The Relationship between Physical Workplace Attributes and Organizational Creativity, Case Study: Knowledge-based Companies

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ABSTRACT: After years of investigating the effective factors of organizational productivity, managers concluded that physical workplace attributes is one of the most important variables. Physical workplace attributes play a vital role in increasing or decreasing organizational productivity, effectiveness, high performance, creativity as well as influence on job motivation, satisfaction and loyalty. Limited research findings link the physical work environment to employees' physical and mental health. Although the significant of physical attributes in work environments couldn't be ignored, there is a big gap in management literature reviews and studies of this field. The aim of this research is to fill this theoretical gap as well as recognition, classification and evaluation the physical attributes of workplaces. To gain these goals, in this study we have investigated the relationship between organizational creativity and Physical workplace attributes, and the effective factors of driving creativity in work places. Nowadays, Innovation and creativity have become critical skills for achieving success in organizations while they can increase the productivity of the organization. Therefore, after reviewing the related literature, 260 questionnaires were distributed among 80 active knowledge-based companies in "Khorasan Razavi Science and Technology Park" and "Ferdowsi university of Mashhad" incubator to evaluate their Physical workplace attributes as well as its relationship with organizational creativity. Analysis via Structural equation modeling by AMOS software shows that Physical workplace attributes strongly influences on organizational creativity, especially through "Work surfaces" and "Daylight and view" factors. In other words, to increase organizational creativity as a vital factor of creating sustainable competitive advantage for organization, designing and creating and developing a workplace with proper and fit physical features is necessary.

Keywords: Physical Workplace Attributes, Workplace Environment, Organizational Creativity, Work Surfaces, Daylight and View.

INTRODUCTION

The amount of investigation of learning in the workplace has increased dramatically in recent years. The nature of organizations is such that interactions take place not only between members, but also between the members and their physical surroundings, such as buildings, their layout and their objects (Otoole, 2001).

The physical aspects of a workplace environment can have a direct impact on the productivity, health and safety, comfort, concentration, creativity, job satisfaction and morale of the people within it (Martens, 2011). When people are working in situations that suit their physical and mental abilities, the correct fit between the person and the work task is accomplished. People are then in the optimum situation for learning, working and achieving, without adverse health consequences, e.g. injury, illness (Thayer, 2010).

The physical environment is more than just a collection of work surfaces, storage options and adjustable chairs. It sets boundaries for the way that employees can accomplish their tasks, and therefore should be matched to the kind of culture that the organization wants to develop.

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Physical environmental factors can have an adverse impact on people. The specific physical factors that limit performance will vary depending on both the work environment and individual differences. Those people who are working within an environment are the ones best able to identify factors that affect their work. It is important to involve these 'hands-on' people in consultations with managers when considering options for better workplace in question (Landry, 2012).

Therefore, this paper wants to investigate the relationship between organizational creativity as an important factor of success in today's business world and Physical workplace attributes as determining factors. This paper investigates the viewpoints of employees in such companies which are the recourses of creativity.

The results of this study are directly used by architects in designing workplaces to achieve proper physical features in organizations and gain the best fit between people, organization and society in many aspects.

LITERATURE

Physical Workplace Attributes

It is clear that people create the physical environment around them. People design and build buildings, create and implement floor plans, choose and obtain the objects with which they surround themselves. At the same time, the physical environments will also influence the individuals who dwell and work within the same physical surroundings (Otoole, 2001).

Although both job pattern and its broader context are likely to drive motivation, little is known about the specific workplace characteristics that are important for motivation (Murry & Michaelides, 2015).

Particularly when productivity of workforce is now central to business competitiveness, it is timely to explore the interface between physical and social environments as many of the social/psychological impacts on employees have not been recognized or calibrated (Too & Harvey, 2012).

It has to be considered that physical working conditions differ from one enterprise to another. They are closely related to the work process, and depend on the various arrangements of the work premises. It is essential to keep a safe, comfortable and also creative environment as it contributes to work efficiency and the well-being of workers.

