Can the Office Environment Stimulate a Manager's Creativity?

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ABSTRACT

This article explores whether the manager's physical office work environment can stimulate the manager's creativity. A total of 60 managers from a large manufacturing company participated in the study. They rated the creativity potential and physical elements of office environments shown in 25 photographs. The results indicate that offices differ in terms of creativity potential. Compared to offices with low creativity potential, offices with high creativity potential have lower complexity, more plants, bright lighting conditions, windows, cooler colors, and a computer facility. The results suggest that a good interior design of manager's office environment could stimulate a manager's creativity and could therefore contribute to an organization's innovation. © 2008 Wiley Periodicals, Inc.

1. INTRODUCTION

1.1. Creative Work Environments

The most critical components of a manager's job are problem solving and decision making. Effective problem solving and decision making requires that the manager creatively explore different alternatives (Ganster, 2005; Scratchley & Hakstian, 2001). Managers can perceive the organization's climate as more or less conductive to creativity (Kwasniewska & Necka, 2004).

Several authors have suggested that the physical work environment can stimulate (or inhibit) individual creativity in an organization (e.g., Amabile, 1996; Shalley & Gilson, 2004; Woodman, Sawyer, & Griffin, 1993). For example, Amabile (1996, p. 249) states that "physical environments that are engineered to be cognitively and perceptually stimulating can enhance creativity."

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The question of how work environments must be designed in order to foster creativity is new to the field of human factors and ergonomics (Dul & Ceylan, 2006). The goal of human factors and ergonomics is to design environments for human well-being and overall system performance. Work environments that foster creative performance will also advance well-being in terms of job satisfaction and intention to leave (Shalley, Gilson, & Blum, 2000).

1.2. Literature Review

Most existing empirical studies investigate the effect of one or a small number of physical characteristics on creativity. Usually these studies are experiments in laboratory settings, conducted with students. Empirical studies in real-life context and aimed at employees are very scarce (Alencar & Bruno-Faria, 1997; Stokols, Clitheroe, & Zmuidzinas, 2002).

There is evidence that certain characteristics of the physical work environment can influence creativity directly or indirectly via mood (Dul & Ceylan, 2006). Existing empirical studies on *indoor plants* show that plants can make people's mood more positive (Larsen, Adams, Deal, Kweon, & Tyler, 1998) and can enhance creative task performance (Shibata & Suzuki, 2002, 2004). Plants in the workplace may play a supportive role as a source of inspiration for creative tasks (Shibata & Suzuki, 2002).

The presence of *windows* may have similar effects as plants (Shibata & Suzuki, 2002). Windows can play the role of bringing natural elements such as trees and other vegetation into the indoor environment (Leather, Pyrgas, Beale, & Lawrence, 1998; Shibata & Suzuki, 2002). A window view may stimulate positive mood (Hedge, 1982; Kaye & Murray, 1982; Ruys, 1971) and creative task performance (Shibata & Suzuki, 2002; Stone, 1998; Stone & Irvine, 1994). A windowed room can result in more positive perceptions and a more dynamic environment, in particular for a creative task (e.g., managerial task) rather than a simple repetitive task (e.g., clerical task) (Stone & Irvine, 1994).

Colors can have an effect on a person's mood (Stone, 2003; Stone & English, 1998). It appears that blue is a calming color and red is a stimulating color. A red office is perceived more distracting than a white office (Kwallek & Lewis, 1990), and in a red office, more anxiety is felt than in a blue-green office (Kwallek, Woodson, Lewis, & Sales, 1997). When performing a high-demanding task (e.g., managerial tasks) in a red environment, performance may decrease (Stone, 2003).

The quantity of *light* affects mood and creative task performance, depending on the color temperature of the light (Knez, 1995). If the (white) light is warm, a higher level of illuminance will result in more positive mood and better creative task performance. On the other hand, if the light is cool, a higher level of illuminance will result in lower positive mood and creative task performance.

The type of *materials* (manufactured or natural) used in the work environment also may affect mood and creativity. It may be argued that natural materials could affect mood similar to plants. Offices with wood were more preferred than offices without wood (Ridoutt, Ball, & Killerby, 2002a, 2002b). Ridoutt et al. (2002a) found that respondents used adjectives like innovative and energetic to describe these most preferred offices. People in environments with wood are associated with professionalism, success, honesty, caring, and creativity (Ridoutt et al., 2002b).

