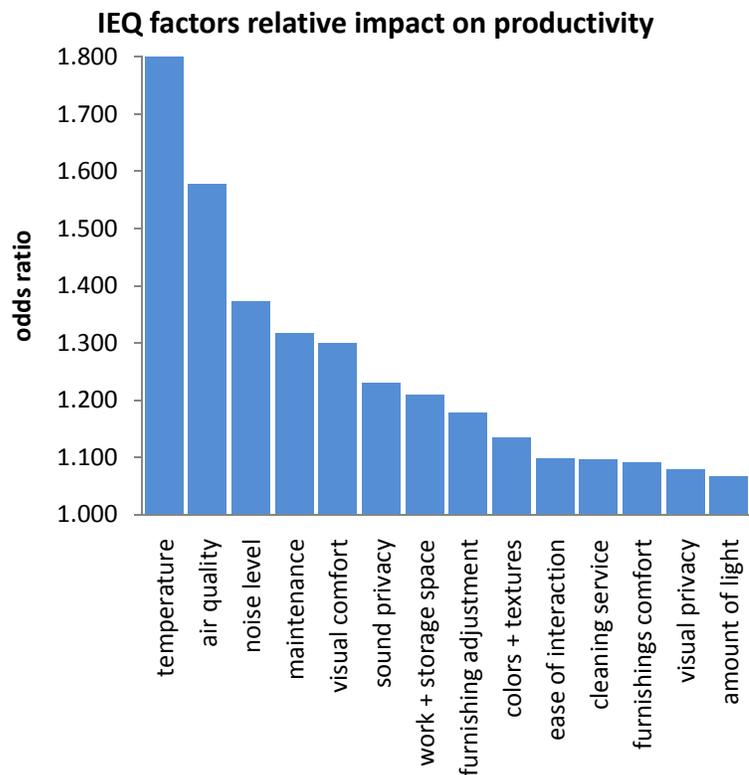




## TechNote Topic: Productivity and IEQ Satisfaction

**Q: “How and to what degree do indoor environmental factors affect occupants’ ability to do their job?”**

Temperature and air quality are the most important IEQ factors to consider in designing an indoor environment workers find productive. If satisfaction with these two factors improves, it is most likely that productivity will as well. At the other end of the scale are amount of light and visual privacy. These variables will always produce a smaller improvement in productivity than will temperature or air quality given the same improvement in satisfaction. Figure 1 shows the ranking of IEQ factors by their ability to help produce an environment conducive to productivity.<sup>1</sup> The larger the odds ratio, the greater the probability of that factor impacting productivity, given an increase in satisfaction. The odds of temperature increasing productivity are near 1.8, while those of visual privacy are just 1.08. Although a small productivity increase is statistically likely with visual privacy, it is *almost* just as likely that no increase (or even a decrease) might take place despite a satisfaction increase in this area.



*Ranking of IEQ factors’ ability to influence worker productivity.*

The degree of existing satisfaction with a particular IEQ factor is also important. Figure 2 illustrates the relationship between the percentage of workers satisfied with visual privacy and the odds of increasing productivity. In private offices, where visual privacy satisfaction is already high, the possibility of a boost in productivity is very low – under one. It is more likely

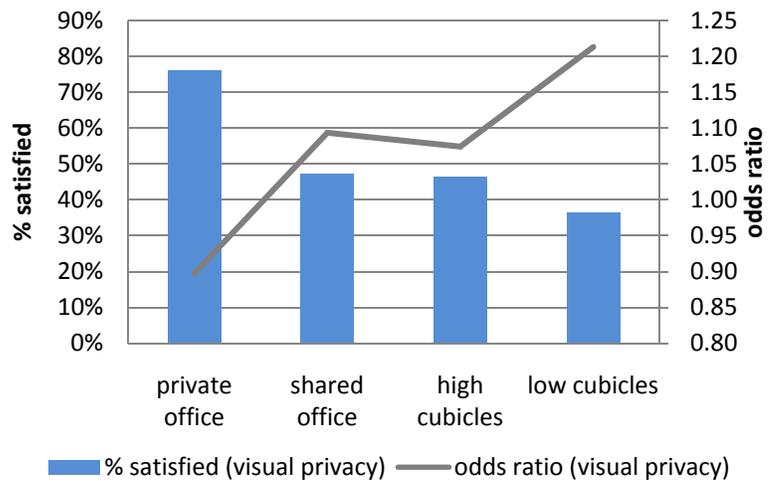
that any increase in satisfaction will have no impact on productivity. These workers do not really need more visual privacy. On the other hand, in offices with cubicles less than 5 feet tall an increase in visual privacy satisfaction can have an impact. This is logical. People who feel they have little visual privacy may benefit from more of it.

It is necessary to consider both the ranking (relative strength) of an IEQ factor and existing levels of satisfaction when designing a space where workers will feel most productive. CBE's Occupant

Satisfaction Survey and Benchmarking Database are a rich source for both kinds of data. Our occupant satisfaction data includes responses from over 40,000 people in over 300 buildings. The productivity impact ranking in figure 1 represents responses from over 16,000 people in 119 buildings throughout North America and Europe. Both are rich samples, representative of today's building stock and diverse occupant preferences.

Survey data has been used to study self-reported office worker productivity for 20 years and is a commonly used source for such information. The CBE survey's 'productivity' questions are based on the Building Use Studies questionnaires, perhaps the most widely used approach to measuring self-reported productivity using surveys.<sup>ii</sup> Because of the size of our dataset and our decision to use well-tested methodologies, we feel confident that this ranking represents a pattern that will hold true in a majority of offices and for a majority of office occupants. Please let us know if you are interested in using our data to determine which design choices will make your project or building a more productive office environment.

**Degree of Satisfaction's Effect on Productivity**



*If satisfaction in an IEQ area is already high, the ability of that factor to influence productivity decreases. When satisfaction is low, the reverse is true.*

## References

[1] Long, J. Scott and Jeremy Freese. 2006. Regression Models for Categorical Dependent Variable using Stata, Second Edition. Stata Press: College Station, TX.

[2] Wilson, S. and A. Hedge. 1986. *The Office Environment Survey: London*, Building Use Studies.

<sup>i</sup> Data were regressed using an ordered logistic model. Demographic variables (office type, gender and tenure) were included in the regression as controls. All values are statistically significant to a 95% confidence level with the exception of amount of light. See Long, et al.

<sup>ii</sup> See Wilson et al., 1986