loyalty
4. Lighting design should serve functions of each area of the lobby, so all areas have sufficient lighting. Lighting should create focal points and catch the interest to main areas such as the counter of the front desk where customers need enough lighting to finish the needed procedures.
5. Natural lighting could varied by using colored glasses in the architectural slots and SPD Glasses that gives different effects and feelings and at the same time support the originality of the place.
6. The temperature of the place should be considered while choosing the lighting type, direction and arrangements. Cool, blue lighting can be jarring while warmer tones are gentler and calming. While you want your hotel lighting fixtures to be elegant and refined, you still want your guests to feel warm and homey.
7. Using various type and wide architectural slots maximize the amount of natural lighting inside the building and is considered the best lighting type that make customers feel welcome and relaxed and escape from the stresses of their daily routine.

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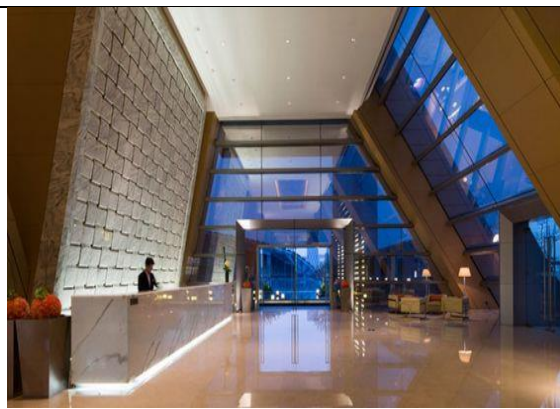
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استخدام مبادئ الاستدامة وتكنولوجيا الإضاءة في إنارة منطقة بهو الفنادق

محمد عبد العزيز عابد

قسم اداره الفنادق – كلية السياحة والفنادق
جامعه 6 أكتوبر

m.a.aziz.abed.Tou@o6u.edu.eg
ORCID: [0000-0002-2889-6975](https://orcid.org/0000-0002-2889-6975)

سالي فتحي السيد

قسم اداره الفنادق – كلية السياحة والفنادق
جامعه 6 أكتوبر

Sally.fathy.tou@o6u.edu.eg
ORCID: [0000-0002-7955-7404](https://orcid.org/0000-0002-7955-7404)

المخلص

يتزايد مطالبات المديرين ومديري التشغيل بالفنادق والمنتجعات لمصممي الفنادق بالاستجابة أثناء عمليه التصميم بالاهتمام المتزايد من العملاء بوجود بيئة مستدامة من خلال استخدام وتوفير عناصر التصميم التي تتماشى مع الممارسات الخضراء لتقليل الطاقة. تهدف الدراسة إلى دراسة كيفية توظيف عناصر التصميم الداخلي التي تساعد في الحفاظ على البيئة وتقليل استخدام الطاقة. وترتكز الدراسة على استخدام تكنولوجيا الإضاءة الجديدة وتطبيقاتها كعنصر فعال في التصميم الداخلي للفنادق في توفير الطاقة وزيادة رضا العملاء. وقد أظهرت نتائج البحث أن هناك أهمية متزايدة للاعتماد على الإضاءة الطبيعية خاصة في ردهة الفندق حيث يتشكل الانطباع الأول للعملاء. تمنح تقنية الإضاءة الجديدة المصمم إمكانية تبني مفهوم التخضير بالإضافة إلى تحفيز الجانب العاطفي للعملاء واتجاهاتهم الشرائية ورفع درجة الرضا لديهم.

منهجية البحث: تم جمع البيانات من خلال استبيان موجه إلى عملاء الفنادق ومقابلات شبه منظمة مع الخبراء الفندقية والمصممون في مجال الضيافة.

قيود / تداعيات البحث: عينة من منتجعات الخمس والأربع نجوم في مرسى علم، البحر الأحمر، مصر.

معلومات المقالة

الكلمات المفتاحية

الاقتصاد الأخضر؛ تكنولوجيا الإضاءة؛ بهو الفنادق؛ الاستدامة؛ تصميم الفنادق.

(JAAUTH)

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