Creativity may also be affected by the *spatial arrangements* of the environment. For example, McCoy and Evans (2002) suggest that high visual *complexity* (many objects) can be stimulating for creativity, and that the presence of *furniture* may stimulate social interaction for getting ideas. On the other hand, crowded spaces may reduce privacy and

affect concentration negatively (e.g., Aiello, DeRisi, Epstein, & Karlin, 1977; Shalley & Oldham, 1997; Stokols et al., 2002).

According to models of the individual's creative process, gathering information is an important step in the production of useful ideas (e.g., Reiter-Palmon & Illies, 2004; Wallas, 1926). Therefore, it could be argued that the availability of *information sources* in the work environment, for example, the presence of *books* or a *computer*, could be perceived as stimulating creativity.

1.3. Research Objective

Despite the recognized importance of managerial creativity, to our knowledge no studies exist on the relationship between components of the physical environment and creativity of managers.

The objective of the present study is to examine whether a manager's office environment can support managerial creativity. From a set of physical elements, we explore which of the elements can support a manager's creativity. We selected the office environment as the manager's most common work environment. A manager usually has control over furniture selection and placement, seating arrangements, presence of artifacts, and other physical characteristics in the office (Davis, 1984). Managers may prefer homelike offices to feel at home, or informative offices or new office layouts to get more stimulation from the environment.

Similar to McCoy and Evans (2002), we define the creativity potential of a given office as the occupant's level of preference to go to that office to creatively solve a complex problem. We hypothesize that (1) offices with different physical settings have different creativity potential and (2) differences in creativity potential can be partly explained by physical characteristics of the office in terms of the presence of plants, windows, color, light, materials, spatial arrangements (complexity, furniture), and availability of information sources (books, computer).

2. METHODS

2.1. Informants

The informants in the study were 60 managers from a large-sized manufacturing facility in Bursa, Turkey, that manufactures spare parts for automobiles and machines. The informants were managers at different organizational levels (44% low, 22% middle, 34% high) from a variety of departments, including human resources, marketing, purchasing, manufacturing, maintenance, accounting, and finance. Sixty-five percent of the informants were men with a mean age of 35.8 years, and 35% were women with a mean age of 30.7 years. Over half of the informants held bachelor's degrees (62%). A total of 17% held master's degrees; 2% held doctorates. The other informants held two-year college degree (20%).

2.2. Office Environments

The informants evaluated different office settings that were shown to them on photographs. Photographs were used as surrogates for the real environment to evaluate the creativity potential of the office environment. Such a photographic approach is a practical and efficient way of data collection from managers with severe time constraints. The photographic method has been used successfully in outdoor environment studies. Good representational validity can be expected when the evaluation task is relatively simple (Meitner, 2004).

The informants judged 25 carefully selected office environments photographs from mostly international architecture magazines. Initially, an experienced interior designer and the first author selected 127 photographs representing a wide range of old and new office concepts (de Croon, Sluiter, Kuijer, & Frings-Dresen, 2005), such as open plan, private, traditional or conventional (e.g., homelike offices, informative offices), and more experimental offices. From this set, they selected 60 photographs of good photographic quality and, according to their judgments, could have high, medium, and low levels of seven theoretical dimensions identified as variables within the physical environment (nature, challenge, freedom, support, coherence, threatening, and status quo) that might affect creativity, as suggested in the Checklist for Rating Theoretical Dimensions of Photographic Images (McCoy & Evans, 2002). Additionally, 10 independent raters (research and teaching employees from university) scored these dimensions within the 60 photographs. For each dimension, they rated three items on a 5-point Likert scale.

The final set of photographs included 25 photographs with a large variety of theoretical dimensions according to the mean scores from the independent raters and according to the judgments of the interior designer and two authors. Multiple sets of 25 photographs were made to allow simultaneous data collection. The data collection instrument consisted of a pile of 25 photographs in random order and an evaluation form.

