Work 41 (2012) 3816-3823
DOI: 10.3233/WOR-2012-0683-3816
IOS Press

The impact of a 'green' building on employees' physical and psychological wellbeing

Andrew Thatcher[a,*] and Karen Milner[a]
[a]*Psychology Department, School of Human & Community Development, University of the Witwatersrand, Johannesburg, WITS, 2050, South Africa*

Abstract. Multiple claims and some empirical findings suggest that 'green' buildings should be healthier (psychologically and physically) and promote greater productivity than conventional buildings. The empirical evidence in this regard over the last decade or so has been inconclusive suggesting either that the studies are flawed or that there are specific aspects of green buildings that promote wellbeing and productivity and others that do not. This study looks at a longitudinal comparison of two groups; a group that moved into South Africa's first GreenStar-accredited building and a group that did not. Measures were taken before the move and six months later. Results demonstrated that the 'green' building did not produce significantly better physical or psychological wellbeing, or higher perceived productivity. These results are discussed in relation to suggestions for what design features to focus on that may produce significant results.

Keywords: psychological wellbeing, physical wellbeing, GreenStar accreditation; perceived productivity; workplace indoor environmental quality

1. Introduction

Since buildings are obviously built for human occupation it makes sense from an ergonomics perspective to focus on the occupants' health, productivity, and efficiency. In general terms, the relationship between improved indoor environmental quality and increased occupant wellbeing and productivity is well-documented in the literature [7] [8] [12] [19] [26] [27]. Further, Baird [2] argues from a financial perspective that it makes sense to focus on the wellbeing and productivity of employees when considering building efficiency since employee salaries easily outweigh the costs associated with building design and building use (e.g. energy, water, waste removal, etc.). This study investigates the claims of improved physical and psychological wellbeing for Green buildings in South Africa's first GreenStar accredited building.

*

* *Corresponding author: andrew.thatcher@wits.ac.za*

1.1. Green buildings

Internationally there have been moves in the last two decades to produce various voluntary benchmarks and standards to guide the promotion, design and operation of "green buildings". Such certification systems include the British Establishment Environmental Assessment Method (BREEAM, from the UK, launched in 1990), the Leadership in Energy and Environmental Design (LEED, from the US, launched in 1993), GreenStar Australia (launched in 2003), GreenStar South Africa (launched in 2008), and the National Australian Built Environment Rating System (NABERS, from Australia, launched in 2000). These rating tools award credits for lifecycle?? elements including: management of the building site, the choice of site and the ecology of that site (before, during and after construction), the choice of materials, innovation in the design (such as passive heating, cooling, and lighting systems), water and energy use, and how a building integrates with other human and environmental services such as transport networks

[10]. Issues related to occupant health and productivity feature prominently in the various international green building rating systems, usually as a dimension referred to as indoor environmental quality, in varying degrees captures features related to employee wellbeing, satisfaction, and productivity [11]. Based on general studies into improving indoor environmental quality these rating tools encourage building designers to incorporate features that will improve occupants' wellbeing and productivity (e.g. increased daylight, improved ventilation systems, more "fresh" air and less recycled air, reduced glare from the sun and artificial lighting, and reduced volatile organic compounds - VOCs). Due to the focus on these elements it is widely believed (even actively promoted) that green buildings are more comfortable, healthier, and produce higher productivity levels than conventional buildings. However, Heerwagen and Zagreus [17] have noted that these claims were not always justified.

