ieq survey results

Subject: RDG Omaha Office – Physical Work Environment
Prepared By: Stuart Shell
Distributed: September 24, 2015

1. PURPOSE

RDG is committed to providing a high-quality working environment for employees. Reliable evaluation tools are a key strategy for achieving indoor environmental quality (IEQ). In December 2014, RDG invited employees at the Omaha office to participate in a survey regarding their satisfaction with the physical work environment. This document summarizes the survey results and compares them to the same survey from December of 2013.

2. EXECUTIVE SUMMARY

Employee satisfaction with the physical work environment generally increased following a significant office renovation implemented from December 2013 to March 2014. Satisfaction with lighting and furniture increased approximately one point on a seven-point scale, and overall satisfaction increased by over half a point. Self-rated productivity in 2014 increased by three fourths of a point over 2013. Relative to other offices, RDG is in the top quartile in the categories of office layout, finishes / furniture, thermal comfort, and air quality. Employees rate the lighting and cleaning as average, while they rate the noise level in the bottom quartile in comparison to similar offices. Based on an investment analysis, the net present value (NPV) of the renovation was $1.08M. Adding acoustical separations, addressing sources of noise or instituting new office policies may increase satisfaction with noise. There may be further benefits to reevaluating the task lighting in the office and cleaning protocol.

3. WORK ENVIRONMENT AND EMPLOYEE PRODUCTIVITY

Research supports the importance of the physical environment for employee engagement and productivity. Heschong (2003) found that partition height contributed to an 11 percent difference in the average time employees processed calls in a call center. Workers with the highest partitions handled fewer calls than those with no partitions. Workers who had good views to the outdoors from their workstation also handled calls 6 percent faster than employees with no views to windows. Workers demonstrated 9 percent better memory retention when they had high quality views.

Veitch et al. (2011) found that office workers who were more satisfied with lighting were also more engaged in work. The researchers in this study provided several different lighting conditions and based their engagement measurement on the interest of participants in reading an article, their persistence in an impossible task and the duration of breaks taken by participants between tasks. Lee and Brand (2005) used a survey tool with over 200 employees from different office jobs to investigate the role of control and distractions in the workplace. They found that employees with more control, such as a variety of workspaces to choose from and the ability to hold impromptu meetings, were more satisfied with their jobs.

In another study conducted with 95 workstations in an open-office plan, Newsham et al. (2009) found that access to views had a significant impact on satisfaction with the lighting, and that employees who were satisfied with the overall office physical environment were also more satisfied with their jobs. Shell (2015) also demonstrated that employee satisfaction with the physical environment was predicted by lighting characteristics.
4. SURVEY INFORMATION AND PARTICIPATION

The Occupant IEQ Satisfaction Survey was developed by the Center for the Built Environment (CBE) at the University of California Berkeley as an online anonymous tool for assessing occupant satisfaction with the workplace (CBE, 2004). RDG contracted CBE to administer the survey to RDG employees in Omaha in December 2013 and 2014. Data collection corresponded with before-and-after capital investments that replaced some workstations and general office lighting. The office renovation also included painting and new flooring installation.

For the first survey in 2013, 49 employees participated. Following the renovation project in 2014, 47 employees completed the survey for a response rate of 72%. Of those, 9 employees reported working in the building less than one year and were presumably hired during or after the renovation project. In the following analysis, all employee responses from the 2014 survey are typically included in the results. However, to improve validity, only responses from employees who had worked at RDG for more than one year are included in the averages used when comparing them with the 2013 results. Because the survey was anonymous it was impossible to see how individuals changed between the two years, as in a repeated measure design. Employee age and length of employment are illustrated in Figure 1 below.