Moreover, physical environment of work can play an important role in physical therapy and occupational therapy practitioners' perceptions of resonant leadership, structural empowerment and psychological empowerment to their experiences of spirit at work, job satisfaction and organizational commitment (Wagner et al., 2014).

A well-designed workplace means different things to different organizations. The definition is dependent on the business, its objectives and its culture. One company may have a clear need for distraction free work 90% of each day, which may result in an office comprised of almost entirely private offices. In contrast, a company whose chief business requires teamwork and extensive collaboration may desire more open work areas. The definition then, of a well-designed workplace, is subjective and relative (Slater, 2010).

The environment that surrounds people is an element of social structure, and, as Giddens explained, becomes part of the structuration process, influencing the humans associated with it, while human agency influences the organization and substance of the artifacts within it (Giddens, 1984; Gieryn, 2000 & Rosen et al., 1990).

This influence relates to meaning, values and beliefs that form part of the "place- identity" that a site or object may hold for an individual. Proshansky, Fabian and Kaminoff (1995) saw "place-identity" as a sub-structure of an individual's self-identity. Schemas relating to an individual's past experience of how places have satisfied needs and desires form as the individual matures. Out of good and bad experiences emerge values and beliefs about the physical world and its meaning. Part of these meanings relates to the role of associations.

An individual learns through childhood the appropriate behaviors relating to roles in school, home and neighborhood. Environmental understandings and competence result from an individual's adaptation to each set (Proshansky et al., 1995). As the individual matures and commences work, this adaptation and adoption of roles continues according to place (Otoole, 2001).

Moreover, new organizations need new workplaces. They have to explore key changes occurring within office occupier businesses that will have a medium- to long-term impact upon the nature and design of the office workplace (Harris, 2016).

Therefore, made environments are important factors in our lives. They are more important when they affect organizational variables. Workplaces can make an organizational successful, pioneer or even crucial. Organizational architecture has an important role in order to help organizations to gain their goals and strategies through architecture interactions with employees' performances.

One of the important variables, which the Physical workplace attributes that it can influence on, is organizational creativity.

Organizational Creativity

Recently, the issue of creativity can gain increasing interest as an important organizational resource (Sundgren et al., 2007).

Organizational creativity is the creation of a valuable, useful new product, service, idea, procedure or process by individuals working together in a complex social system. Woodman et al. (1993) framed the definition of organizational creativity as a subset of the broader domain of innovation. Innovation is then characterized to be a subset of an even broader construct of organizational change.

Contemporary studies of innovation and creativity suggested that successful firms are effective at exploiting existing competencies to create gradually improved exploitative innovations while at the same time successfully exploring new competencies and technologies to create explorative breakthrough innovations (DiLiello, 2006; Binnewies, 2008).

Moreover, design and development units of a select number of organizations across industries in the Indian context revealed the significant relationships among employee creativity and workplace innovative orientation (Ghosh, 2015).

At least for business organisations, creative ideas must have utility. They must constitute an appropriate response to fill a gap in the production, marketing or administrative processes of the organization. Thus, individual creativity is concerned with the generation of ideas while organizational creativity is concerned with both the generation of ideas and the implementation of these ideas.

In fact, to remain competitive, firms would like their employees to be creative at work by generating novel and appropriate ideas for products, processes, and approaches (Shalley & Gilson, 2004).

Company performance is becoming more and more dependent on an organization's ability to be creative. Businesses distinguish themselves through their capacity for continuous innovation. Creativity is necessary for innovation (Martens, 2011).

Physical Workplace Attributes and Organizational Creativity

Most managers will likely acknowledge the critical role played by organizational structure in the innovation process, but few understand that physical space is equally important. In fact, some of the most prevalent design elements of buildings almost shut down the opportunities for the organizations that work within their walls to thrive and innovate. Hence, the implications of physical space for the innovation process are profound (Morris, 2016).

