



The Effect of Indoor Environment Quality on Customer Service Employees' Creativity in Telecommunication Companies in Saudi Arabia

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This study aimed to identify the effect of the Indoor Environmental Quality (IEQ) on the creativity of customer service employees in Saudi Arabia's telecommunication companies located in the country's eastern region. Having conducted this study on a random sample of 192 employees, the researcher used SPSS, Exploratory Confirmatory Analysis, Normality Distribution Tests, ANOVA test and Chi square analysis to analyze the data. This study's findings show that, on the one hand, the elements of thermal comfort, light, location and available facilities have had a statistically significant effect on the employees' creativity. On the other hand, the elements of air quality, sound, noise, interior design and landscape have no statistical effect on their creativity. In addition, while there are no statistically significant differences according to age, experience, and level of education, there are statistically significant differences due to gender. This study's results have great importance generally for decision makers and the companies' policies and, more particularly, for their customer service



departments in creating high-quality work environments that stimulates creativity.

Keywords: *Indoor Environmental Quality; Creativity; customer service; Telecommunication Companies; Saudi Arabia*

Introduction

Green building classification systems play an important role in sustainability matters related to the operation and design of buildings. There are many rating systems such as Leadership in Energy and Environmental Design (LEED) in the USA, the Building Research Establishment Environmental Assessment Method (BREEAM) in the UK, the Green Mark in Singapore and the Green Star in Australia. These systems are used to promote and develop the sustainability matters associated with the design and operation of buildings. (Altomonte et al 2019)

Therefore, the success of the design and construction of the basic building, whether outside or inside the building, are among the requirements for building accreditation according to the criteria of sustainable classification as a green building (Tharim, 2018). These requirements include the acoustics and air control, sustainable structural and enclosure design, heat and moisture control and, finally, ultimate Indoor Environmental Quality (IEQ).

Undoubtedly, IEQ factors impact deeply on the employees' wellbeing. Increased absenteeism, reduced performance and illness can arise from exposure to pollutants that may result from a lack of attention to complex and overlapping IEQ factors. (Toyinbo et al., 2019)

Interest in studying the physical environment began between 1927 and 1932 when Elton May experimented with Western Electric factories in the American city of Chicago. The aim of these experiments was to understand the effect of variables such as lighting and rest periods on the employees' performance through sharing their views and interactions with others along with the other variables that were tracked and measured. The results demonstrated that the moral factors had a significant influence on the employees' performance and productivity and that the conditions surrounding these factors affected their productivity. The results, demonstrated, also, recommended the need to take account of the employees' humanitarian aspects and that psychological and social changes determined largely the quantity and quality of their performance. Thereafter, research studies and research did not fail to pursue everything new related to the circumstances surrounding the employees. Therefore, when searching for new factors, related to developments in business environments and everything



that affects business environments, the internal physical environment became the destination of researchers with their various administrative, engineering and technical specializations.

Literature and Hypotheses formulation

IEQ background

Some studies have estimated that employees in organizations spend 75% to 90% of their working lives in buildings and that most of them spend 50% of their time in an IEQ where their thoughts, emotions, and actions are affected. Consequently, the IEQ is of great importance to the employees' well-being, their health and their performance and productivity (Fisk, 2002, Samani et al., 2015, Tharim, 2018).

On the other hand, with the growth of telecommunication services within the Kingdom of Saudi Arabia (KSA) economy, it seems important to research the dimensions of the IEQ and its effect on the employees' productivity. The telecommunication services are characterized by special features that make the tangible physical environment a very important element in shaping the quality of the telecommunication services. These are determined through contributions or interactions between the employees and the customers because the physical environment connects in one place the service provider with their customers. Therefore, an appropriate IEQ enables the service provider's employees to participate actively in providing the customers with a high-quality service.

In addition, the activity of customer service relates to meeting the needs of customers and solving their problems. Such solutions are formed through physical elements (IEQ, lighting, ventilation) and through interactive elements (listening, attention, response, treatment)

The IEQ concept refers to the attention that is paid to all the elements that make up the internal environment and that affect the employees' health, welfare and productivity (Lee, 2019).