2.3. Creativity Potential

The first item on the evaluation form measured the creativity potential dependent variable of the office environment using the question: "If you had a very special problem to solve and needed to generate a lot of new ideas where would you most likely choose to go?" (McCoy & Evans, 2002). Informants rated each photograph on an 11-point itemized rating scale from 0, indicating an environment that the informant would be least likely to choose for creative problem solving, to 10 indicating an environment that the informant would most likely choose to be in for creative problem solving. We selected a relatively large number of rating scale categories to maximize sensitivity (Malhotra & Birks, 2003). We presumed the scale as an interval scale, and creativity potential of an office environment was defined as the mean score on the 11-point scale. A high mean score showed that the office had high creativity potential; a low mean score showed that the office had low creativity potential.

2.4. Physical Characteristics

Two approaches were used to measure the presence of physical elements in the offices seen on the photographs. In the *self-evaluation approach*, the informants who also rated the creativity potential were asked on the evaluation form to rate the presence of the physical elements according to their perceptions:

- Plants ("Please evaluate the presence of living plants in each office photograph and tick if living plants [potted and growing within the office space] are present.")
- Natural materials ("Please evaluate the characteristics of materials in each office photograph and tick if natural materials [wood, marble, granite, copper, natural fibers (such as wool, cotton, or silk), and leather] are present.")
- Manufactured materials ("Please evaluate the characteristics of materials in each office photograph and tick if manufactured materials [drywall, plastic laminate, glass (but

not the view beyond), terrazzo, carpet, synthetic fibers (i.e., nylon or olefin), vinyl, and steel] are present.")

- Color ("Please evaluate the colors according to groups of warm [yellow, orange, pink, red, or red violet] or cool colors [green, blue, or blue violet] in each office photograph and tick if the color in the corresponding group is present.")
- Light ("Please evaluate the amount of light in each office photograph and use a seven-point scale ranging from 1 to 7. Give a number from 1 [extremely low] to 7 [extremely high].")
- Complexity ("Please evaluate the amount of all structural elements in each office photograph and use a seven-point scale ranging from 1 to 7. Give a number from 1 [extremely low] to 7 [extremely high].")
- Furniture ("Please evaluate the amount of furniture in each office photograph and use a seven-point scale ranging from 1 to 7. Give a number from 1 [extremely low] to 7 [extremely high].")

Hence, a dichotomous categorical scale (0 = absent, 1 = present) was used to rate the presence of the physical elements: plants, natural materials, and manufactured materials. Color was rated on a scale with two categories: 0 = warm, 1 = cool. Light, complexity, and furniture were rated on a 7-point scale from 1 to 7, which we presumed to be interval scales.

In order to limit monomethod bias, two authors also judged the presence of physical elements using the *third-party evaluation approach*. They observed and counted the following physical elements visible in the photographs:

- Plants/flowers: potted plants or flowers (0 = absent, 1 = present)
- Windows: windows with a view (0 = windowless, 1 = windowed)
- Furniture:

    - Chairs: number of chairs or couches for seating
    - Seats: number of seating places (e.g., couch can have 2 or 3 seating places)

- Information sources:

    - Books: books seen in a cupboard (0 = absent, 1 = present)
    - Computer: computer unit, screen, or keyboard (0 = absent, 1 = present)

2.5. Data Collection

For the main data collection with informants, the human resources department of the company contacted the managers to ask them to participate. The first author explained the goals and procedures of the study to the human resources professionals. These professionals met with informants to give information and to distribute the data collection instruments.

The informants were asked to judge each of the office environments shown on the photographs. They were asked to compare the photographs by displaying them on a table or otherwise. The informants returned the evaluation forms directly to the first author.

For the third-party evaluation approach about the presence of physical elements, two authors first rated the photographs independently, having the same score for 90% of all judgments. The remaining differences were discussed until consensus was reached for the final score.

2.6. Data Analysis

To test the hypothesis that offices with different physical settings have different creativity potential, we conducted an analysis of variance with 25 offices and 60 managers as independent variables and creativity potential (judged by managers) as the dependent variable.

To test the hypothesis that differences in creativity potential can be partially explained by physical characteristics of the office in terms of presence of plants, windows, color, light, materials, spatial arrangements (complexity, furniture), and availability of information sources (books, computer), we first used analysis of covariance with 25 offices and 60 managers as independent variables, the physical characteristics (judged by managers using the self-evaluation approach) as covariates, and the creativity potential (judged by managers) as the dependent variable.