The review of related literature reveals knowledge gaps and fragmentation in research about the relation between creativity and the physical workplace (Martens, 2011).

This gap may cause from this viewpoint:

"… the primary reason which allowed great work to happen had little to do with the special characteristics of workplaces. Creative employees achieved great work in very ordinary and unremarkable environments" (Berkun, 2012). But most of researches show that office space can contribute to company performance (Brill, 2001; Voordt et al., 2003) and also proved that the physical layout of workplaces can affect the behavior of organizational members (Martens, 2011).

Organizations may choose to adapt their physical layout to promote mental ability and activity of workers, such as creativity, that gives a competitive edge. For example, Brenner and Connell (1994) conducted research on the privacy and collaboration needs of knowledge workers.

Oksanen and Ståhle (2013) discussed about physical environment as a source for innovation. They believe that managers can support innovation creation in organizations by developing physical spaces. They found that the configuration of floor plans was one factor that actively promoted a learning creative environment. Pedler, Burgoyne and Boydell (1997) suggested that the environment of an organization may help support the learning creative climate. They gave the following examples of "architectural practice with the possible organizational interpretations" in table 1.

Table 1. Architectural Features with the Possible Organizational Function (Pedler et al., 1997, p. 127)

Design Features	Function
Removal of dividing walls partial removal of floors	Decentralize functions, remove central services
Outside staircase; putting service pipes, etc. outside central courtyards, wells, atriums	Encourage outside trading re-train people, encourage radical job changes
Add balconies recycling old bricks, etc	Celebrate differences, encourage expression
Use historical objects as sculpture lots of inside greenery	Blur home/work/community boundaries
Put skylights in the roof put in bigger windows preserve historical objects	Full disclosue; open up top management processes for inspection and comment
Demolish departmental boundaries	Encourage secondments outside

Empirical research shows that the right place and the right time are essential for creativity. Buildings and the configuration, design and management of space can both constrain and support the exchange of ideas and the flow of knowledge (Martens, 2008). The challenge for a firm to grow and prosper is to have the ability to capture, share and innovate from that knowledge (Worthington, 2001).

For example, Creative interactions can just as well take place in individual offices. Kornberger and Clegg (2004) found that 64 percent of all Creative interactions happened in individual offices, and not, as intended by the planners, in the multi-rooms, café shops, and meeting rooms.

In 2003, Vithayathawornwong's et al. study presented two principle objectives through, first exploring the perceived relationship between the social-psychological work environment and the physical work environment; the two dimensions of the total work environment that operate as a contextual factor to creativity in organizational settings. Quantitative and qualitative data was collected by means of survey questions. The data from this study suggested that dynamism, the degree of energy and activity within an organization, is the most salient social-psychological condition, conducive to creative behavior, which is supported by the physical work environment (Vithayathawornwong et al., 2003).

Kornberger and Clegg's (2004) empirical study discussed the concept of office designing and cited research, indicating the office encounters that could lead to creative interactions usually took place in individual offices and not in multi-rooms, coffee shops, and meeting areas as planners intended.

In 2002, Stokols' et al. study examined the physical and social predictors of perceived support for creativity in the workplace and their affects on important personal and organizational outcomes. The researchers could not determine, with the data collected, if the links between environmental distraction, or social climate in the workplace were perceived to support creativity, but did find that "levels of distraction undermined perceived support for creativity at work" (Stokols et al., 2002, p. 145).

Martens (2011) believes that creativity research is broad and recognizes culture, process and activities as creative thinking and moments of insight, which can be supported with the physical workplace. He theorically proved the relationship between the physical workplace and creativity.

Nowadays most of managers have come to the conclusion that workplace environment is important enough to be invested on.

For example, Bakke (2007) showed that Nordic managers recognize workplace design as one instrument for changing workplace practices, and they are making plans to change the physical environment.