Figure 1: 2014 Participant Age and Length of Employment

The CBE survey contains semantic differential items on a 7-point scale from “Very Satisfied” to “Very Dissatisfied.” Some items are on a scale of “Enhances” to “Interferes.” Each item is coded as -3, -2, -1, 0, 1, 2, or 3 for analysis. Arithmetic averages for each item are presented near the end of this report in Table 1. The Center for the Built Environment also provides a benchmarking database of over 150 offices that have completed the same survey. The number of participants at each office in this database ranges from 4 to 600, with an average of 89 and a median of 57.

5. GENERAL SATISFACTION

One survey item asked employees how satisfied they were in general with their workspace. The average response was 1.6, with the majority of employees reporting satisfaction. In comparison to other offices, this score places RDG in the top quartile. The range of responses is illustrated in Figure 2. The average score increased from 0.9 in 2013, which was in the 37th percentile of the CBE database. Figure 3 shows this change from 2013 to 2014.
6. OFFICE LAYOUT

The pre-renovation layout of the office space is presented in Figure 5. The floorplan shows 58 workstations formed from systems furniture that is approximately 20 years old. Figure 6 shows the layout following the renovation. New systems furniture created 28 new workstations, and 38 existing workstations remained in place. Four additional spaces were reorganized with casual furniture for group and individual work.

In the 2014 survey, most employees reported working in spaces without partitions. As shown in Figure 7, this contrasts with the 2013 survey results when most employees reported working in cubicles with high partitions. The majority of furniture remained in place, suggesting that the modifications impacted employee perception of the overall work environment.

After the renovation, 36 percent of employees reported sitting within 15 feet of a window. Figure 8 highlights the decline from 2013. For both Figure 7 and Figure 8, all employees from 2014 are included to better represent the general impact of the renovation on perception. A view analysis was conducted to further investigate this finding. Prior to the renovation, 19 of the 58 workspaces in the office were within 15 feet of a window, or 33 percent. Following the renovation, 20 of the 66
workspaces were within 15 feet, or 30 percent. The change in employee perception of distance to windows may be related to the views, workspace density, and layout of renovated office.

Employees generally responded that the office layout enhances their ability to do their work. Figure 9 shows that average satisfaction increased from the 2013 survey. More specific questions on the survey related to office layout asked about amount of space available, ease of interaction and visual privacy. Responses on these items are presented respectively in Figure 10, Figure 11 and Figure 12. These are cumulative frequency graphs showing score distributions from the offices in the CBE database on the same question. The points on the graph indicate, for the given score, the fraction of companies that fall at or below that score. RDG responses were above average for each item, with satisfaction for interaction rising considerably from the 2013 average. Satisfaction with the amount of space provided and the visual privacy both decreased from the 2013 responses, suggesting a trade-off with the perception of ease of interaction with coworkers.

Other trends emerged from review of the write-in comments provided for the office layout section. Three employees reported a desire for additional spaces to support private conversations, and three employees desired more visual privacy for their workspace. Four employees commented on distractions by ambient noise being counterproductive or unprofessional.

**Figure 4: View Looking South Before (Above) and After Renovation**
Figure 5: Office Layout Prior to Renovation (2013)
Figure 6: Office Layout Following Renovation (2014)
Figure 7: Comparison of Responses to Workspace Description

"Which of the following best describes your personal workspace?"

Figure 8: Comparison of Responses to Window Proximity

"Are you near a window (within 15 feet)?"

Figure 9: Comparison of Responses to Whether Layout Enhances Work

"Overall, does the office layout enhance or interfere with your ability to get your job done?"
How satisfied are you with the amount of space available for individual work and storage?

Score
Relative Frequency

2013: 93%
2014: 82%

How satisfied are you with ease of interaction with co-workers?

Score
Relative Frequency

2013: 32%
2014: 84%

How satisfied are you with the level of visual privacy (ability to work without your neighbors observing you and vice versa)?