1.2. Evaluations of the impact of Green buildings on occupants' health and productivity

Birt andNewsham[5] observed that there were a limited number of detailed examinations of green building performance available in the public domain. While measures of productivity gains in green buildings are relatively well-established, the relationships for physical and psychological wellbeing are less well-documented. Early case studies of green buildings [26] produced consistent evidence that green buildings increased productivity (in one building the claim was for a 28% increase in productivity), a reduction in absenteeism, and improved building use satisfaction levels. More recently, support for the impact of green buildings, while still generally favourable, is more mixed. Generally, studies that report on improved productivity either use absenteeism as a proxy for productivity [33] or ask respondents to indicate how much their work environment has improved their productivity [1] [17]. The most comprehensive study assessing productivity directly [28] found evidence for increased typing speed and billing amounts, reduced absenteeism, but no perceived productivity change. Other studies have found that absenteeism rates have remained unchanged [24]. Studies that look at user satisfaction with the physical environment generally find positive satisfaction ratings for green buildings [28] [3] [9] [15] [32] However, studies have also consistently found that noise [6] [9] [17] [24] [33], thermal comfort [9] [17] [25][33] , and lighting conditions [1] [6] [17] [24] were problematic in some green buildings. This lack of consistency in the results would suggest there are some design aspects of green buildings or some aspects of the work context that are more important in determining positive reactions to the physical environment. For example, Heerwagen [15] found significant differences between different groups of workers in satisfaction with the physical environment, but only for the office workers who worked during the day and not for shiftworkers. She found that respondents across-the-board felt overworked at the end of a work shift. Studies that draw comparisons across a range of green buildings also produce inconclusive results. Abbaszadeh [1] for example compared 21 "green" buildings to 160 "non-green" buildings and found that users were most satisfied with thermal comfort and air quality (and least satisfied with noise and lighting conditions). Fowler and Rauch [9] examined 12 green buildings and found that while satisfaction with the indoor environment was generally high, noise and thermal comfort were lower than national benchmarks. The US Green Building Council [33] report examined 25 LEED-accredited buildings and found that these buildings were higher than the national average on satisfaction scores (especially on lighting) but lower than the national average for thermal comfort and noise. Leaman et al. [22]examined 22 green buildings and 23 conventional buildings and found that the green buildings were rated significantly lower on thermal comfort, noise, and some lighting conditions (i.e. glare). Paul and Taylor [24] examined two "non-green" buildings and a GreenStar-accredited building and found no significant differences on satisfaction ratings, except for thermal comfort where the green building was perceived to be significantly warmer.

Part of the reason for the inconsistencies in results is due to design differences between buildings and in part due to methodological issues. From a methodological perspective most of the studies only assess satisfaction with the indoor environmental quality as a post-occupancy measure. Unfortunately, only taking a post-occupancy measure tells us very little about what conditions were like before employees moved into the green building. It could be that employees were already satisfied with building conditions before moving into a green building. Evans [7] called for more longitudinal designs in order to understand the relationships between people and their wellbeing responses to the built environment. Further, comparing green buildings to conventional buildings on post occupancy measures may be meaningless

because employees in different buildings may be in different organizations, working in different industries, and doing different types of work. For example, Paul and Taylor [25] compared a green building at one university with two green buildings at another university. Differences in satisfaction ratings may have been due to the different organizational settings. Many of the studies do not include any comparison group or comparison groups that are not directly relevant. Some of the studies draw comparisons with national benchmark databases [1] [6] [9] [17] [33]. Only Paevere and Brown [24] draw direct comparisons between buildings in the same organization.

2. Methods

2.1. Procedures

The study was conducted in a large financial institution with more than 10 000 employees across the country. The new Green Building could accommodate as many as 1500 staff members when fully occupied. The study design was longitudinal (Time 1 before any employees moved and Time 2 six months after the treatment group had moved to the Green Building) with two groups: a treatment group where employees moved from existing buildings to the new Green Building and a contrast group where employees stayed in their existing building ("Other"). A total of 2525 emails were sent to two randomly selected samples from each of these groups (approximately 1200 employees from each group). The email consisted of a short covering note inviting participation and a hyperlink to the online version of the survey. Volunteer respondents completed the survey online and clicked on the submit button at the end of the survey. Clicking the submit button was considered as consent to participate. At Time 1 there were 655 completed responses returned. Six months later 611 emails were sent to respondents who had responded to the Time 1 survey and who had provided valid employee numbers. At Time 2 there were 251 responses received. After matching the Time 1 respondents to the Time 2 respondents based on valid employee numbers there were 240 respondents.