Together, the awareness and the actual plans show large potentials for using workplace design to change work practices.

Therefore, by wide investigation of formerly researches, we found that there is no previous research about the influence of Physical workplace attributes on creativity in Iranian organizations. Therefore, we assumed that:

There is a positive relationship between Physical workplace attributes and organizational creativity.

RESEARCH METHODOLOGY

Survey Instrument

This study was based on the design and administration of a multi dimensional survey to address the research hypotheses.

For investigating Physical workplace attributes, we used the results of Landry's (2012) thesis which has established a list, in order of importance, of physical elements and properties of the workplace and its immediate surroundings that its sample group, the majority IDC and ASID members, perceived to encourage their creativity.

An exploratory mixed method of social science qualitative and quantitative research was employed that applied methodological triangulation validating the data through cross verification of the phenomena of office workers' perceived creativity related to the physical organizational environment to establish this list.

Regarding to the Landry's research, final themes ranked in order of importance from the viewpoint of 129 workers, are as following in Table 2.

Table 2. Elements of Physical Workplace Attributes

No	Elements	No	Elements
1	Daylight and View	7	Multiple Work Areas
2	Work Surface	8	Artificial Lightning
3	Personal Items	9	Nature
4	Privacy	10	Air Conditioning
5	Collaboration	11	Décor
6	Ergonomic Furniture	12	Color

We used these factors as dimensions of Physical workplace attributes from employees' viewpoints.

For measuring organization's creativity, we applied Randsip's creativity questionnaire which its implementation and assessing is standard and uncomplicated. We used the version of a questionnaire which has been investigated in Ivancevich ' book in 1989. Its validity and reliability has been confirmed in several studies (Ivancevich, 1989).

We asked from the participants to rate the extent to which they agree with each item on a five-point scale ranging from strongly disagree (1) to strongly agree (5).

Reliability and Validity of Questionnaire

In order to analyze reliability, Cronbach's coefficient and the composite reliability coefficients were calculated. These indices reflect the degree of internal consistency of the observed variables, that is to say, the extent to which they represent the common latent variable. Cronbach's a coefficient in all cases was over 0.7, the criterion usually considered to identify strict internal consistency (Hair et al., 1998), exceeding the value of 0.6 recommended in exploratory studies (Hair et al., 1998). In all cases, the composite reliability coefficient was above the minimum level of 0.6 recommended.

The next step was to analyze the content, convergent and discriminate validity of the measurement scales used.

Content validity indicates that the items included in the survey correctly represent the concept to be analyzed. Since, the scales were built on the basis of the previous literature and therefore include items used in scales that had already been validated for measuring similar concepts and assessed by case studies and the questionnaire pre-test, it was considered that each item had the necessary content validity.

Convergent validity measures the degree to which the different scales used to measure a latent factor are correlated. A measurement has convergent validity if it converges in the same model as the rest of the measurements that form part of the same concept. Steenkamp and Van Trijp (1991) link the convergent validity of a concept and its corresponding scale of measurement with the coefficients' significance of the standardized regression factor between the group of explained variables of the scale and their corresponding latent saturation variable. To test convergent validity, the l coefficients that measure the relation between the observed and the latent variable were analyzed. All the standardized factor loadings were statistically significant at a 95 per cent confidence level (t=1.96, weak condition) and exceeded 0.5 (strong condition) (Hair et al., 1998).

Discriminant validity measures the degree to which the specified latent factors differ even though they are correlated (Hair et al., 1998). Each construct should be sufficiently different from the others to justify its existence. In order to check discriminate validity, the confidence intervals of the correlation between each pair of dimensions or scales were calculated. Discriminant validity of the scales was confirmed because none of the confidence intervals contained the value 1 at a 95 per cent confidence level (Vázquez et al., 2007).