According to the operational definition, the IEQ can be defined as the group of tangible physical factors surrounding the organization's employees that directly or indirectly affect their creativity at work.

Scientific studies and specialized institutions differed in determining the formation of IEQ elements. Some studies divided IEQ into 6 elements: namely, air quality and ventilation; thermal comfort; lighting; noise and acoustics; views; and office layout. Other studies summarized them in 4 main components: namely, thermal comfort; acoustics; visuals; and ventilation quality (Lee, 2019).



According to the research literature, the IEQ includes several elements which are explained briefly below:

Indoor Air Quality & Ventilation

The quality of the internal ventilation refers to the quality of the air inside the building in which the employees work and move. This relates to their ability to breathe easily in performing work related tasks, whether they are office or technical tasks. Previous studies have indicated (Fisk, 2002) that air quality has an effect of between 2% -20% in performing office tasks such as printing, learning, reading, making calculations and remembering.

In addition, poor quality internal ventilation affects the employees' performance and outputs and can give them ailments such as shortness of breath, skin ulcers, eye infections, etc. Consequently, the cost of absenteeism increases and has a general negative impact on employees and their productivity (Al Horr et al, 2016). Therefore, the absence of air quality and ventilation has a negative impact on the range of the employees' creativity. This is because creativity is a mental activity that is related definitely to the physical and moral state of the human body.

Thermal comfort

The concept of thermal comfort refers to "a state of mental saturation with a thermal environment" (Ashrie, 2004, Al Horr et al., 2016). The feeling of heat varies from person to person according to age, gender, and metabolism and, therefore, providing thermal comfort to everyone is a difficult and complex process. Thermal comfort is measured by the rate of complaints of uncomfortable workplace heat. Some studies have identified the following six factors that influence thermal comfort: namely, temperature; air velocity; relative humidity; radiant body temperature; insulating clothing; and metabolic rate (Ashrie, 2004, Lin & Deng, 2008). Previous studies' findings indicate, also, that the optimum heat varies with different functions. Creative mental activity requires an ideal temperature while muscle activity requires somewhat less heat (Tanabe et al., 2007).

Lighting and day Lighting

Lighting is divided between natural lighting and artificial lighting. Natural lighting, which is daylight or sunlight, clearly affects our daily lives. The place, from which the sun is absent, turns into dark or dark-like. This affects everyday life activities and affects the human body's biological clock. Previous studies' results indicate that organizations, which are concerned with natural lighting, achieve high levels of productivity, low rates of absenteeism and higher levels of attendance. Buildings worldwide contribute, also, 40% to energy consumption. For example, in the United Kingdom, buildings or offices use 33% of the generated electrical



energy. Usually, employees, who work in buildings, prefer natural lighting over industrial lighting (Aries, 2005, CIBSEm, 2015) According to the rates, announced by the KSA Ministry of Electricity, it is possible to take advantage of natural light as much as possible and to reduce up to 25% of the lighting consumed from electricity. Also, commercial buildings' lighting consumption is more than 30% of the total consumption of energy¹.

Noise & Acoustics

Hearing is one of the five senses. The sounds reach our ears and, then, they are translated and passed onto our minds. Not every sound is noise. This is because noise is a group of loud, sharp, and unwanted sounds that reach the level of disturbance and depends not only on the intensity of the sound but, also, on our attitude towards it. It is measured in decibel units and previous studies' findings have shown that those, who are exposed to loud noises from 95 - 110) decibels, have hearing problems, increased heart rate and high blood pressure. Noise varies across the working environment. For example, there is a lot of noise in either customer waiting halls or customer service sites where there are a large numbers of customer service employees interacting with customers. These places are not unsuitable for the work either of accountants or clerical tasks or developers of creative ideas. The findings from the literature review demonstrate a relationship between sound levels and employee productivity in the work environment. The two types of noise affecting the work environment are, namely, external noise and internal noise. Therefore, the design of offices should strive to reduce noise intensity in the work environment. As for the internal noise, it is affected by the office space, the number of employees and tasks and technology. Organizations can measure the noise level by conducting employee surveys; these have a role in determining the employees' level of satisfaction with noise in the workplace (Ayer et al, 2003, Al Horr et al, 2016).