2.2. The Green building

The building was the first GreenStar accredited building in South Africa and should be considered as a test case for other green buildings in the country. The Green building received GreenStar rating of 46 credits (45 credits are required for a four star GreenStar rating) and 16 (out of 27; or 59% of the available credits) credits for the Indoor Environmental Quality dimension. The building featured a ventilation system with a rate of fresh air intake twice the national standard, a monitoring system for CO^2 levels connected to the ventilation system, lighting systems that reduced flicker and were movement sensitive, interior paints and carpeting with reduced VOC levels, and 80% of the office area had exterior views. In addition, the Green building had a freshwater catchment system, a "black" water treatment facility, a building user guide, and 95% recycled steel in the main frame of the building.

The "Other" buildings were a variety of pre-existing office buildings which did not have a "green" intent in their design. They pre-date the GreenStar rating tool and therefore have no rating information. The existing buildings did not have fresh air ventilation and no individual control of lighting or ventilation.

2.3. Sample

From the 240 respondents who responded at Time 1 and were matched to Time 2 there were 161 respondents in the treatment group (Green building) and 79 respondents in the contrast group (Other buildings). There were 149 males and 91 females in the sample. The respondents were from a range of different ethnic groups. The average age of the respondents was 40.85 years (with a standard deviation of 9.97 years) and they had an average of 12.33 years working for the organisation (with a large standard deviation of 9.18 years). There were 66 respondents who indicated that they had at least one chronic underlying illness including asthma, high blood pressure, a psychiatric disorder, and diabetes mellitus.

2.4. Measures

The first part of the survey captured biographical information including age, gender, race, organisational level, tenure, disability, and chronic underlying illness. In the second part of the survey the primary variables of interest were assessed. These measures were taken both at Time 1 and at Time 2. There are a number of post-occupancy building surveys that have been used in previous studies (e.g. Building User Survey and Center for the Built Environment's occupant satisfaction survey). We chose to use separate

measures common and independently validated in the ergonomics and organisational psychology literature.

Psychological wellbeing was assessed using the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) [30].The WEMWBS is a 14-item scale with five response categories assessed over the past month (i.e. none of the time, rarely, some of the time, often, all of the time). Tennant et al. [30] reported an internal consistency of 0.91 in a general population sample and good criterion-related validity.

Physical wellbeing was assessed using the Sick Building Syndrome (SBS) questions [13]. This is a set of 15 items that assess different physical well-being factors related to SBS on a 4-point frequency scale over the previous month (i.e. never, 1-3 times per month, 1-3 times per week, every day).

Perceptions of physical work conditions were assessed using 14 items taken from Hedge et al. [13]. Respondents were required to indicate the frequency of negative aspects of the work environment on a 4-point frequency scale over the previous month (i.e. never, 1-3 times per month, 1-3 times per week, every day). These were treated as individual items in the analysis.

Job satisfaction was assessed by a single item asking "Taking everything into consideration how do you feel about your job as a whole?" (from very dissatisfied to very satisfied). Wanous et al. [34] observed that single-item measures of job satisfaction were parsimonious and at least as good as multiple items in assessing global measures of job satisfaction.

Absenteeism was assessed by a single item asking "During the last 12 months, how many days sick leave have you taken?"

Presenteeism was assessed by a single item asking "During the last 12 months, how many days did your work despite being ill because you felt you had to?" Since presenteeism was highly skewed as a variable we followed Biron et al. [4] by dividing presenteeism by absenteeism to produce a ratio of number of days absent-present against number of days absent.

Perceived productivity was assessed on a single item asking "On a scale of 0-100 percent (where 100% is full capacity), rate how well you have been working over the last month in relation to your full capacity."

