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Plants at Work: Improving Asset Performance

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No longer just a pretty face, plants are hard at work in offices throughout America. Until recently, we lacked the research necessary to investigate and quantify the economics between plants, employees and bottom-line corporate America. However, we now have access to data that is shifting the way businesses think about plants in the workplace. Plants enhance productivity by 12% while deflating the mounting problem of workplace stress. Live interior plantscapes actually lower Operating & Maintenance (O&M) costs – energy and cooling as well as grounds maintenance expenses. Interior plantscapes are dramatically improving both the recruitment and retention of top employees in today's tight, mobile job market. Interior plants increase aesthetic value, enhancing customer and employee perception of the property. Plants have proven to be an economical way to manage the growing risks and liabilities associated with poor indoor air quality (IAQ). And finally, plants absorb

sound, contributing to heightened productivity levels.

Plants offer a means to decrease stress while enhancing productivity by twelve percent.

Office anxiety levels are high as our current economy and security uncertainties place added stress on American workers. According to research conducted by Integra Realty Resources, New York, NY, and Opinion Research Corp. International of Princeton, NJ, 23% percent of today's workforce has been driven to tears as a result of this workplace anxiety, with 10% working in an atmosphere where physical violence has occurred. 29% percent of workers have actually raised their voice at co-workers themselves. One of eight workers (12%) has called in sick because of workplace stress, and one of five American workers (19%) has left a company in the past year because of stress.

According to Wayne Hansen, a member of the California Occupational Safety and Health Administration (Cal. OSHA) and an editor for the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) publica-

tions, human assets are the most valuable and expensive assets of any business. In terms of cost per square foot, the human asset is approximately 10 times the total building operating cost and nearly 100 times the energy cost. No matter how it is expressed, when a business can give rise to personal productivity, the business wins.

It is widely known through the respected research done by Dr. Roger S. Ulrich of Texas A&M University (College Station, Texas), Helen Russell, University of Surrey (West Sussex, England) as well as the recent studies conducted by Dr. Virginia Lohr of Washington State University (Pullman, Wash.) that plants significantly lower workplace stress and enhance productivity.

In Dr. Lohr's study, participants were 12% more productive and less stressed than those who worked in an environment with no plants. The study took place in a simulated office setting. Common interior plants were used in a computer laboratory with 27 computer workstations. A computer program to test productivity and induce stress was specifically designed for these experiments which incorpo-

rated one hundred symbols and time-measured readings of participants' reactions. They were presented in the same randomized sequence to each subject.

Blood pressure readings recorded while using the program confirmed the program was effective in inducing stress. Emotional states and pulses were also measured during the experiment. Plants present and plants not present were the only variables that participants experienced.

When plants were present, they were positioned so that a cluster would be in the peripheral view of each subject sitting at a computer terminal, but would not interfere with the subject's activity. In addition to demonstrating significant increases in their post-task attentiveness, subject reaction time in the presence of plants was 12% faster than those in the absence of plants.

The results indicating an influence of plants on blood pressure are consistent with research conducted by Dr. Ulrich. Visual exposure to plant settings has produced significant recovery from stress within five minutes.

As many performance-based incentives to enhance employee productivity also give rise to stress, this rare capability of raising productivity while lowering stress is extremely valuable. Progressive human resource executives are finding they cannot afford to ignore such an efficient method of human asset management.

Interior plants lower O&M (Operations and Maintenance) costs while contributing to “Green Building” design considerations.

Professional interior landscaping enhances O&M efficiency in several ways. Interior plants are keeping humidity levels at optimal range for human comfort, health and facility maintenance. The cooling effect of indoor trees and landscapes has been carefully measured and well documented. The mere process of outsourcing interior landscaping services is saving many facilities time, staff and equipment costs.



Plants cool by a process called transpiration, which, according to the U.S. Department of Agriculture (Washington, D.C.), decreases air temperature in offices by ten degrees. Dr. Lohr's study out of Washington State University (The Contribution of Interior Plants to Relative Humidity in an Office) demonstrates that plant transpiration in an office environment releases moisture, creating a humidity level exactly matching the recommended

human comfort range of 30% to 60%. Similarly, the same study concludes that in an absence of plants, the relative humidity in offices runs below this recommended range.

When the relative humidity of office air is too low, costly materials such as wood become damaged and crack. When the relative humidity is too high, the condensation of windows and exterior walls can result in costly structural damage.

According to the International Society of Arboriculture (Champaign, Ill.), the net cooling effect of one young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day. According to literature from the Associated Landscape Contractors of America (ALCA) of Herndon, Va., proper selection and placement of plant materials can lower heating and cooling costs by as much as 20%.