Office layout

Office design is one of the most influential factors in human performance and behavior in the work environment. Design, convergence and privacy influence business performance. Studies in the field of desk design have examined two axes, namely the Open Office and the Office Cellular, and their effects on processes and activities. The findings of many research studies show a mismatch between the office environment and operations or activities and such a mismatch results in a reduction in productivity (Al Horr et al., 2017).

There is no perfect office design that fits all purposes; in the past, the offices were the same despite their different activities and tasks. Nowadays, the forms of offices vary with the

¹ For more information visit this website:
<https://www.se.com.sa/ar-sa/Pages/CommercialSector.aspx>



multiplicity of their activities and tasks. It becomes clear that the basic criterion in assessing the appropriateness of the office design is the extent of its contribution to raising employee productivity and developing their performance and the extent to which it contributes to reducing the time allocated to performing tasks.

Landscapes

Previous studies' findings show that the natural scenery and green color in the workplace contribute to satisfying the employees' needs (psychological comfort and mood). In addition, the green color contributes to increasing productivity and reducing pressure. In addition, plants, spread around the workplace, contribute to improving air quality and reducing the severity of pollution emanating from industrial materials inside the workplace (Gray, Birrell, 2014, Grindw, Patil, 2009).

Location and amenities

Previous studies (Al Horr et al., 2017) confirm the impact of the site and its physical facilities on employee performance and their outputs. This effect is measured by using Google Maps to analyze the distances. The proximity of the work location to the employees' homes is of remarkable importance to the employees. This is because it enables them to reach their workplaces easily and quickly. Also, it saves time and effort that can be directed towards work and productivity. In addition, the available facilities, such as entertainment places, childcare places, health care facilities and sports activities, provide the employees with a more comfortable working environment.

IEQ and Creativity

The organization's success depends on the creative vision. Also, since 70% of the cost of any product is determined by the way it is designed, creative designs have a strong relationship to reduced costs. IEQ contributes to promoting the concept and practices of creativity among organizations and motivates organizations to allocate appropriate budgets to encourage their employees to be creative. Professionals see creativity as a feature that any organization's management must possess. This has led to organizations searching constantly for factors that motivate employees and encourage their creativity. Human creativity is the ultimate economic resource. The ability to innovate new ideas and modern methods of doing things leads to the development of production levels and raises societies' living standards. In the race of other regulatory factors, the influence of the physical environment increases employees' creativity and productivity (Runco, 2014). From their research study, Ekval & Rayhammer present the following measures of organizational climate: support for new ideas; challenge; trust and openness; empowerment; support for the spirit of adventure;



encouragement of new and unconventional experiences; and motivating creators both financially and morally) (Ekvall, & Ryhammar, 1999).

Many of the variables and relationships, which link creativity to the business organization's internal environment, are evident in the following studies. Samani et al's (2015) study findings provide a theoretical review of the relationship between, on the one hand, personal control over the elements of the physical environment and, on the other hand, creativity at work. This study's findings indicate that creativity relates to providing either new ideas or new products or new services or new ways of working or new systems. It is clear from this study's findings that personal control in the work environment leads to the achievement of satisfaction (the individual's feeling that he/she is getting what he/she wants), so that, in the next stage, the satisfaction turns into creativity. This study's findings indicate, also, that positive emotions affect the individual's physical and psychological conditions; support his/her ability to face work stress; motivate him or her to think and focus; and to provide the best levels of performance (Samani et al, 2015).

From their examination of the relationship between the creative work environment and the innovation of new products, Dul and Seylan,'s (2014) study findings clarify the meaning of creativity and the meaning of innovation. In this respect, creativity relates to the generation of ideas and innovation relates to turning ideas into products. Consequently, innovation is based on the idea of a creative idea. From their findings, Dul and Seylan conclude that the environment, which supports creativity, is an environment that supports the ability to generate new ideas. They conclude, also, that the matter is not only unrelated to the number of new ideas but, also, to the quality of ideas. Several variables, including those related to the organizational climate, have been used to measure the variable of the working environment that supports creativity. These variables are challenge, teamwork, task rotation, job control, supervisory training, time available for thinking, and creative goals. In addition, there are other, such as furniture, plants or flowers, colors, privacy, nature windows, lighting, sounds and noise ratio that relate to the tangible physical environment).