Next, multiple linear regression was used with the physical elements plants, windows, furniture (chairs, seats), availability of information sources (books, computer) as independent dummy variables (predictors; judged by authors using the third-party evaluation approach) and mean creativity potential (judged by managers) as the dependent variable.

3. RESULTS

3.1. Descriptive Statistics

Tables 1 and 2 show the means, standard deviations, and Pearson correlations of the scores for creativity potential and for the presence of physical elements using the self-evaluation approach (Table 1) and the third-party approach (Table 2).

The mean creativity potential for all 25 offices was 5.2 on the 0–10 point rating scale (range 2.7–6.9). For illustration, Figure 1 shows the two offices (Offices 11 and 1) with the lowest creativity potential (both scored 2.7), two offices (Offices 22 and 9) with medium creativity potential (scores 4.7 and 4.9), and the two offices (Offices 10 and 17) with the highest creativity potential (scores 6.8 and 6.9). For these example offices, the scores regarding the physical elements using the self-evaluation approach and the third-party approach are shown in Table 3.

TABLE 1.   Descriptive Statistics and Correlations of Creativity Potential and Physical Elements Judged by 60 Informants (Self-Evaluation Approach)

Variables[a]	Mean	*SD*	1	2	3	4	5	6	7	8
1. Creativity potential	5.16	2.93	—							
2. Complexity	3.61	1.86	−.29**	—						
3. Light	4.10	1.58	.24**	−.28**	—					
4. Furniture	4.24	1.53	−.11**	.41**	−.17**	—				
5. Manufactured materials	.57	.50	.13**	−.13**	.10**	−.11**	—			
6. Natural materials	.49	.50	−.18**	.18**	−.14**	.12**	−.70**	—		
7. Plants	.17	.38	.12**	.00	.09**	.06*	−.07**	−.04	—	
8. Color	.37	.48	.08**	−.13**	.00	−.15**	.19**	−.23**	.02	—

[a]$N = 1,500$.
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

TABLE 2.   Descriptive Statistics and Correlations of Mean Creativity Potential and Physical Elements Judged by Two Authors (Third-Party Evaluation Approach)

Variables[a]	Mean	SD	1	9	10	11	12	13	14
1. Creativity potential	5.15	1.23	—						
9. Chairs	3.72	2.39	.16	—					
10. Seats	4.12	2.76	.14	.96**	—				
11. Books	.68	.48	−.24	−.12	−.00	—			
12. Computer	.52	.51	.47*	−.22	−.28	−.32	—		
13. Window	.68	.48	.37	−.16	−.16	−.29	.03	—	
14. Plants/flowers	.52	.51	.43*	.30	.25	−.14	.36	.03	—

[a] $N = 25$.
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

3.2. Effect of Office on Creativity Potential

The results of the analysis of variance show that, controlled for managers, there are significant differences in creativity potential between offices ($F = 14.049$, $p < 0.001$). This means that our hypothesis that offices with different physical settings have different creativity potential can be confirmed.

3.3. Effect of Physical Elements on Creativity Potential

The results of the analysis of covariance using the self-evaluation of physical elements show that, controlled for managers and offices, four physical elements have an effect on creativity potential: complexity ($F = 60.423$, $p < 0.001$), light ($F = 20.802$, $p < 0.001$), plants ($F = 5.563$, $p < 0.05$), and colors ($F = 5.555$, $p < 0.05$).

The signs of the correlations (Table 1) indicate that complex and dimly lit offices with few plants and warm colors are associated with low creativity potential. Offices with low complexity, that are brightly lit, have cool colors, and have plants are associated with high creativity potential.

Table 4 shows the results of a linear regression with all physical elements scored with the third-party evaluation approach and with exclusion of seats because of collinearity. The presence of a computer and the presence of windows are related with creativity potential ($R^2 = 0.48$, $p < 0.05$). The high correlation between chairs and seats can be explained by the fact that seats are defined as the number of seats on the chairs or couches.

The results of the third-party evaluation approach for scoring physical elements indicate that offices with windows and a computer are associated with high creativity potential, and offices without windows and a computer are associated with low creativity potential.

Taking both evaluations of physical elements into account, we conclude that our hypothesis that differences in creativity potential can be explained by physical characteristics of the office in terms of the presence of plants, windows, colors, light, materials, spatial arrangements (complexity, furniture), and the availability of information sources (books, computer) is confirmed for all physical elements, except for materials and furniture.