3. Results

Data were also collected on how much time respondents spent in their respective buildings while at work. These results are found in Table 1 and show no significant differences between the Other group and the Green Building group.

Table 1

Average time spent in the building.

	Green Building group	Other group
Hours per day in the building	8.87	8.63
Hours per day at their desk	7.08	7.48
Days per week in the building	4.93	5.01

As shown in Table 2 and Table 3 there were no significant differences between Time 1 and Time 2 on measures of perceived productivity, psychological wellbeing, physical wellbeing, job satisfaction, or absenteeism in either group. Presenteeism was significantly higher at Time 2 in the Green Building group ($t=1.46$, $p<0.01$). As shown in Table 4 and Table 5, the Other group perceived significantly poorer lighting, more drafty conditions, an unpleasant odour, more dusty, and increased electrostatic shocks at Time 2. In the Green Building group the work environment was perceived as significantly better in terms of temperature and ventilation at Time 2. However, statistically the lighting conditions were perceived as poorer, the air movement was too drafty, there was more likely to be an unpleasant odour in the air, and it was perceived to be dustier at Time 2. Both groups perceived working conditions to be less noisy at Time 2.

Similarly, when the two groups are compared at Time 1 there were almost no significant differences between the groups. The Green Building group had significantly higher job satisfaction ($t = 2.44$; $p < 0.05$) and a significantly higher propensity to stay in the organisation at Time 1 ($t = 3.03$; $p < 0.01$), although these differences were non-significant at Time 2. It was noticeable that the Other group experienced significantly less dryness ($t = 2.37$; $p < 0.05$), noisiness ($t = 2.22$; $p < 0.05$), and dustiness ($t = 3.13$; $p < 0.01$) at Time 1. At Time 2 these differences between the two buildings were non-significant (suggesting improvements for the Green Building group) but the Other group was significantly less likely to experience electrostatic shocks ($t = 2.51$; $p < 0.05$).

Table 2
Comparisons of wellbeing and productivity from T1 to T2 – Other group

Variable	T1	T2	t-statistic	Sign.
Psychological wellbeing	3.55	3.47	0.70	NS
Physical wellbeing	2.97	2.89	0.81	NS
Job satisfaction	3.27	3.47	1.25	NS
Propensity to stay	3.07	3.19	0.71	NS
Productivity (last month)	77.51	77.92	0.12	NS
Productivity (last 2-3 months)	78.28	80.03	0.53	NS
Productivity (last 4-6 months)	80.62	80.14	0.15	NS
Productivity (last 7-12 months)	80.84	78.58	0.69	NS
Absenteeism	3.51	4.52	1.72	NS
Presenteeism	3.44	3.20	0.09	NS

Table 3
Comparisons of wellbeing and productivity from T1 to T2 – Green Building group

Variable	T1	T2	t-statistic	Sign.
Psychological wellbeing	3.59	3.52	1.03	NS
Physical wellbeing	3.01	2.97	0.61	NS
Job satisfaction	3.67	3.53	1.36	NS
Propensity to stay	3.40	3.26	1.39	NS
Productivity (last month)	77.20	77.15	0.02	NS
Productivity (last 2-3 months)	79.18	77.61	0.73	NS
Productivity (last 4-6 months)	79.35	77.76	0.69	NS
Productivity (last 7-12 months)	77.88	79.04	0.46	NS
Absenteeism	3.56	4.49	1.23	NS
Presenteeism	2.01	5.69	1.46	<0.01