Score
Relative Frequency

2013: 83%
2014: 66%
7. **FURNITURE**

Employees were generally satisfied with office furnishings. This represents a considerable improvement over 2013 responses, as indicated by the productivity question presented in Figure 13. Satisfaction with the colors, adjustability, and comfort of furnishings was generally in the top quartile of comparable office spaces as shown in the cumulative frequency graphs of Figure 14, Figure 15 and Figure 16. In write-in comments, five participants reported dissatisfaction with the inability to adjust desk height, while two participants commented that not having a laptop computer limited their ability to utilize collaboration spaces.

**Figure 13: Comparison of Responses to Furnishings Satisfaction**

“Do your office furnishings enhance or interfere with your ability to get your job done?”

**Figure 14: Comparison of RDG Average Responses to CBE Database Responses**

How satisfied are you with the colors and textures of flooring, furniture and surface finishes?
How satisfied are you with your ability to adjust your furniture to meet your needs?

Score
Relative Frequency
2013: 15%
2014: 71%

Figure 15: Comparison of RDG Average Responses to CBE Database Responses

How satisfied are you with the comfort of your office furnishings (chair, desk, computer, equipment, etc.)?

Score
Relative Frequency
2013: 44%
2014: 76%
8. TEMPERATURE

On average, employees were moderately satisfied with the temperature of their workspaces. Of seven employees dissatisfied with the temperature, most were too cold. Satisfaction increased following the office renovation as depicted in Figure 17. RDG employee satisfaction with temperature is in the top 10 percent of comparison offices as shown in the cumulative frequency graph of Figure 18.

**Figure 17: Comparison of Responses to Whether Thermal Comfort Enhances Work**

“Overall, does your thermal comfort in your workspace enhance or interfere with your ability to get your job done?”

**Figure 18: Comparison of RDG Average Responses to CBE Database Responses**
9. **AIR QUALITY**

Air quality was an area of satisfaction or indifference to most employees in 2014. This was an improvement over responses in 2013, when odors from food, printers and tobacco smoke led to dissatisfaction for some. Figure 19 provides employee self-estimated productivity responses. RDG employee satisfaction as a group increased from about average to being in the top quartile in 2014, based on responses from other companies. This comparison is illustrated on the cumulative frequency graph of Figure 20.

**Figure 19: Comparison of Responses to Whether Air Quality Enhances Work**

“Overall, does the air quality in your workspace enhance or interfere with your ability to get your job done?”

**Figure 20: Comparison of RDG Average Responses to CBE Database Responses**

How satisfied are you with the air quality in your workspace (i.e. stuffy/stale air, cleanliness, odors)?

- 2013: 49%
- 2014: 76%
10. LIGHTING

Employees generally reported that the office lighting enhanced their ability to do work, shown in Figure 21. This category represented the area of most significant change from 2013, when the majority of employees felt the lighting interfered with their productivity. The 2013 office lighting, originally installed in 2000, is shown schematically in Figure 22. The retrofit involved replacing general illumination in primary work areas as well as most of the group working spaces. The new system provided continuous dimming through direct-indirect LED linear luminaires and volumetric troffers. While still presenting some contrast glare discomfort, the luminous environment was considerably more consistent and controllable than that provided by the original direct fluorescent luminaires with parabolic reflectors. Figure 23 depicts the lighting layout implemented in early 2014.

**Figure 21: Comparison of Responses to Whether Lighting Enhances Work**

"Overall, does the lighting quality enhance or interfere with your ability to get your job done?"

![Comparison of Responses to Whether Lighting Enhances Work](image)

In comparison to other companies, the RDG average satisfaction scores improved dramatically from 2013 to 2014. Figure 24 shows the average RDG employee satisfaction with the amount of light provided was typical. The visual comfort reported by RDG employees was in the top quartile of other companies, shown in Figure 25. It will be important to investigate the persistence of this effect to understand to what degree the renovation work is responsible for the change in employee satisfaction.