Office 11

Office 1

Office 22

Office 9

Office 10

Office 17

Figure 1   Office environments with low creativity potential (Offices 11 and 1), medium creativity potential (Offices 22 and 9) and high creativity potential (Offices 10 and 17).

4. DISCUSSION

4.1. Limitations

To our knowledge, the study presented here is the first empirical study that explores the relationship between a large number of physical elements in a manager's work environment and managerial creativity.

TABLE 3.   Score for Creativity Potential and Physical Characteristics (Self-Evaluation and Third-Party Evaluation) for the Example Offices Shown in Figure 1

Variables	Low Creativity Offices		Medium Creativity Offices		High Creativity Offices	
	Office 11	Office 1	Office 22	Office 9	Office 17	Office 10
Creativity potential	2.7	2.7	4.7	4.9	6.8	6.9
	Self-Evaluation					
Complexity	5.5	6.5	4.4	3.5	2.9	2.7
Light	3.2	2.8	3.5	4.8	4.7	4.9
Furniture	5.7	6.2	5.2	3.7	4.2	4.1
Manufactured materials	0.4	0.2	0.5	0.5	0.7	0.7
Natural materials	0.7	0.8	0.7	0.6	0.4	0.5
Plants	0.4	0	0	0.4	0.3	0.3
Color	0.3	0	0.1	0	0	0
	Third-Party Evaluation					
Chairs	4	4	5	1	5	4
Seats	5	4	7	1	5	4
Books	1	1	1	1	0	1
Computer	0	1	0	1	1	1
Window	1	0	0	0	1	1
Plants/flowers	1	0	0	1	1	1

TABLE 4.   Results of Regression Analysis of Creativity Potential on Physical Elements (Third-Party Evaluation)

Predictor	*B*	*Beta*	*t*	Significance
Chairs	0.148	0.288	1.462	0.160
Books	0.232	0.090	0.473	0.642
Computer	1.172	0.487	2.366	0.029*
Window	1.078	0.418	2.328	0.031*
Plants/flowers	0.402	0.167	0.849	0.406

*Significant at the 0.05 level.

Our study had several limitations. We had to find simple and efficient ways of data collection because managers had limited time to participate in research. We could not measure the creativity of managers directly, which is time consuming, and relate this measure to the physical setting of the manager's work environment. Instead we asked the manager to rate the creativity potential of offices and the physical elements in the office environment using one-item questions for each concept. Although this might have hampered measurement validity and reliability, we accepted this approach in a first study on the relation between physical environment and managerial creativity.

Therefore, our study measures the manager's perception of the creativity potential of offices, and this does not necessarily mean that offices with high perceived creativity potential also result in better creative performance of the manager.

For obvious practical reasons we also could not ask the manager to work in different real-life offices and then rate perceived creativity potential and physical settings. Instead, we showed the managers photographs of 25 offices and asked their perceptions regarding these offices. Although a photographic method has good representational validity for outdoor environments when the evaluation task is relatively simple (Meitner, 2004), it is not known if this method is valid for indoor environments as well.

The presence of physical characteristics was measured by self-evaluation by the manager. Since both the independent and the dependent variables were measured using the same informant, a monomethod bias may have been introduced in the study, which is a common problem in questionnaire research. To reduce this problem, two authors rated the presence of physical elements that could easily be observed from the photographs (third-party evaluation). However, this method was quite crude, and future research would benefit from more detailed analysis of the presence and physical characteristics in the work environment.

As our study is a first attempt to explore the relation between the physical work environment and managerial creativity, making generalizations is premature. Our data come from only one company and from one country. Perceptions of creativity potential and physical characteristics may be different among companies and cultures. This may imply that we cannot generalize the results to managers from other companies and cultures. After initial testing, replication studies are needed before generalizations can be made (Dul & Hak, 2007).

4.2. Possible Explanations of Results

Despite the aforementioned limitations, the results of this study indicate that offices differ in terms of creativity potential and that several physical characteristics of office environments are associated with creativity: complexity, light, colors, and the presence of windows, plants, and a computer. The group of managers that we investigated preferred offices with relatively low complexity that are brightly lit, have cool colors, have plants and windows, and also include a computer (Table 5).