Table 4

Comparisons of physical work conditions from T1 to T2 – Other group

Physical environment condition	T1	T2	t-statistic	Sign.
Temperature too warm	2.87	3.07	1.40	NS
Temperature too cold	2.87	3.06	1.02	NS
Lighting too dim	3.53*	2.67	6.09	<0.01
Lighting too bright/glaring	3.59*	2.35	9.91	<0.01
Insufficient ventilation	2.89	3.13	1.37	NS
Too drafty	3.45*	2.46	7.16	<0.01
Too little air movement	2.90	3.09	1.10	NS
Air too dry	3.29	2.78	3.39	<0.01
Air too humid	3.60	2.49	8.72	<0.01
Distracting ambient noises	2.72	3.29*	3.14	<.010
Unpleasant odour in the air	3.32*	2.79	3.72	<0.01
Stale air	3.17	2.86	1.87	NS
Dusty air	3.33*	2.71	4.01	<0.01
Electrostatic shocks	3.55*	2.47	8.23	<0.01

* physical conditions that were better

Table 5

Comparisons of physical work conditions from T1 to T2 – Green Building group

Physical environment condition	T1	T2	t-statistic	Sign.
Temperature too warm	2.80	3.23*	3.55	<0.01
Temperature too cold	2.95	3.06	0.97	NS
Lighting too dim	3.37*	2.68	6.94	<0.01
Lighting too bright/glaring	3.55*	2.34	14.30	<0.01
Insufficient ventilation	2.76	3.23*	3.58	<0.01
Too drafty	3.62*	2.44	12.26	<0.01
Too little air movement	2.75	3.17*	3.16	<0.01
Air too dry	2.94	2.99	0.04	NS
Air too humid	3.69*	2.34	16.93	<0.01
Distracting ambient noises	2.37	3.48*	9.02	<0.01
Unpleasant odour in the air	3.16*	2.78	3.57	<0.01
Stale air	2.96	2.83	1.13	NS
Dusty air	2.86*	2.57	2.49	<0.05
Electrostatic shocks	3.53*	2.23	15.61	<0.01

* physical conditions that were better

4. Discussion

Contrary to a number of the green building accreditation claims, the Green Building group did not consistently produce significantly better psychological and physical wellbeing or perceived productivity gains from Time 1 to Time 2. Noise levels, thermal comfort (specifically an appropriately warm building), ventilation levels, and air movement were all significantly better in the Green Building at Time 2. The findings for noise and thermal comfort were contrary to a large proportion of the previous studies [17] [9] [25] [33]. The improvements in ventilation and air movement were consistent with previous research [25].

Green Building group respondents perceived that the lighting conditions, dust, draftiness, and odours in their workplace had significantly worsened. The finding with respect to lighting was consistent with a good proportion of previous findings [1] [17] [20] but the results for dust, drafts, and air quality were not. The reduction in lighting conditions was not surprising given that the organisation struggled with the commissioning of the advanced lighting system. The GreenStar certification process did not impact directly on the physical and psychological wellbeing of building occupants (although impacts may be indirect or imperceptible – e.g. off-gassing from paints and adhesives) in this study.

Kellert [20] refers to 'green' architectural design specifications (e.g. LEED, BREEAM, GreenStar, etc.) as being "low environmental impact design" (p. 120) that may lead to reduced environmental impact but not to "enhancing and restoring positive contact between people and nature [that] can foster human well-being and productivity" (p. 122). From this we suggest that these 'green' building specifications, while better overall for the environment, may not automatically lead to improved physical and psychological wellbeing or perceived productivity gains. Heerwagen [14] notes specifically with regards to indoor environmental quality in green buildings: "it's not how green you make it – it's how you make it green" (p. 353). There are several recommendations from the literature on how to do this. Based on findings from the Building User Survey, Leaman [21] proposes that rapid responses to conditions (through personal control over environmental conditions [14]); focusing on discomfort alleviation; communicating the design intent; reducing technological complexity; and understanding the dynamics of occupation density are the key factors in ensuring employee wellbeing and productivity in buildings. Heerwagen and Hase [16] take a slightly different approach suggesting that designers should focus on biophilic design (i.e. design that connects humans to nature). This would involve designing buildings where windows give natural daylight and views to natural landscapes, gathering places outdoors, and passive viewing of nature inside buildings (e.g. water, plants, and animals). According to Heerwagen and Hase [16] biophilic buildings should provide refuge, water, biodiversity, sensory variability, biomimicry, playfulness, and enticement. Certainly, there is a growing body of literature supporting the idea that the incorporation of nature into our built environment has positive wellbeing benefits [18] and higher productivity [23] [31].