The lighting that employees reported controlling also changed from 2013 to 2014. The percentage of employees who reported no control of lighting dropped from 45 percent to 5 percent. This corresponded with an increase of employees who responded as controlling task lights, window blinds, light dimmers, and light switches. The shift, presumably due in part to the lighting retrofit, is illustrated in Figure 26. Of the seven employees dissatisfied with the lighting, common perceptions included the workspace being too dark, not having enough daylight, and having too much electric lighting. Several employees described shadows in the workspace.
How satisfied are you with the amount of light in your workspace?

Score
Relative Frequency
2013: 1%
2014: 56%

How satisfied are you with the visual comfort of the lighting (e.g., glare, reflections, contrast)?

Score
Relative Frequency
2013: 1%
2014: 80%

“Which of the following controls do you have over the lighting in your workspace?”

<table>
<thead>
<tr>
<th>Control</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light switch</td>
<td>24%</td>
<td>47%</td>
</tr>
<tr>
<td>Light dimmer</td>
<td>4%</td>
<td>63%</td>
</tr>
<tr>
<td>Window blinds or shades</td>
<td>16%</td>
<td>33%</td>
</tr>
<tr>
<td>Desk (task) light</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>None of the above</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>

N=49

N=50
11. ACOUSTICS

On average, employees reported being somewhat dissatisfied with the acoustic quality of their workspaces. The satisfaction with acoustics remained similar or decreased slightly following the office renovation. Figure 27 shows self-reported productivity impacts of acoustics. Satisfaction with the noise level and acoustic privacy are illustrated in the cumulative frequency graphs of Figure 28 and Figure 29, respectively. Of 24 employees dissatisfied with acoustics, the majority reported problems resulting from phone conversations, people talking nearby, and people overhearing private conversations. Ringing telephones and the door buzzer were also concerns to some employees. Three employees commented on their headphone use as a strategy for managing distracting noises.

**Figure 27: Comparison of Responses to Whether Acoustics Enhances Work**

"Overall, does the acoustic quality in your workspace enhance or interfere with your ability to get your job done?"

**Figure 28: Comparison of RDG Average Responses to CBE Database Responses**

How satisfied are you with the noise level in your workspace?
12. CLEANING AND MAINTENANCE

Employees were generally satisfied regarding cleaning and maintenance of the building. Self-reported productivity impacts of cleaning is shown in Figure 30. The renovation may have had a moderate impact on satisfaction with cleaning and maintenance, as indicated in Figure 31, Figure 32 and the cumulative frequency graph of Figure 33. In comparison to the CBE database RDG responses are average. One employee recommended an occasional intensive cleaning to remove dust from worksurfaces.

Figure 30: Comparison of Responses to Whether Cleaning and Maintenance Enhances Work

“Does the cleanliness and maintenance of this building enhance or interfere with your ability to get your job done?”
How satisfied are you with general cleanliness of the overall building?

Score
Relative Frequency
2013: 24%
2014: 49%

How satisfied are you with cleaning service provided for your workspace?

Score
Relative Frequency
2013: 37%
2014: 50%

How satisfied are you with general maintenance of the building?

Score
Relative Frequency
2013: 42%
2014: 65%
13. TECHNOLOGY

Employees were generally satisfied with the Mondopad video system, flat screen conference room displays and phone system. Several employees request additional hardware support, such as a screen in the Kimball Room, the ability to reserve rooms from the hallway and a digital controller for media in the New Idea Room. Some employees felt limited in their access to technology because they did not have a laptop. Two employees suggested an additional Mondopad. Two employees suggested addressing the chords that can become tangled when connecting to the Modopad or adding a puck system to allow multiple sources for the display. Some employees may not be familiar with remote desktop access in the Burlington Room and New Idea Room.

14. FISCAL CONSIDERATIONS

The capital cost of the renovation was approximately $450,000. This amount includes construction costs and the soft costs associated with completing the work, lost productivity and analysis.