These statistics have become an important tool for today's environmentally efficient corporate designers and facility managers such as U.S. Energy Systems Inc. of White Plains, NY. This growing energy company is enthusiastically endorsing the use of indoor plants.

Susan Odiseos, V.P. of Corporate Communications, states "We practice what we preach and find that our investment in interior plant services has had the expected outcome of improving indoor air quality, supporting a positive outlook in the workplace and increasing employee productivity." She continued, "interior plants are a solid return on

investment and a MUST for any corporation concerned with sustainable, 'green building' solutions."

Buildings magazine (Cedar Rapids, Iowa) listed outsourcing as one of four top industry trends in 2001. Outsourcing interior landscaping contracts has allowed key staff and management to focus completely on tasks specific to company goals.

According to Karen Parks, Contract Manager, Aetna Business Resources (Hartford, Conn.), the need to outsource interior plant services became obvious. Her in-house grounds staff salaries, equipment and material costs were increasing yearly and she found her crews struggling to meet the growing demands of the property and OSHA regulations.

Many in-house staffs are spread so thin that they become unable to apply professional standards to the property, and appearance, as well as property value, begin to suffer.

The Associated Landscape Contractors of America reports that certification for the interior landscaping industry has become even more competitive, requiring these professionals to be equipped with advanced aesthetic and environmental technologies. This professional premium is readily apparent and can be measured in visual and bottom-line advantages to the property.

Richard Greninger, managing director of CarrAmerica Realty Corporation (Washington, D.C.), with 326 buildings in 15 markets, claims that through outsourcing

these services, "live plantscapes have become a value-added distinguisher, defining our first class brand identity."

"REAL OR MEMOREX"

Although aesthetics inspired Tom Rubidoux of the MGM Grand Hotel (Las Vegas, Nev.) to switch from artificial indoor plants to live landscaping throughout public areas, he was delighted with the bonus of saving money. Not only did the MGM find silk plants were more expensive than buying live, they now save on maintenance. Live plants can be tended in place and repair minor damage by growing new leaves. In the right light, live plants flourish while silk plants' color bleaches out. The involved dusting process for silk requires taking them outside, washing them, letting them dry and treating them with fire retardant. By the time they are cleaned twice, they have to be discarded.

Plants in the workplace attract, retain and enhance attitude of today's selective employee.

The Human Resource Executive (April, 2001 – Horsham, Pa.) published results of a study from Headhunter.net (Reston, Va.) indicating that 78% of today's best and brightest employees would leave their current job for a "better offer" while 48 percent are actively pursuing other opportunities. Statistics from Unifi Network, Westport, Conn. indicate that salary alone is no longer the determining factor in what constitutes this "better offer."

Surveys conducted by Unifi Network report numerous factors that assist in managing this morale curve. The data indicates that in order to attract and retain top employees, the workplace must include aspects of what inspires employees during "off" time. Gallup polls indicate that two thirds of the American working force cite gardening as their favorite hobby. Perhaps this "green thumb" passion explains why humanizing the workplace with green plants is a highly effective method to promote employee satisfaction.



Copious studies such as those conducted by Dr. Ulrich and Dr. David Uzzell (University of Surrey) verify the positive effect plants have on employee perception and disposition. In the final analysis, marketing research (Krome Communications, Pittsburgh, Pa. 2000) confirms that employee attitude and retention is a

top incentive for corporations to continue interior landscape contracts.

The dramatic aesthetic value inherent in indoor landscaping has continued to be the number one return on interior plant investments.

As reflected in The 2001 BOMA/CEL Tenant Satisfaction “A-List Award” (Building Owners and Managers Association, Washington, D.C.), “appearance and condition of the property” is a top category of evaluation among tenants. Similarly, studies out of England’s Oxford Brookes University (Oxford, England) reinforce that while indoor plants continue to cost less than most alternative corporate décor choices, they offer a guarantee of positively enhancing perception and contributing to well being.

The same set of studies conclude that people (clients or employees) perceive a building with interior planting as more expensive-looking, more welcoming and more relaxed. Conversely, the studies prove that people’s perceptions of a building are less positive in the absence of plants. Melissa Coley, V.P., Brookfield Financial Properties (Manhattan, NY), is a corporate interior plant enthusiast. She asserts that the vast landscapes throughout Brookfield’s property “provide a critical elegance to this bustling business setting of 40,000 corporate employees.”

Although some facilities assign their entire design budget to sculpture

and other forms of art, they are left without the certainty of aesthetic value that interior foliage provides. Moreover, plantscaping carries its aesthetic value into a wide array of settings. According to the Associated Landscaping Contractors of America, impressive arrangements can be found among traditional corporate designs as well as in today’s open, casual “cyber café” work-zones.