Study limitations include the fact that only one organisation was used and the sample size (while reasonable for a longitudinal study) was relatively small. The Time 1 measurement was taken in May/June (in the middle of winter just before/during the transition) and the Time 2 measurement was taken in December/January (in the middle of summer, six months after relocation). It is possible that: (a) the different times of year may mask any real underlying differences (e.g. the end of the year holidays versus the middle of year colds); or (b) the time period of six months may be insufficient to measure any real differences. Heerwagen [15] for example, reported using a nine months interval in their study of Herman Miller's green building. Many organisational change interventions produce feelings of uncertainty and disorientation especially immediately preceding and following a change intervention [29]. Employees often find the change process itself stressful and take time to accustomise to the change/s. Heerwagen [15] noted that most organisations experience a drop in productivity when workers move, so perhaps a non-significant difference six months after a move might be indicative of improved productivity in the future. It could be that we have taken measurements at a point where the advantages of the changes are now beginning to take effect but there has not yet been sufficient time to see improvements. Follow-up investigations are proposed.

References

[1] S. Abbaszadeh, L. Zagreus, D. Lehrer & C. Huizenga, Occupant satisfaction with indoor environmental quality in green buildings, Proceedings of Healthy Buildings, Lisbon, Vol. III, 2006, pp. 365-370.