To investigate the potential impact of the renovation on business operations, the increase in employee satisfaction with the physical environment is assumed to be a result of the retrofit. Based on evidence provided in Section 3, the impact on company revenue is conservatively estimated to be 5 percent, or $353,460. This increase derives from increases in employee engagement and satisfaction with lighting. Assuming a 5-year period of similar benefits and a discount rate of 6 percent, the present value of this productivity gain is $1,488,917. While the actual revenue per employee realized by a company is dependent on market factors, the actual observed increase in revenue from 2013 to 2014 was $9,721 per employee, or a total productivity increase of $524,934. Based on the limitations of this analysis, the observed increase agrees with the productivity gains predicted by research.

Regarding fuel use, the office space has one meter for all electricity use. The lighting retrofit impacted the base electrical load for the office during occupied hours. A utility analysis revealed that the average annual electricity use for the five years preceding the renovation was 210,813 kWh with a standard deviation of 15,642 kWh. Average monthly demand was 56 kW with a standard deviation of 6 kW. For the year following completion of the renovation (March 2014 to February 2015), electricity use was 153,520 kWh with 40 kW of demand. This represents a savings of $4,067 per year. The first year of performance was significantly different than the previous five years (>99% confidence). Projected for 15 years at a discounted rate of 6 percent, this is a present value of $39,500.

The resulting net present value (NPV) of the investment is the sum of all present values. This amount is $1,488,917 for productivity gains, $39,500 in fuel use savings, and ($450,000) for capital expense. The resulting NPV is $1,078,417.

15. SUMMARY

Employees rate their overall satisfaction with their workspaces as well above average in comparison to other companies. This is an improvement over the 2013 survey when employee satisfaction was below average. Figure 34 summarizes the category average scores from 2013 and 2014 for all employees that participated. A detailed summary of item scores is provided in Table 1 which has columns for the 2013 survey, the 2014 survey, and the 2014 survey excluding employees who reported working in the building less than one year. A final column indicates the change in average response between 2013 and 2014 (excluding new hires).

Most categories showed a net improvement, with notable gains in employee satisfaction with furniture and lighting. Acoustics is one category where employee satisfaction lags behind other offices. One employee asked if the front door could be unlocked, and two employees asked about outdoor work spaces. Many employees expressed a positive opinion of the energy efficiency of the office. Three employees provided complimentary comments regarding the office renovation project.

Based on employee feedback and investment analysis, the renovation had a net positive impact on RDG operations. Employee satisfaction with the workspace can be tracked yearly to determine opportunities and to establish the persistence of positive effects from the renovation. Other investments to increase employee engagement and productivity may be financially beneficial.
Figure 34: Category Satisfaction for All Employees

**RDG Offices - Omaha 2013**
Survey dates: 12/10/2013 — 12/18/2013 (inclusive)
Response rate: 82% (60 letters distributed, 49 valid responses)

- General Satisfaction-Building 0.38
- General Satisfaction-Workspace 0.9
- Office Layout 1.71
- Office Furnishings 0.56
- Thermal Comfort 0.35
- Air Quality 1
- Lighting 0.32
- Acoustic Quality 0.08
- Cleanliness and Maintenance 0.92

N=49

**RDG Offices - Omaha 2014**
Survey dates: 12/11/2014 — 12/19/2014 (inclusive)
Response rate: 72% (85 letters distributed, 47 valid responses)

- General Satisfaction-Building 1.76
- General Satisfaction-Workspace 1.6
- Office Layout 1.68
- Office Furnishings 1.68
- Thermal Comfort 1.32
- Air Quality 1.56
- Lighting 1.58
- Acoustic Quality 0.04
- Cleanliness and Maintenance 1.58