Sampling Process and Data Collection

The information needed to test the above hypotheses was obtained from a survey conducted to analyze the variables. 260 questionnaires were distributed among 80 active knowledge-based companies in Khorasan Razavi Science and Technology Park and Ferdowsi university of Mashhad incubator. The sample case randomly was chosen in regards to Morgan table. We believed that knowledge based companies are the best developers of creativity in workplaces. Moreover creativity is vital in their works and they try to improve their products or services via creativity. Moreover there are some facilities

which help them to change their workplace while there are some training courses, encouraging them to increase creativity through physical aspects.

Data collection was carried out through personal administration of survey instruments at organizations and through dispersing randomly within organizations among employees. Finally a total of 243 valid questionnaires were returned in one week period.

DATA ANALYSIS AND RESULTS

After validating the scales, the conceptual model was evaluated. A structural equation model was used to test the data and check the hypotheses. This methodology was chosen because of the advantages offered by multivariate analysis in comparison with other techniques, as stated by Hair et al. (1998). Firstly, structural equation modeling adopts a confirmatory rather than an exploratory approach for data analysis. Secondly, while traditional multivariate procedures cannot measure or correct measurement errors, structural equation modeling offers explicit estimates of these parameters.

Finally, while data analysis using other methods is based only on observable measurements, in structural equation modeling both observable and non-observable or latent variables can be included. As it is indicated in The
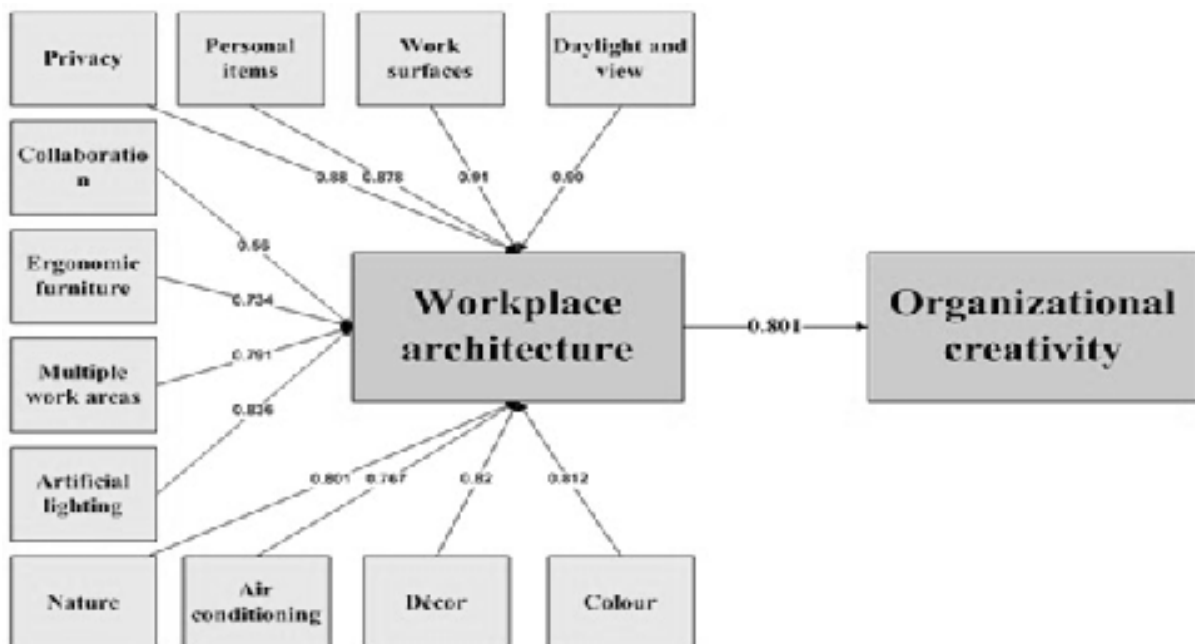

Fig 1. Final Confirmed Model

hypothesis stated that the relationship between Physical workplace attributes and organizational creativity is positive and also significant (β=0.801, C.R = 8.743).