Managers, who perform complex tasks, tend to prefer settings that are conductive of thinking and concentrating (Block & Stokes 1989). The managers in our study preferred offices with a low level of complexity because this may facilitate thinking and concentrating for producing novel and useful ideas. They also preferred offices that were brightly lit. The negative correlation between complexity and light (Table 1) may indicate that offices that have a low level of complexity and are brightly lit are associated with freedom and room for thinking.

TABLE 5.   Characteristics of Offices with Low and High Creativity Potential

Physical Characteristic	Low Creativity Offices	High Creativity Offices
Complexity	High	Low
Light	Dim	Bright
Color	Warm	Cool
Plants	Absent	Present
Window	Absent	Present
Computer	Absent	Present

Managers did not prefer offices with mainly warm colors; such environments may be too stimulating. Offices with high creativity potential had more cool colors; cool colors are calming. Plants may help a manager to relax after stress, and result in a positive mood supportive for creativity. Windows provide daylight illumination, which generally is preferred over artificial light (Butler & Biner, 1989; Hedge, 1982). A computer may be associated with availability of information in a private environment, which may be useful in creativity phases where information needs to be gathered. It also gives possibilities for controlled contact with others through e-mail or the Internet; contacts may help to get new ideas. An electronic workspace may enable a manager to give subordinates orders without a need for continuous communication during task engagement (Dewett, 2003), hence allowing more time for thinking.

We did not find an association between material or furniture and creativity. The presence of natural materials had no independent effect on creativity potential. Offices with natural materials have warm colors. For example, the two offices with the lowest creativity potential (Figure 1) had a wooden interior design, dominated by brown colors. Warm colors (and related natural materials) were more present in offices with low creativity potential, and cool colors and related manufactured materials were more present in offices with high creativity potential. The correlation between natural materials and warmer colors that we found (Table 1) can be explained by the fact that most offices with natural materials dominantly use wood products with warm colors.

We also found no effect of furniture on creativity potential. It may be that the informants, while evaluating furniture, actually may have judged complexity; they seem to perceive furniture as an aspect of complexity. Our finding of a correlation between furniture and complexity (Table 1) supports this idea.

In particular, the study of McCoy and Evans (2002) can be used for comparing the results of our study. McCoy and Evans also studied the creativity potential of physical environments by analyzing a large set of physical characteristics. However, they studied educational environments (classrooms, hallways, libraries, etc.) for undergraduate students.

Although both studies showed that windows are associated with high creativity potential, the other physical elements that were measured in both studies (complexity, light, color, plants, natural materials and furniture) showed considerable differences.

Probably, the two studies are not comparable in terms of study population (managers versus students), environment (offices versus educational environments), cultural differences (Turkey versus United States), and methodological differences. If and how these differences between the studies can explain the differences in the environment–creativity potential relationship is still unclear and open for further exploration after replication studies have become available.

One (theoretical) reason for the difference between the results of both studies may be that it is difficult to compare studies on the effect of physical characteristics if the range of levels of physical characteristics is different. Figure 2 shows a hypothetical nonlinear relationship between physical characteristic and creativity.

It is possible that there is an optimum level of physical characteristic for nearly all physical characteristics: too little presence of the physical element (complexity, light, color temperature, etc.) nor too much presence is good. In hypothetical study 1 of Figure 2, a higher level of the physical characteristic results in higher creativity; in study 2, a higher level of the physical characteristic results in lower creativity. For example, it appears that McCoy and Evans (2002) included environments with very low complexity, such as hallways (see Figure 7 in McCoy & Evans, 2002). Therefore, it is not surprising that the office that is
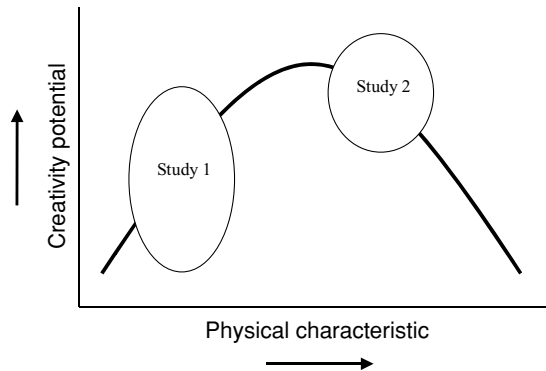
Figure 2   Possible curvilinear relationship between creativity potential and physical characteristics.

shown in their paper as an example of a high creativity potential environment (see Figure 4 in McCoy & Evans, 2002) is indeed more complex than the hallway, although it is considerably less complex in comparison to our high complex office environments like Office 1 as shown in Figure 1.