[2] G. Baird, Incorporating user performance criteria into Building Sustainability Rating Tools (BSRTs) for buildings in operation, in Sustainability, 1, 2009, pp. 1069-1086.
[3] G. Baird, Sustainable Buildings in Practice What the Users Think, 2010, Routledge, New York.
[4] C. Biron, J. Brun, H. Ivers & C.L. Cooper, At work but ill: psychosocial work environment and well-being determinants of presenteeism propensity, in J. Pub. Mental Health, 5, 2006, pp. 26-37.
[5] B. Birt & G.R. Newsham, Post-occupancy evaluation of energy and indoor environment quality in green buildings: a review, in 3rd International Conference on Smart and Sustainable Built Environments, Delft, Netherlands, June 15-19, 2009, pp. 1-7.
[6] R. Bunn, R. Tales from the Rivergreen. BSRIA Delta T, 2007, pp. 12-16.
[7] G.W. Evans, The built environment and mental health, J. Mental Health, 80, 2003, pp. 536-555.
[8] W.J. Fisk, Health and productivity gains from better indoor environments and their relationship with building energy efficiency, in Ann. Rev. Energy Environ., 25, 2000, pp. 537-566.
[9] K.M. Fowler & G.M. Rauch, Assessing green building performance: a post-occupation evaluation of 12 GSA buildings, in U.S. General Services Administration Report, 2008, available from: www.gsa.gov/graphics/pbs/GSA_Assessing_Green_Full_Report.pdf [accessed August 2011]
[10] K. Gowri, Green building rating systems: an overview, in ASHRAE Journ., 46, 2004, pp. 56-60.
[11] A. Hedge, The sprouting of "green" ergonomics, in HFES Bull., 51, 2008, pp. 1-3.
[12] L. Heschong, R.L. Wright & S. Okura, Daylighting impacts on human performance in school, in J. Illumin. Engin. Soc., Summer, 2002, pp. 101-114.
[13] A. Hedge, W.A. Erickson & G. Rubin, Predicting sick building syndrome at the individual and aggregate levels, in Environment International, 22, 1996, pp. 3-19.
[14] J. Heerwagen, Green buildings, organizational success, and occupant productivity, in Building Res. Inform., 28, 2000a, pp. 353-367.
[15] J. Heerwagen, Do green buildings enhance the well being of workers, in Environ. Design + Const. Mag., 2, 2000b, pp. 24-30.
[16] J. Heerwagen & B. Hase, Building biophilia: connecting people to nature in building design. Environ. Design + Const. Mag., 3, 2001, pp. 30-36
[17] J. Heerwagen & L. Zagreus, The human factors of sustainable building design: post occupancy evaluation of the Phillip Merrill Environmental Center, 2005, available from: www.wbdg.org/pdfs/human_factors_cbf.pdf [accessed August 2011].
[18] R. Kaplan, The role of nature in the context of the workplace, in Landscape & Urban Planning, 26, 1993, pp. 193-201
[19] G. Kats, The costs and financial benefits of green buildings, in California Sustainable Building task Force, Sacramento, 2003.
[20] S.R. Kellert, Building for life: designing an understanding the human-nature connection, in Washington: Island press, 2005
[21] A. Leaman, human factors: the bottom line, in Ecolibrium, December, 2009, pp. 36-38.
[22] A. Leaman, L. Thomas & M. Vandenberg, 'Green' buildings: what Australian building users are saying, in EcoLibrium, November, 2007, pp. 22-31.
[23] V.I. Lohr, C.H. Pearson-Mims & G.K. Goodwin, Interior plants may improve worker productivity and reduce stress in a windowless environment, in J. Environ. Horticulture, 14, 1996, pp. 97–100.
[24] P. Paevere & S. Brown, Indoor environment quality and occupant productivity in the CH2 building: post-occupancy summary, 2008, CSIRO, available from http://melbourne.vic.gov.au/Environment/CH2/Evaluation/Documents/CH2_Post_Occupancy_Summary.doc [accessed August 2011]
[25] W.L. Paul & P.A. Taylor, A comparison of occupant comfort and satisfaction between a green building and a conventional building, in Build. & Environ., 43, 2008, pp. 1858-1870.
[26] J.J. Romm. & W.D. Browning, Greening the building and the bottom line, Rocky Mountain Institute Snowmass, 1994.
[27] M. Schweitzer, L. Gilpin & S. Frampton, Healing spaces: elements of environmental design that make an impact on health., in J. Alt. Compl. Med., 10, 2004, S71-S83.
[28] Sustainability Victoria, Employee productivity in a sustainable building: pre- and post-occupancy studies in 500 Collins Street, 2006, available from: www.resourcesmart.vic.gov.au/.../500_Collins_Productivity_Study.pdf [accessed August 2011].
[29] V. Swanson & K. Power, Employees' perceptions of organizational restructuring: the role of social support, in Work & Stress, 15, 2001, pp. 161-178.
[30] R. Tennant, L. Hiller, R. Fishwick, S. Platt, S. Joseph, S. Weich, J. Parkinson, J. Secker, J. & S. Stewart-Brown, The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation, in Health and Quality of Life Outcomes, 5, 2007, p. 63.
[31] C.M. Tennessen & B. Cimprich, Views to nature: affects on attention, in J. Environ. Psych., 15, 1995, pp. 77-85.
[32] L.E. Thomas & G. Baird, Torrent Research Centre, Ahmedabad, Gujarat, India, in G. Baird (ed.), Sustainable Buildings in Practice What the Users Think, 2010, Routledge, New York, pp. 313-323.
[33] US Green Building Council – Chicago Chapter, Regional green building case study project: a post occupancy study of LEED projects in Illinois, 2009, available from: http://www.usgbc-illinois.org/?p=3809 [accessed August 2011].
[34] J.P. Wanous, A.E. Reichers & M.J. Hudy, M.J., Overall job satisfaction: how good are single-item measures, in J. Appl. Psych., 82, 1997, pp. 247-252.