It’s finally possible to have an energy efficient building without “Sick Building Syndrome!”

Plants help with bottom-line savings on mounting sick leave expenses. Many facilities can’t afford to maintain a system to control humidity and/or are forced to operate contaminated systems, which emit disease-causing microorganisms. The result is a notable increase in employee illness (generally eye, lung and upper respiratory problems as well as allergies, colds and viruses). In addition, employee health and productivity is at risk due to common but dangerous office toxins found in fibers (carpet, fabric, wall coverings) and solvents (wallboard, paints, varnishes, furniture).

Specifically, formaldehyde is found in office foam insulation, plywood, particleboard in desks and bookshelves, carpeting, paper goods and janitorial supplies. Benzene is in offices rich with synthetic fibers, inks, plastics and tobacco smoke. Trichloroethylene comes from adhesives, inks, and paints, laquers and varnishes used in office buildings.

“Sick Building Syndrome” develops into a serious and expensive liability when these toxins become concentrated inside sealed office buildings. The National Aeronautics and Space Administration (NASA, Washington, D.C.) reports that the syndrome is widespread in these energy efficient buildings. The problem is that these sealed energy efficient buildings have less exchange of fresh outdoor air for stale indoor air. This causes higher concentrations of toxic chemicals in indoor environments, brought about by emissions from a great variety of building constituents.

As energy efficient construction becomes absolutely essential, “green building” designers have become justifiably concerned about this indoor air quality (IAQ) dilemma. Perhaps one of the most troubling reports comes from research published by Bio-Safe Incorporated (New Braunfels, Texas). Their data confirms that energy efficient, sealed office structures are often 10 times more polluted than the air outside!

According to studies done by JCAHO, IAQ related absenteeism has been on an alarming upswing. In recent studies 40% of absenteeism was attributed to IAQ-related illnesses. Similarly, the same report demonstrates an increase of Worker Compensation Claims from 1980 to 1994 for IAQ-related issues. The number of such cases rose by almost 5,000 claims within that period and has continued to rise over the last five years. As a matter of fact, many of these more recent cases have become litigants.

The average cost of one of these Worker's Compensation Claims is \$27,850 (which includes \$4,750 in insurance premium increases, \$2,100 in human research costs and \$21,000 in medical treatment costs). What these figures do not account for is the cost to business for absenteeism of these individuals. If the absent worker happens to be in a supervisory or managerial position, there is a cascade effect on productivity losses from the staff they supervise.

Research shows that plant-filled rooms contain 50% to 60% fewer airborne molds and bacteria than rooms without plants. For almost twenty years, Dr. Billy C. Wolverton and his aids in the Environmental Research Laboratory of John C. Stennis Space Center (Picayune, Miss.) have been conducting innovative research employing natural biological processes for air purification. "We've found that plants can suck these chemicals out of the air," he says. "After some study, we've unraveled the mystery of how plants can act as the lungs and kidneys of these buildings."

The plants clean contaminated office air in two ways. They absorb office pollutants into their leaves and transmit the toxins to their roots, where they are transformed into a source of food for the plant. In his book, *How to Grow Fresh Air: 50 Houseplants That Purify Your Home or Office* (Penguin, 1997), Dr. Wolverton details exactly how plants emit these water vapors that create a pumping action to pull dirty air down around the roots,

where it is once again converted into food for the plant.

Wolverton has found that plants are especially needed in office buildings in which Sick Building Syndrome is common. He goes so far as to suggest that everyone have a plant on his or her desk, within what he calls the "personal breathing zone." This is an area of six to eight cubic feet where you spend most of your working day.

Jon Naar, author of *Design for A Livable Planet: How You Can Help Clean Up the Environment* (Harper & Row, 1990), suggests that 15 to 20 plants are enough to clean the air in a 1,500 square foot area.

If such a large body of credible research didn't exist, it would be hard to believe that a solution as simple and economical as indoor plants can address a problem as menacing and expensive as IAQ.

Plants help reduce distractions due to office noise.

Strategically placed, plants quiet down an office. A small indoor hedge placed around a workspace will reduce noise by 5 decibels. The positive contribution of interior plants to sound absorption has been well documented in numerous studies, including the work done by Dr. Russell and Dr. Uzzell. Although it would be difficult to measure the cost of productivity loss due to office noise pollution, one doesn't have to go far to find examples! Almost anyone who works in an office can give account of being "annoyed" into a taking a break due

to the common audible elements of a busy office.

According to the Associated Landscape Contractors of America, landscape professionals are replacing stale cubicles for "tree walls" and other innovative plant groupings to reduce this costly "decibel distraction factor."

