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Exploring the Influence of Biophilic Workplace Design on Employee Creativity: A Comparative Study

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ABSTRACT

This research delves into the influence of office spaces infused with biophilic elements on the creativity of employees, examining differences across various biophilic indices. The study follows a correlational and comparative research design and data were collected from 222 employees including 152 workers from organisations with low biophilic index and 70 workers from organisations with high biophilic index following purposive sampling method. Biophilia Index has shown a significant positive correlation and a strong predictive value for creativity of employees and considerably higher correlation is found in environment factor of creativity. The t-test results indicate that employee creativity and its dimensions are comparatively higher in the group with high biophilic index than the group with low biophilic index. These findings emphasize the significance of integrating nature-inspired design features in workplaces to augment creativity, particularly focusing on the environmental facets of the work place setting.

Key words: Employee Creativity, Biophilia, Nature-inspired design, Sustainable designs, Built environment, Creative working space

INTRODUCTION

Within the modern workplace, the convergence of design, psychology, and employee well-being has become a central focus of study and conversation. A particularly intriguing area within this domain is the influence of natural design on the creative abilities of employees. Natural designs like biophilic designs incorporate elements from the natural world into constructed environments, aiming to strengthen the connection between individuals and nature in workspaces. Biophilia is a natural human predisposition to engage with nature (Wilson 1986); a term first coined by social psychologist Erich Fromm (Fromm 1964). Architects adopted the "biophilia" notion while designing buildings considering the positive psychological aspects of people's connectedness with nature. Biophilic design is the application of the concept of "biophilia" to the design of landscapes and the built environment, with the aim of fostering connections between humans and nature (Hes and du Plessis 2014).

Creativity is an indispensable asset for organizations seeking innovation and adaptability in today's rapidly changing business environment, which is influenced by both contextual and individual factors (Zhou and Hoever 2014). They include; personal characteristics, cognitive abilities, organizational culture factors, encouragement of creativity, leadership approach, diversity, inclusivity, physical workspace etc. (Aldabbas et al. 2023, Barjak and Heimsch 2023, Emami et al. 2023). This study specifically emphasizes on the influence of physical workspace on creativity of employees. Understanding how the inclusion of nature in workplaces affects creative thinking among employees and can offer valuable insights for both designers and organizational leaders (Suckley and Nicholson 2018, Sailer 2011). Studies have shown that green architecture or biophilic contents in the built environment enhance the creativity of the workers which is also associated with health and wellbeing benefits (Chulvi et al. 2020, Caple 2019).

This research embarks on a comparative investigation into the correlation between the biophilic index and employee creativity in various organizational settings. Hence, this study was taken under the consideration with the hypotheses; (H1)

biophilic index would significantly effects employee creativity and its dimensions; (H2) there would be a significant difference in creativity among employees working in organizations with low and high biophilic index; (H2a) there would be a significant difference in person dimension of creativity among employees working in organizations with low and high biophilic index; and (H2b) there would be a significant difference in environment dimension of creativity among employees working in organizations with low and high biophilic index.

METHODOLOGY

Sample and design

The study follows a comparative research design, and a total of 222 people made up the sample, comprising 152 workers from organisations with low biophilic index and 70 workers from organisations with high biophilic index. Purposive sampling was used to gather data from workers from corporate organisations located in the Indian states of Kerala and Karnataka. The inclusive criteria taken for the selection of the sample are, (i) Only employees in the marketing, finance, operations, human resources, information technology, and engineering fields were taken into account for the sample; and (ii) Employee within the age range 20 to 50, both male and female employees, and those with at least one year of experience and with a minimum graduation degree were taken into account for the sample (Amabile et al. 1996).

Study measures

Sociodemographic variables such as age, gender, marital status, educational level, place of residence, and years of experience were collected. Biophilic index B (Salingaros 2006) which goes from $0 \leq B \leq 20$, evaluates the biophilic quality of the constructed environment. Light, gravity, details, curves, colour, water, life, representations of nature, fractals, and organised complexity are among the ten qualities that make it up. The respondents were given the task of rating the quality of the items using the following scale: none = 0, some = 1, and a great amount = 2. In this study, a biophilic index of 13 above are considered as group with high biophilic index and 7 or lower as group with low biophilic index.

Employee creativity was assessed using the 14-item, two-factor Sen et al. (2014) scale. While the environmental factor was used to demonstrate the favourable environmental circumstances for creativity, the personal dimension was used to assess an individual's creative potential using Person-Environment Fit Scale (PEFSC). The scale was score on a five-point Likert scale with ratings ranging from "extremely disagree" (1) to "extremely agree" (5). The Cronbach's alpha coefficients of the environment and person dimensions were 0.86 and 0.89, respectively.

Assessment procedure

The samples were gathered following the study's biophilic index standards. Initially researcher consulted 25 organizations, and checked the biophilic index. After the rating, researcher has selected only those organizations who got either 13+ score (more biophilic organizations) or 7 or less score (less biophilic organizations) using Salingaros (2006) Biophilic index screening tool. In the third step subjects were taken from the selected organizations as per the inclusion criteria. All participants were asked to rate the biophilic index scale, socio-demographic details and the employee creativity scale. We excluded those samples whose subjective rating of the biophilic index scale is extreme with respect to other participants from the same organization (outliers), i.e., 3 participants who has rated the biophilic index measure in extreme level compared to other participants in the same organization and as per the researchers' ratings are excluded. Prior to gathering data from the participants, their informed consent was obtained, a suitable rapport was built, and ethical standards were upheld. After gathering the data chosen tools were applied and the analyses of the data were conducted using correlation analysis, regression analysis to see the association and impact and independent sample *t*-test for the comparison of creativity and the dimensions among the two groups were carried out in the SPSS (version 25).