From their examination of the characteristics of the physical environment that support creativity in startups, Lee's (2015) study findings show that the nine most important physical characteristics which encourage creativity in the workplace are daylight, exterior appearance, personal purposes, privacy, cooperation, comfortable furniture, comfort areas, industrial light, nature, air conditioning and decoration and colors. This study's findings emphasize the importance of spaces for play and entertainment and those for social interactions such as cafes, open breaks, and doodle spaces. The findings highlight, also, the importance of elements that contribute to reducing work stress and give comfort to employees. These elements are such as plants, water and outdoor views, the use of furniture



similar to the furniture used in the home, and the design of offices similar to the living rooms. In addition, the findings indicate that the creative work environment requires open and flexible spaces that provide employees with the opportunities to exchange information and ideas easily and smoothly.

Duel et al. (2011) conducted a survey of 274 Knowledge Worker workers from 27 Small and Medium sized Enterprises (SMEs) to measure the impact of the social environment and the physical environment on their organizations' creative performance. Their findings show that the social environment's effect on creative performance is greater than that of the physical environment. In addition, their findings show that the elements, through which the social environment is formed, include challenges in the job, teamwork, job rotation, and job control. In the case of the physical environment, these include several elements such as furniture, plants, privacy, lighting and sounds.

In their 2015 study on the effect of the physical environment on creative employees, Hoff and Obergm relied on face-to-face interviews with employees in order to discuss with them the elements of the physical environment that affected creativity. From their study findings, they conclude that the physical environment provides three types of support for creative activities. Namely, these are: functional support; psychological support; and inspirational support). The tools of functional support are comfortable furniture, lighting, and adequate space. Psychological support is achieved through tools such as the employee's private space, the space designed according to the employee's customized needs, the view from the window and an area available to deal with stress. As regards inspirational support, this is achieved through improving creativity and achieving the required quality through making available spaces for thinking and brainstorming.

In his 2005 study, Mccoy examined the relationship between the characteristics of the physical environment and the creativity of teams. His study findings show found there are tangible material elements that affect the creative outputs of work teams. These elements are such as, informal spaces, the possibility of visual communication between team members, multiple places to work, participation in the design of the workplace, access to technology, privacy, comfort, and calm.

In their 2019 study, (Sicotte et al aimed to explore (i) the effect of physical environment characteristics (diversity of spaces, quality of the internal environment, dimensions of meeting rooms and workstations) and (ii) the impact of the technological and social characteristics surrounding it (commitment to the project, information technology environment) on the effectiveness and creativity of project teams who specialized in developing new products. Their study's findings show that there are differences between the two variables of physical characteristics and technological and social characteristics) in



respect of their effectiveness and creativity of those teams. More specifically, the effect on effectiveness was greater than the effect on creativity.

In their respective 2011 and 2015 studies, Dul, et al. And Samani examined the creativity variables. These included: having new and innovative ideas; suggesting new ways of performing work tasks; and proposing creative solutions to problems. In his (2015) study, Young relied on the measurement of the creativity used to produce and introduce new products to the market and the percentage of the firm's sales in the previous year from new improved products. On the other hand, in their 2015 study, (Hoff & Öberg measured creativity by the number of creative outcomes.

This study relied on measuring creativity by motivating employees to present new ideas; to share new ideas with colleagues; and to arrive at creative solutions in solving problems in an appropriate manner (Samani, 2015 Dul, et al., 2011)

After reviewing the previous studies related to the changes in the internal physical environment and the organizations' creativity in dealing with various activities, it is obvious that the continuous development in the physical environment results from the evolution of the various environmental variables surrounding business organizations. More specifically, technological developments emphasize the importance of continuing scientific studies in this direction and, consequently, this study supports this orientation. Likewise, the general application of this study's findings in relation to the Gulf business environment and KSA in particular may constitute a scientific and practical addition to this study bearing in mind that it is a luxury environment in which workers value the provision of the physical facilities and their impact on multiple elements related to their performance and outputs. More specifically, the Application of this study's findings to KSA's telecommunications sector may constitute a scientific and practical addition having regard to the importance of this sector and its overall impact on the activities of individuals, institutions and society generally. Finally, after a thorough and comprehensive study of the elements of the physical environment, this study has included multiple and various elements of the internal physical environment that were not included in all of the previous studies; this is particularly evident in the field aspect of this study. Accordingly, these factors are included and tested in this study. Therefore, this study's hypotheses are as follows:

H1 IEQ has a significant impact on employees' creativity.