The regression analysis of model shows that the regression coefficient for organizational creativity differs significantly from zero. The robust statistics CFI= 0.92 (Comparative Fix Index) and IFI=0.95 (Incremental Fit Index) showed values above the recommended minimum of 0.9. The GFI=0.91 (goodness of fit) and AGFI=0.89 statistics reached high values, close to 0.9, exceeding the generally required minimum of 0.8. SRMR (Standardized root mean square residual) and RMSEA (root mean square error of approximation) took a value close to zero and below 0.08, respectively.

The results are in accordance with Landry's results (2012) in his thesis. This result means that by paying attention to the elements of Physical workplace attributes, the managers can increase creativity in their employees. The strong relationships between these two variables show that small changes in work environment can create big changes in employee performance.

Moreover, in the viewpoints of Iranian employees, the most important factor influenced on creativity is work surface. It means the more place for working, the more creative the employee will get. Therefore, having big desks, large rooms and carefully chosen material for surfaces can help managers to improve creativity in their organizations.

The next important factor is daylight and view factor. Big windows, green views, and designing the rooms to have the lightest hours of a day can improve creativity in organizations.

Privacy and having separate rooms is another important factor from the viewpoint of employees.

The results of this study are the same as Dul and colleagues' research. They examine the effect of the physical work environment on the creativity of knowledge workers in 27 SMEs. The results of their research give support for HR practices that focus on the physical work environment in order to enhance knowledge worker creativity (Dul et al., 2011). Experimental studies show that certain features of the physical workplace can have positive effects on creative task performance and mention features such as the presence of plants (Shibata & Suzuki, 2002, 2004), a non-crowded work space (Aiello, DeRisi, Epstein & Karlin, 1977) and direct window view (Stone & Irvine, 1994). Other studies examine a combination of various physical features, and find positive effects on creativity. For example, Alencar & Bruno-Faria (1997) report that an agreeable physical environment with adequate light, furniture, space and ventilation can stimulate creativity, whereas an environment with noise, heat, insufficient illumination, and lack of space inhibits creativity. McCoy & Evans (2002) identify physical features in educational environments with low and high creativity potential, and Ceylan, Dul & Aytac (2008) conduct a similar analysis of managers' offices. The physical elements in these studies include windows, light, colors, plants, use of natural materials and furniture. Evidence that the physical work environment substantially contributes to knowledge workers' creativity supports HR practices to strengthen an organization's innovation capacity by influencing decision making of architects and interior designers about the design of physical workplaces (e.g. offices and company buildings) (Dul et al., 2011).

the findings of this study as well as others show that physical features, such as a window view and plants may provide a source of information for a creative task (e.g. Shibata & Suzuki, 2002; Stone & Irvine, 1994), and features such as colors may have a positive influence on person's mood (e.g. Küller, Ballal, Laike, Mikellides, & Tonello, 2006) and positive mood is associated with creativity (e.g. Amabile, Barsade, Mueller, & Staw, 2005; Davis, 2009).

The regression model of the present study shows that the interaction between creativity of employees and the physical work environment was relatively high which suggests that high creative personalities could benefit more from the physical work environment.

CONCLUSION, RESEARCH IMPLICATIONS AND DIRECTION FOR FUTURE RESEARCH

This research work provides empirical justification for a framework that identifies the two factors of Physical workplace attributes and organizational creativity. We conducted 80 knowledge based companies and the sample size of 260 employees to test the hypotheses. The results confirmed the main hypotheses and the fitness of structural model by AMOS through SEM method.

This research work offers vital managerial implications in employing the architecture science. By paying more attention on architectural elements of workplace especially Daylight and view, Work surfaces and Privacy managers can expect increasing creativity in their organizations. Organizational Workplaces in Iran suffer from lack of scientific plan and design. Physical workplace attributes is a useless expense in Iranian managers' perspectives. Because of that there are quite a few Iranian architecture groups working on this area. As the results of this study show, it is a time to have a

new look at Physical workplace attributes as a long-term investigation by its influence on increasing vital organizational variables, especially creativity.