RESULTS

Demographic details

Majority of employees in the sample were males

(66.2%) and only 33.8-% were females. Out of the total respondents, 45.9% were between the age of 20-30, 42.8% between 31 to 40 and 11.3% between 41 to 50 years of age. About 56.3% of respondents were married and the rest unmarried. Majority of participants (75.2%) were from urban and only 24.8% from rural. Out of total 222 respondent individuals, 51.4% have working experience of 1 to 3 years and rest (48.6%) have more than 3 years of experience.

Significant correlation between employee creativity and index B ($r = 0.21$, $p<0.01$) (Table 1). Also, the index B was more correlated with the environment dimension ($r = 0.23$, $p<0.01$) than the person dimension ($r = 0.17$, $p<0.05$) of employee creativity. The biophilic index was a significant predictor of creativity with a maximum variance of 21% explained by it (Table 2), hence accepting the hypothesis H1. Significant difference between the scores of employee creativity ($t220 = 3.02$, $p<0.005$), person dimension ($t220 = 2.35$, $p<0.005$), and environment dimension ($t220 = 3.37$, $p<0.001$); these values show that employees of organizations with high biophilic index scored significantly higher than employees of organizations with low biophilic index, hence accepting the hypothesis H2, H2a and H2b (Table 3).

Table 1. Correlation between biophilic index and creativity (person and environment factor) among the samples

	IND B	C	P	EV
IND B	1	.21**	.17*	.23**

Note: IND B= Biophilic Index, EC= Employee Creativity, P= Person Dimension, EV= Environment Dimension. ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

The results revealed that biophilic index has a substantial positive correlation and predictive value for employee creativity and its dimensions, meaning employees are more creative when the biophilic index is higher. Numerous studies have demonstrated the benefits of exposing people to nature (de Vries et al. 2013, Martin et al. 2020, Dobson et al. 2021), and incorporating these features in built environments may also have a positive impact on the inhabitants. Environmental psychologists' explanations of people's "love for nature" and related restorative responses in terms of mechanisms assumed to be rooted in our evolutionary past provide additional support for these findings (Ulrich 1993, Kaplan 1995).

The hypothesis which stated that "there would be a significant difference in creativity among employees working in organizations with low and high biophilic index" was found significant where the employees of the organization with high biophilic index have shown significantly higher creativity than the employees of organizations with low biophilic index.

Table 2. Regression analysis summary using biophilic index (B) as predictor variables (IV) and Creativity and its dimensions as criterion variables (DV) among employees

Predictor	R	R^2	Beta change	F change	Significance of F change
IND B	0.210	0.044	0.210	10.19	0.002

Note: IND B= Biophilic Index. Criterion variable: Creativity

Table 3. Comparison of creativity and it's dimensions among the groups of low and high biophilic index

Variables	Low index (N=152)		High index B (N=70)		t-value	Significance level (P =)
	Mean	SD	Mean	SD		
EC	3.6	0.89	3.9	0.72	3.02	0.003
P	3.7	0.94	4.0	0.71	2.35	0.019
EV	3.4	0.92	3.9	0.85	3.37	0.001

Several scholars have emphasized the potential influence of the environment on creativity, as highlighted by McCoy and Evans (2002) and Plambech and Konijnendijk (2015). Ulrich (1993) particularly emphasized the beneficial impact of sensory stimuli derived from natural surroundings, including visual elements, birdsong, water sounds, and the tactile qualities of the air, in fostering creative behaviour. Environments rich in nature's features, both in terms of quality and quantity, offer conducive spaces that facilitate unrestricted thinking and heightened functionality, thereby fostering creativity. Therefore, the person dimension of creativity has also found significantly high in the group with high biophilic index, thus accepting the (H1a) hypothesis.

Research indicates that various environmental factors, such as thermal comfort, lighting conditions, spatial location, and available facilities, exert a considerable influence on employees' creativity (Alayis et al. 2020). This study aligns with existing research demonstrating that exposure to biophilic elements, whether in virtual or physical form, contributes to stress reduction and heightened creativity (Yin et al. 2019). Additionally, experimental findings by Palanica et al. (2019) concluded that the restorative properties of nature on creativity, revealing that while indoor exposure to stimuli is beneficial, being outdoors can also stimulate creativity, irrespective of the specific environmental context – whether natural or urban. These results collectively contribute to a nuanced comprehension of the intricate interplay between biophilic design, environmental factors, and creative outcomes within organizational contexts, which thereby confirming the third hypothesis of the study, where the environment dimension of creativity has also found significantly high in the group with high biophilic index.

As organizations increasingly acknowledge the importance of employee well-being and creativity, this research aims to contribute valuable knowledge to the fields of organizational psychology, design, and human resource management. By investigating the relationship between the biophilic index and employee creativity, this study strives to provide practical insights that can inform the creation of more innovative, inspiring, and sustainable workplaces.

CONCLUSION

Nature and natural contents in architecture, and their quantity and quality were found to be beneficial for the inhabitants in terms of better creativity. Employees of organisations with high biophilic index significantly performed better than employees of organizations with low biophilic index in terms of creativity and its person and environment dimension.

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