H1a Indoor Air Quality & Ventilation has a significant impact on employees' creativity.

H1b Thermal comfort has a significant impact on employees' creativity.

H1c Lighting & daylighting has a significant impact on employees' creativity.

H1d Noise & Acoustics has a significant impact on employees' creativity.

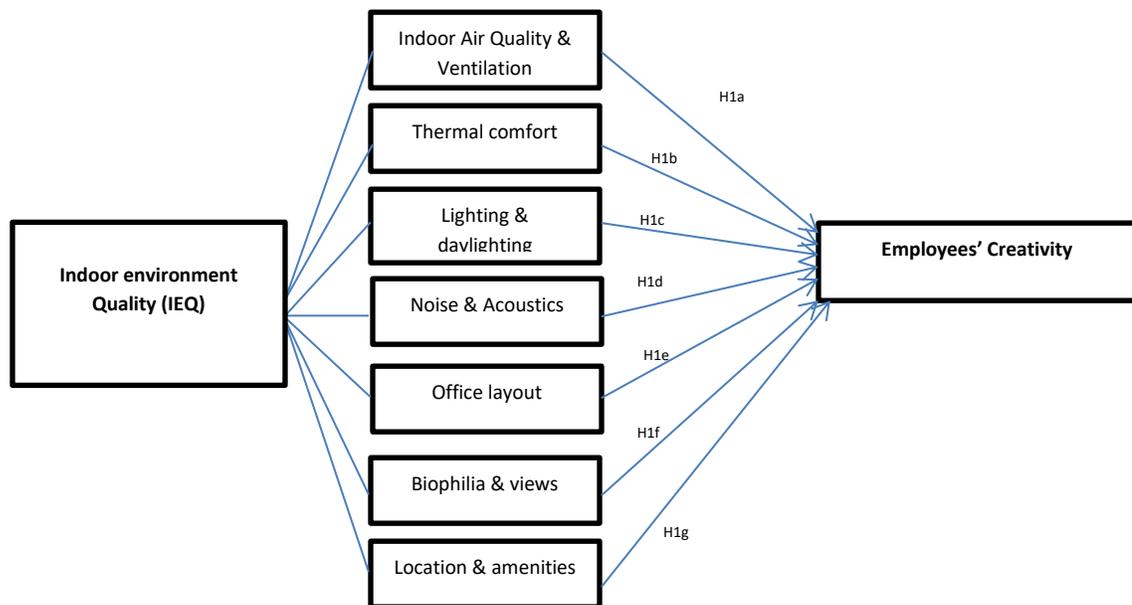
H1e Office layout has a significant impact on employees' creativity.

H1f Biophilia and views have significant impacts on employees' creativity.

H1g Location and amenities have significant impacts on employees' creativity.

H2 There are significant differences between respondents according to sex, age, education, and experience.

FIGURE 1
RESEARCH FRAMEWORK



Methodology:

Sample and data collection

The data has been collected from the employees of the telecommunication companies located in KSA's eastern region. This study focuses on customer service employees because the customer service departments have great importance in dealing directly and indirectly with clients in performing their services in order to achieve their expectations; to achieve their customers' satisfaction with the services provided; and, consequently, to retain their custom with the company.

This study's participants are 192 employees from three companies which are Saudi Telecom Company (STC), Zain, and Mobily. This study is based on a random sampling technique. A total sample was selected based on Krejcie and Morgan's (1970) sampling table. Our participants were asked to assess to what extent the characteristics of the IEQ were available in customer service branches as well as an evaluation of their creativity.