4.3. Future Research

Our study is a first attempt to explore the relation between physical work environment and managerial creativity. More studies are needed with different study populations, with wider ranges of physical characteristics, and with standardized instruments to measure creativity potential and physical characteristics.

Prospective studies with direct measures of creativity could examine if perceived creativity potential of the work environment is indeed related to the creative performance of its occupant. Future research also may include individual characteristics such as personality traits and cognitive styles. For example, introverted people might have different needs for creativity supporting physical environments than extroverted people.

Cross-cultural studies on the relationship between work environment and creativity seem an interesting future research direction, and some of our preliminary results in another study indicate that cross-cultural differences exist in creativity-supporting work environments (Ceylan & Dul, 2007).

4.4. Practical Implications

Our finding that offices differ in terms of creativity potential can have implications for today's office design. Over the past few decades, companies have changed their approaches toward workplace design, partly because of changing trends and partly because of changing needs. Previously, companies had focused on, for example, facility costs reductions and employee efficiency (e.g., office standardization, information technology systems), employee health and comfort (e.g., ergonomic office design), or employee communication (e.g., open-office concepts). Employee creativity was, at best, an indirect or implicit goal of the company's approaches for office design.

However, nowadays, companies need to be innovative for survival and need creative employees to generate novel ideas about products, services, processes, or procedures. Our study suggests that offices can be designed for stimulating creativity. This means that creativity could be another goal for the design of workplaces, without jeopardizing other goals like efficiency, flexibility, communication needs, and health and safety. This seems to be particularly important for knowledge workers such as managers.

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REFERENCES

Aiello, J. R., DeRisi, D. T., Epstein, Y. M., & Karlin, R. A. (1977). Crowding and the role of interpersonal distance preference. Sociometry, 40, 271–282.

Alencar, E. M. L. S., & Bruno-Faria, M. F. (1997). Characteristics of an organizational environment which stimulate and inhibit creativity. The Journal of Creative Behavior, 31, 271–281.

Amabile, T. M. (1996). Creativity in context. Boulder, CO: Westview Press.

Block, L. K., & Stokes, G. S. (1989). Performance and satisfaction in private versus nonprivate work settings. Environment and Behavior, 21, 277–297.

Butler, D. L., & Biner, P. M. (1989). Effects of setting on window preferences and factors associated with those preferences. Environment and Behavior, 21, 17–31.

Ceylan, C., & Dul, J. (2007). Cross-cultural differences in creativity stimulating work environments. In Eastern Academy of Management International Conference on Managing in a Global Economy XII: Culture: Integration and Innovation Proceedings. Amsterdam, The Netherlands.

de Croon, E. M., Sluiter, J. K., Kuijer, P. P. F. M., & Frings-Dresen, M. H. W. (2005). The effect of office concepts on worker health and performance: A systematic review of the literature. Ergonomics, 48, 119–134.

Davis, T. R. V. (1984). The influence of the physical environment in offices. The Academy of Management Review, 9, 271–283.

Dewett, T. (2003). Understanding the relationship between information technology and creativity in organizations. Creativity Research Journal, 15, 167–182.

Dul, J., & Ceylan, C. (2006). Enhancing organizational creativity from an ergonomics perspective: The Creativity Development model. In R. N. Pikaar, E. A. P. Koningsveld, & P. J. M. Settels (Eds.), 16th World Congress on Ergonomics (IEA 2006) Proceedings (pp. 667–672). ISSN 0003-6870, Elsevier Ltd. Maastricht, The Netherlands.

Dul, J., & Hak, T. (2007). Case study methodology in business research. Oxford, UK: Butterworth Heinemann.

Ganster, D. C. (2005). Executive job demands: Suggestions from a stress and decision-making perspective. Academy of Management Review, 30, 492–502.

Hedge, A. (1982). The open-plan office—a systematic investigation of employee reactions to their work-environment. Environment and Behavior, 14, 519–542.