N=47
Table 1: Survey Item Summary from 2013 to 2014

<table>
<thead>
<tr>
<th>CBE Survey Question</th>
<th>2013 Survey (N = 49)</th>
<th>2014 Survey (N = 47)</th>
<th>2014 prev. empl. (N = 38)</th>
<th>2013-2014 Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL: All things considered, how satisfied are you with your personal workspace?</td>
<td>0.90</td>
<td>1.60</td>
<td>1.50</td>
<td>0.60</td>
</tr>
<tr>
<td>GENERAL: Please estimate how your productivity is increased or decreased by the environmental conditions.</td>
<td>0.33</td>
<td>1.14</td>
<td>1.06</td>
<td>0.73</td>
</tr>
<tr>
<td>LAYOUT: How satisfied are you with the level of visual privacy?</td>
<td>1.47</td>
<td>1.09</td>
<td>1.05</td>
<td>(0.42)</td>
</tr>
<tr>
<td>LAYOUT: How satisfied are you with the amount of space available for individual work and storage?</td>
<td>2.31</td>
<td>1.94</td>
<td>1.89</td>
<td>(0.42)</td>
</tr>
<tr>
<td>LAYOUT: How satisfied are you with ease of interaction with co-workers?</td>
<td>1.37</td>
<td>2.02</td>
<td>2.11</td>
<td>0.74</td>
</tr>
<tr>
<td>FURNITURE: How satisfied are you with the colors and textures of flooring, furniture and surface finishes?</td>
<td>-0.18</td>
<td>1.66</td>
<td>1.74</td>
<td>1.92</td>
</tr>
<tr>
<td>FURNITURE: How satisfied are you with your ability to adjust your furniture to meet your needs?</td>
<td>0.55</td>
<td>1.51</td>
<td>1.45</td>
<td>0.9</td>
</tr>
<tr>
<td>FURNITURE: How satisfied are you with the comfort of your office furnishings (chair, desk, computer, equipment, etc.)?</td>
<td>1.31</td>
<td>1.8</td>
<td>1.78</td>
<td>0.47</td>
</tr>
<tr>
<td>TEMPERATURE: How satisfied are you with the temperature in your workspace?</td>
<td>0.35</td>
<td>1.32</td>
<td>1.26</td>
<td>0.91</td>
</tr>
<tr>
<td>AIR QUALITY: How satisfied are you with the air quality in your workspace (i.e. stuffy/stale air, cleanliness, odors)?</td>
<td>1</td>
<td>1.57</td>
<td>1.55</td>
<td>0.55</td>
</tr>
<tr>
<td>LIGHTING: How satisfied are you with the amount of light in your workspace?</td>
<td>0.57</td>
<td>1.62</td>
<td>1.63</td>
<td>1.06</td>
</tr>
<tr>
<td>LIGHTING: How satisfied are you with the visual comfort of the lighting (e.g., glare, reflections, contrast)?</td>
<td>0.06</td>
<td>1.57</td>
<td>1.65</td>
<td>1.59</td>
</tr>
<tr>
<td>ACOUSTICS: How satisfied are you with the noise level in your workspace?</td>
<td>0.18</td>
<td>0.21</td>
<td>-0.05</td>
<td>(0.23)</td>
</tr>
<tr>
<td>ACOUSTICS: How satisfied are you with the sound privacy in your workspace?</td>
<td>-0.35</td>
<td>-0.3</td>
<td>-0.39</td>
<td>(0.04)</td>
</tr>
<tr>
<td>CLEANING: How satisfied are you with general maintenance of the building?</td>
<td>1.18</td>
<td>1.7</td>
<td>1.58</td>
<td>0.4</td>
</tr>
<tr>
<td>CLEANING: How satisfied are you with general cleanliness of the overall building?</td>
<td>0.71</td>
<td>1.6</td>
<td>1.37</td>
<td>0.66</td>
</tr>
<tr>
<td>CLEANING: How satisfied are you with cleaning service provided for your workspace?</td>
<td>0.86</td>
<td>1.45</td>
<td>1.18</td>
<td>0.32</td>
</tr>
</tbody>
</table>
16. REFERENCES