The researcher had taken the acceptance of distributing the questionnaires through the branches' managers whom he asked to send to all customer service staff a copy of the questionnaire which included measures of IEQ and the employees' creativity. The items were measured on a five-point Likert-type scale on which the participants were asked to indicate the extent of their agreement with each item (1=strongly disagree, 5=strongly agree). The researcher translated the original scales were translated into Arabic and used back translation to cross-validate them.

The questionnaire, which the researcher used to gather the data, consists of three main parts. The first part is the demographic variables scale. As shown in Table 3, this scale includes the participant's sex, age, education, experience and monthly income. The second part is the list of elements used to measure IEQ. In building this scale, the researcher relied mainly on some previous research studies (Al Horr, et al., 2016, Al Horr, et al., 2017). The third part is concerned with the measurement of employees' creativity. This relied on motivating employees to present new ideas; sharing new ideas with colleagues; and realizing creative solutions to problems in an appropriate manner (Dul, et al., 2011; Samani, 2015). Table 1 presents the total number of branches in the eastern region that participated in this study.

Table 1

Total Number of Branches in Eastern Region

No. of Branches	STC	Zain	Mobily
Dammam	8	14	14
Khobar & Zahran	10	10	13
Haffof	12	8	14
Jobail	4	4	4
Katif	3	4	6
Hafr Elbatin	2	4	3
Ebgig	2	2	1
Ras Tanora	2	1	1
Total	43	47	56

Reliability and Validity Tests

As shown in Table 2, the confirmatory factor analysis examined the validity of IEQ components and creativity. The factors load was above 0.05 and this was considered adequate for validity purposes. Composite Reliability (CR) was above 0.7.

Table 2
Confirmatory Factor Analysis

IEQ / creativity components	Indoor air quality and ventilation	Thermal comfort	Lighting and daylighting	Noise and acoustics	Office layout	Biophilia and views	Location and amenities	creativity
Cronbach's α	0.753	0.550	0.683	0.842	0.752	0.728	0.819	0.780

With the aim of testing the reliability of these measures, the researcher calculated the Cronbach's Alpha for the measures used in this study. The Alpha value ranged between zero and one. The closer that it was to 1 the greater the significance that there was a high degree of reliability and the closer it was to 0 the lesser the significance.

As shown in Table 2, the results indicate that the alpha coefficient value of the measures, used in the study, is 0.93 which is greater than 0.6 which is the minimum acceptable alpha coefficient. Therefore, we can say that the scales, used in this study, were characterized by internal reliability. As for the validity of the scale, it was the square root of the coefficient alpha; this reached 0.96.

Results

Statistical method

The researcher used SPSS v23 to perform statistical analysis. Firstly, by using the Kolmogorov-Smirnov and Shapiro-Wilk tests, he tested the creativity data for normal distribution (Shapiro & Wilk, 1965). Secondly, he used the confirmatory analysis to examine the validity of IEQ components and creativity. Thirdly, he examined reliability by calculating the Composite Reliability (CR).

However, although the data results are often a little skewed and kurtotic for males and females, a small departure from zero is not regarded as a problem provided the measures are not too long when compared to their standard errors. All four z-value are within +/-1.96 and

from using the above- mentioned tests, the significance levels of normal distribution are all a little above 0.05. Therefore, we can assume that the data is approximately normally distributed.

Biographical data results

As shown in Table 3, the results of the questionnaire reveal that of the 192 respondents to the questionnaire 85% were male and 15% were female. Further analysis showed that 49.5% of the respondents were between the ages of 20–30 years, 33.5% were between the ages of 31–40 years and 10 % were between 41–50 years. Furthermore, the results reveal that 53.5% of the respondents have bachelor's degrees. And 31% have intermediated degrees and 10.5% have higher degrees. In addition, the results reveal that 51.5% of respondents have been working in their buildings for between 1 and less than 5 years, 32.5% for between 5 and less than 10 years, and 16 % for ten years or more.