Closing thoughts.

Factors that contribute to the total effect of plants on asset performance are complex and multifaceted. The full economic impact cannot be estimated from the studies mentioned in this document. However, the results described here demonstrate that this area of research warrants more study.

Case Study

The following is an actual draft of a case study performed by Michael R. Evans, former Associate Professor of Hotel, Restaurant, and Institutional Management at VA Polytechnic Institute and State University.

Edited by Diane Relf, taken from the Symposium: *The Role of Horticulture in Human Well-Being and Social Development*. (Timber Press, Portland, OR 1992). The article is entitled "People and Plants: A Case Study in the Hotel Industry."

The Opryland Hotel: A Case Study of Plants & People.

The best example of plants as a differentiating product design element and a possible determinant product attribute in the hotel industry may be the Opryland Hotel in Nashville, Tenn. Opryland is considered one of

the most financially successful meeting and convention hotels in the country.

The hotel opened in 1977 with 600 guest rooms, expanded to 1,068 in 1983, and expanded again to 1,879 guest rooms in 1988. The hotel also has one of the largest meeting spaces in the country. The total investment in Opryland is approximately \$145 million.

As the 12th largest hotel in the country, Opryland has received numerous honors. It has earned the Golden Key Award from *Meeting and Conventions* magazine, and has been named one of the 10 best hotels in the country by the readers of *Corporate Meetings and Incentives* magazine. It holds both the Mobil four-star award and the AAA four-diamond award.

The strength of Opryland's product is indicated by the fact that the hotel enjoys occupancy rates over 85 percent each year, well above the current national average of 68 percent (*Trends*, 1989). The hotel also has one of the largest investments in indoor and outdoor gardens in the U.S. There are currently 25 acres of outdoor space and 12 acres of indoor space with approximately 18,000 indoor plants (and 600 species) valued at well over \$1 million. The annual horticulture budget to maintain this living investment is approximately \$1.2 million. A staff of approximately 52 people tends to the plants year-round.

The hotel has two massive, six-story, semi-tropical indoor gardens.

The 2-acre Conservatory was completed in 1983, and the 1.5-acre Cascades was completed in 1988. Both gardens have numerous footpaths or walkways that allow guests to meander through fountains, waterfalls, and many varieties of foliage.

It is estimated that over 500,000 hotel guests tour the gardens each year. Some 705 guest rooms, many with balconies, overlook the gardens and an open-seating, cafe-style restaurant that gives the impression of an old European village. These facilities were designed after studying several of the large conservatories in Canada and Europe.



The Conservatory is meant to recall the lush solitude of a Victorian garden, and features a 72-foot-tall sculptured fountain called the Crystal Gazebo. There are many places to sit quietly and think.

The Cascades is a water-oriented space that features a 12,500 square-foot lake and a 40-foot-tall rock

mountain with three waterfalls and lush gardens. It has a fantasy-like atmosphere with a "Dancing Waters" fountain that is accented by laser beams and colored lighting in the evenings.

There are several examples of how Opryland's "greatscapes" have had a positive impact on the financial success of the hotel. For example, the unusually high annual room occupancy rate of 85%, numerous awards, and the continued expansion of the complex are just a few.

One other positive impact of the plants is the fact that rooms overlooking the gardens are always the first to be reserved by repeat guests. These rooms generally command a premium price of at least \$30 more than rooms that do not offer garden views. (1990 Average Daily Rate of \$149 per room versus \$179 per room for view of garden). This translates into an additional \$7 million in room revenue each year for the hotel.

Even though it is very difficult to estimate a precise cost/benefit figure, it would seem that the plant investment and maintenance costs are covered by the additional room revenue generated by the gardens.

The Opryland Hotel is one of the best examples of "plantscaping" in the hospitality industry. The large investment in plants, flowers, and landscaping has made Opryland a unique product in the convention hotel market. Plants, as a differentiating design element, have created a positive image for the hotel compared to many of its national com-

petitors: in this case, a factor for people selecting the Opryland Hotel.

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MJ joined Focal Point in the spring of 2001 as Director of Media and Public Relations. She earned her bachelors degree in Communications from Ohio University and her master's degree in Psychology from Antioch University. As a public relations executive, she has helped Alan Alda, Kurt Douglas , Marlo Thomas and numerous entertainment firms improve their public image. Her responsibilities at Focal Point include coordinating all Media Relations for the national information campaign, Plants at Work, which educates professionals and the public about the important benefits of interior plantscaping. MJ also serves as an account executive for Focal Point's marketing and public relations services. Focal Point Communications is a full-service advertising, graphic design and public, corporate and media relations agency with headquarters in Cincinnati, Ohio.