Research findings show that the physical work environment can contribute to creative performance of knowledge workers to support the view and practice of manager who has a strategic role in physical workplace design of today's knowledge-intensive and innovation driven economy.

If the goal is to encourage creativity among employees, there are many ways to use workspace to pursue that objective. One step is to re-evaluate how much space should be devoted to common areas like conference rooms and number of individual work spaces. If the organization wants to promote creativity in teams, it's likely to demand more common areas in compare to its previous situation.

Top Managers can play a vital role in contributing to designing creative workplaces by cooperating with architects, interior designers, facility managers, ergonomists, purchasing managers, etc. Physical workplace design is just added to the effects of other practices. One advantage of focusing on designing physical work environments is that many creativity stimulating features such as plants or inspiring colors are relatively cost effective and can be easily implemented without much resistance against change, in contrast to social-organizational measures such as restructuring jobs or changing leadership styles. Another advantage is that changes in physical work environments are immediately visible to employees. In a knowledge-based economy, where the creativity of knowledge workers is central, HR practices to promote physical work environments that enhance creativity as strategically important, because they contribute to the company's innovation capacity. It may also be worthwhile to consider providing spaces for unexpected encounters. An area that provides coffee and snacks can be designed with comfortable seating, tables, network connections and white boards to facilitate unprepared meetings. Those same elements can be incorporated into lobbies or nooks off main corridors. When designing these spaces, they should be appealing to employees, whether because they offer nice views, good food or just an attractive design.

An economic downturn inevitably brings pressure to cut real estate costs. The easiest way to do that is simply to compress more people into less space. But that strategy may not be the most effective way to achieve the goal management which is due afterwards: boosting profitability, especially when mental activities such as creativity are vital. A better approach to rightsizing space is to analyze work processes and then reshape the physical environment to match the actual ways in which people work. That may well require openness to new approaches. Telecommuting, for example, can reduce the amount of space needed in a central office, but it can only succeed if management endorses the idea. If the amount of individual space is being reduced, it's important to ensure that the new work environment provides enough shared space – conference rooms, for example – to support the work being done. It's also essential to ensure that a more crowded workplace doesn't present acoustical problems to employees.

In sum, Organizations need to nurture their employees' creativity through the physical work environment if they want to be competitive in today's market. Interior designers and facility managers need evidence based tools to produce designs which will offer the office workers, who spend a tremendous amount of their lives sitting at work stations, areas that promote healthy, happy, and creative lifestyles.

Achieving positive affect and creativity in organizational settings is an extremely complicated and challenging process with numerous variables that are constantly changing. Therefore, conducting longitudinal research on the complexities of organizational life is a necessity. "Only through such investigation will we develop an understanding of the connections between how people feel, how they think, and how they perform in work organizations" (Ambile, 2005, p. 398).

As part of the limitation the data were collected from single respondents in organizations, which might be a cause for possible response bias. A caution should, therefore, be exercised when interpreting the results.

All data was gathered from knowledge workers who were employed in Iranian knowledge based companies. In order to generalize our results to knowledge workers in other (larger) companies and other cultures, replication studies are needed, which include the above mentioned data. Our results cannot be generalized to creativity in other domains, for example, entrepreneurial creativity or artistic creativity, because we focus on employee creativity in a business setting.

Future research should endeavor to collect data from multiple members across the manufacturers or even various organizations. Future studies can also investigate the proposed relationships by integrating some challenging variables into the model.

In addition, other dimensions of the Physical workplace attributes could be included, such as diversity or complexity. Future research should also analyze the impact of architecture in organization, on the basis of other organizational variables such as culture. This research can be done in other sample cases with more practical elements.

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