Table 3
Statistics Descriptive

Characteristics	respondents	percentage
Sex	192	100%
Male	163	85
Female	29	15
Age (%)	192	100%
less than 20	12	6.3
Between 20 - less than 30	95	49.5
Between 20 - less than 40	64	33.3
Between 40 - less than 50	19	9.9
More than 50	2	1.0
Education (%)	192	100%
Below average.	9	4.7
Intermediate education	60	31.3
Bachelor	103	53.6
Postgraduate	20	10.4
Experience (%)	192	100%
1 year - less than 5 years	99	51.6
5 years - less than 10 years	62	32.3
More than 10	31	16.1

As shown in Table 4, the measured R square of the model is 0.51; this is statistically acceptable.

Table 4

Model Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.711 ^b	0.506	0.487	0.53292	0.506	26.886	7	184	0.000

The researcher set the significance level of all the following tests at 0.05. As shown in Table 5, this means that the results are statistically significant when P-value is < 0.05. In addition, the researcher used regression analysis (ANOVA) to explore the quantitative impact of IEQ components on the employee's creativity. As shown in Table 5, the results in respect of Indoor air quality and ventilation, Noise and acoustics, Office layout and Biophilia and views are not significant because the P.Value is more than 0.10. Therefore, each of the above-mentioned have no effect on the employee's creativity. However, because the P.Value is less than 0.10, Thermal comfort, Lighting and daylighting and Location and amenities impact on the employee's creativity.

Table 5

Coefficients between IEQ and creativity

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.242	.307		4.045	.000
Indoor air quality and ventilation	.093	.072	.086	1.279	.203
Thermal comfort	-.101	.043	-.138	-2.363	.019
Lighting and daylighting	.101	.059	.119	1.715	.088
Noise and acoustics	.068	.045	.089	1.520	.130
Office layout	.104	.066	.117	1.580	.116
Biophilia and views	.023	.047	.029	.483	.630



Location and amenities	.427	.061	.462	6.996	.000
b. Dependent Variable: Creativity					

The researcher used one-way ANOVA test to examine the differences among the respondents in relation to their gender, age, education and experience. The results show that there are no differences in relation to age, education, and experience because the P.Value is more than 0.05. However, because the P.Value is less than 0.05, there is a difference between males and females.

Table 6
One Way (ANOVA) Test for Demographic Factors

Characteristics	Mean	Std. Deviation	f	Sig.
Sex				
Male	4.257669	0.708972	5.107408	0.024959
Female	3.922414	0.876538		
Age (%)				
less than 20	4.541667	0.234359	1.647537	0.164091
Between 20 - less than 30	4.265789	0.786193		
Between 20 - less than 40	4.136719	0.698538		
Between 40 - less than 50	3.921053	0.829377		
More than 50	4.375000	0.530330		
Education				
Below average.	0.440959	0.146986	1.657334	0.177721
Intermediate education	0.714990	0.092305		
Bachelor	0.817894	0.080590		
Postgraduate	0.399630	0.089360		
Experience				
1 year - less than 5 years	4.224747	77137	0.470922	0.625157
5 years - less than 10 years	4.237903	0.738890		
More than 10	4.0887	0.672521		



Discussion

The study aims to study the effect of IEQ variables on the creativity of employees in the KSA's telecommunications companies located in the country's eastern region. Through the previous statistical analysis, this study's general findings show that some elements of the IEQ have a statistically significant effect of on the employees' creativity employees. In particular, the IEQ elements of Thermal comfort, Location & amenities and Lighting & daylighting affect their creativity.

This study's results on Thermal comfort's effect on the employees' creativity are consistent with the findings of previous studies (Asrie, 2004, Tanabe et al, 2007, Lin & Deng, 2008, Duel et al., 2011). This indicates that the telecommunication companies realize the importance and the impact of this element on their employees' creativity. This means that, provided the necessary devices offer an appropriate level of thermal comfort, these motivate employees to be creative in the performance of the tasks assigned to them; to suggest creative solutions to problems; and to share creative ideas in the workplace.

The effect of natural and artificial lighting on the employees' creativity is agreed, also, a by the findings of previous studies (Duel et al., 2011, Dul & Seylan, 2014 and Samani et al, 2015). These findings confirm generally that lighting affects the employees' moods which, in turn, affects their productive and creative capabilities. This confirms the physiological role of lighting which affects each employee's breathing, pulse rate, enzymatic activity, body temperature, and hormonal secretion. Clearly, these affect each employee's psychology and mood and, in turn, affects his or her creativity. Usually, employees in buildings prefer natural lighting over industrial lighting. (Aries, 2005 CIBSEm2015, Duel et al., 2011, Hoff & Obergm 2015).