Kaye, S. M., & Murray, M. A. (1982). Evaluations of an architectural space as a function of variations in furniture arrangement, furniture density, and windows. Human Factors, 24, 609–618.

Knez, I. (1995). Effects of indoor lighting on mood and cognition. Journal of Environmental Psychology, 15, 39–51.

Kwallek, N., & Lewis, C. M. (1990). Effects of environmental color on males and females: A red or white or green office. Applied Ergonomics, 21, 275–278.

Kwallek, N., Woodson, H., Lewis, C. M., & Sales, C. (1997). Impact of three interior color schemes on worker mood and performance relative to individual environmental sensitivity. Color Research and Application, 22, 121–132.

Kwasniewska, J., & Necka, E. (2004). Perception of the climate for creativity in the workplace: The role of the level in the organization and gender. Creativity and Innovation Management, 13, 187–196.

Larsen, L., Adams, J., Deal, B., Kweon, B. S., & Tyler, E. (1998). Plants in the workplace: The effects of plant density on productivity, attitudes, and perceptions. Environment and Behavior, 30, 261–281.

Leather, P., Pyrgas, M., Beale, D., & Lawrence, C. (1998). Windows in the workplace: Sunlight, view, and occupational stress. Environment and Behavior, 30, 739–762.

Malhotra, N. K., & Birks, D. F. (2003). Marketing research: An applied approach (2nd European ed.). London: Financial Times/Prentice Hall.

McCoy, J. M., & Evans, G. W. (2002). The potential role of the physical environment in fostering creativity. Creativity Research Journal, 14, 409–426.

Meitner, M. J. (2004). Scenic beauty of river views in the Grand Canyon: Relating perceptual judgments to locations. Landscape and Urban Planning, 68, 3–13.

Reiter-Palmon, R., & IIlies, J. J. (2004). Leadership and creativity: Understanding leadership from a creative problem-solving perspective. The Leadership Quarterly, 15, 55–77.

Ridoutt, B. G., Ball, R. D., & Killerby, S. K. (2002a). First impressions of organizations and the qualities connoted by wood in interior design. Forest Products Journal, 52, 30–36.

Ridoutt, B. G., Ball, R. D., & Killerby, S. K. (2002b). Wood in the interior office environment: Effects on interpersonal perception. Forest Products Journal, 52, 23–30.

Ruys, T. (1971). Windowless offices. Man–Environment Systems, 1, 49–50.

Scratchley, L. S., & Hakstian, A. R. (2001). The measurement and prediction of managerial creativity. Creativity Research Journal, 13, 367–384.

Shalley, C. E., & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. Leadership Quarterly, 15, 33–53.

Shalley, C. E., Gilson, L. L., & Blum, T. C. (2000). Matching creativity requirements and the work environment: Effects on satisfaction and intention to leave. Academy of Management Journal, 43, 215–223.

Shalley, C. E., & Oldham, G. R. (1997). Competition and creative performance: Effect of competitor presence and visibility. Creativity Research Journal, 10, 337–345.

Shibata, S., & Suzuki, N. (2002). Effects of the foliage plant on task performance and mood. Journal of Environmental Psychology, 22, 265–272.

Shibata, S., & Suzuki, N. (2004). Effects of an indoor plant on creative task performance and mood. Scandinavian Journal of Psychology, 45, 373–381.

Stokols, D., Clitheroe, C., & Zmuidzinas, M. (2002). Qualities of work environments that promote perceived support for creativity. Creativity Research Journal, 14, 137–147.

Stone, N. J. (1998). Windows and environmental cues on performance and mood. Environment and Behavior, 30, 306–321.

Stone, N. J. (2003). Environmental view and color for a simulated telemarketing task. Journal of Environmental Psychology, 23, 63–78.

Stone, N. J., & English, A. J. (1998). Task type, posters, and workspace color on mood, satisfaction, and performance. Journal of Environmental Psychology, 18, 175–185.

Stone, N. J., & Irvine, J. M. (1994). Direct and indirect window access, task type, and performance. Journal of Environmental Psychology, 14, 57–63.

Wallas, G. (1926). The art of thought. New York: Harcourt Brace Jovanovich.

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. The Academy of Management Review, 18, 293–321.