This study's findings are consistent, also, with those of previous studies on the impact of Location and amenities on employee creativity and productivity (Samani et al, 2015 Lee, 2015 Hoffand, 2015, Al Horr et al., 2017) in. This result indicates the need for companies to pay attention to the availability of places for social interaction such as cafes, open breaks, spaces available for brainstorming, role-playing, improvisation and informal meetings. Consequently, the required quality on the part of the location and amenities inspires the employees in their quest for creativity.

This study's results indicate that variables of the internal physical environment such as the quality of internal ventilation, office layout, Noise & Acoustics, and Biophilia & views, do not affect the employees' creativity. Therefore, this study's results differ from those of previous studies (Duel et al., 2011, Dul & Seylan, 2014, Hoff & Obergm, 2015, Lee, 2015 Samani et al., 2015 and Al Horr et al, 2017). From the researcher's point of view, this



difference is due to the work environment in KSA, which is characterized by capabilities and facilities that provide an appropriate and distinguished level of industrial ventilation that deals particularly with the nature of the country's climate and in the Gulf countries generally. On the other hand, the nature of this study's sample reduces the effect of the above-mentioned elements and, therefore, work in customer services requires an appropriate location, appropriate temperature and appropriate lighting. In addition, to a lesser degree, it requires the availability of other elements such as the office layout, Biophilia & views, and Noise & Acoustics. This is because, unlike other administrative jobs that require closed places, privacy and quiet, the customer service activity includes interactions and dealings with customers.

Conclusion

This study aimed to identify the extent of the impact of IEQ elements on the creativity of customer service employees in the KSA's telecommunications companies located in the country's eastern region. This study appeared to keep pace with the growing importance of the physical environment in service institutions and its significant impact on the employees' performance generally and, in particular, on their creative outputs by stimulating them to achieve a high level of awareness of problems in the workplace and to enable them to provide new ideas and creative solutions to problems and to share those ideas or solutions with their co-workers.

From the questionnaire distributed among the telecommunication companies' customer service departments, the results of the analysis show an average increase in the evaluation of the quality of the indoor environment generally. As follows, the elements are arranged according to their averages: the indoor air quality & ventilation; the quality of Location & amenities; the quality of the Office layout; the quality of Lighting & daylighting; Noise and Acoustics; Thermal comfort; and Biophilia and views.

Despite the researcher's satisfaction with the components that make up the indoor environment mentioned earlier, these do not show their total impact on the customer service employees' creativity of.

Consequently, the researcher has linked this study's results with the nature of the customer service function that requires interaction with customers and movement within the places designated for their service. This requires an adequate level of thermal comfort and lighting. In addition, the ease and speed of customer service employees' access to their workplaces contributes to shortening time and effort, which they can direct towards the performance of their creative activities.



This study presents results that are important for the telecommunication companies' decision makers in developing the quality of IEQ elements in the customer service department and in enabling customer service employees to develop their creativity and outputs. This confirms that every job within the company requires conditions for an indoor environment that are commensurate with the nature and requirements associated with each employee's performance. In turn, this opens up other areas for further research.

Limitation and Future studies:

The field study was conducted with the customer service employees of KSA's telecommunication companies located in the country's eastern region. The study limitation was represented by the sample number of 192 respondents. Although the research sample achieved the desired results and contributed to testing the research hypotheses, an increase in the study sample would lead to the ability to generalize the results.

The researcher collected the field data over a period of more than 4 months. In addition to the proliferation of branches in many geographical locations, customer service employees were too busy, and this had a clear impact on their responding to the questionnaire.

Another limitation was the sampling bias in terms of gender. This resulted from the difficulty of meeting female customer service employees in women's branches due to the characteristics and culture of the Saudi work environment.

This leads to the recommendation that further studies be conducted in different Gulf organizations that deal with IEQ's effect on the employees' performance and their outputs, loyalty and organizational citizenship behaviors.



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