

EFFECT OF GREEN WORKPLACE ENVIRONMENT ON EMPLOYEE PERFORMANCE

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Abstract: Today, to minimize the negative environmental impacts establishment of green buildings has become a worldwide trend. Many industries are adopting Leadership in Energy and Environmental Design (LEED) certification, as a global benchmark for high performing green buildings. This concept is new to Sri Lanka and the impact of LEED on employee performance and satisfaction has not been studied yet. Therefore, this study attempts to examine the perceptions of employees regarding their green workplace environment and its impact on their performance. The study was conducted with randomly selected, 30 factory staff members and 30 factory workers in an export apparel company that has won a platinum award for LEED. Majority of employees (68.9%) mainly factory staff members, had a good understanding about the LEED practices. Employees believe that introduction of LEED created a good impact on their work lives. About 86% of employees perceive that their performance has improved after establishing the green building. The green building has rewarded the company by improving its employee performance, saving energy and resources, maintaining the market, and creating a better public image.

Keywords: green buildings, employee performance, LEED, sustainable development

1 Introduction

The textile and apparel sector continues to maintain its dominant position in the industrial sector of Sri Lanka, while contributing around 44% of industrial production and 49% of the country's total export earnings with a value of US \$2,809 million in 2009 (Central Bank, 2009). There are 830 garment factories in Sri Lanka, of which 157 are small, 438 are medium, and 235 are large. The industry produces around 500 million units of garments per annum of which woven garments account for 55% and knitwear 45 % (Saheed, 2005). The present status of the apparel industry in Sri Lanka represents dynamic, ever-changing conditions in import dependence for fabrics and other raw materials, tax and fiscal incentives/barriers including GSP+, labor costs, and skilled and trainable labor. In addition to the above, other conditions such as health and safety, environmental issues, quality issues, eco-labeling, formation of economic and trade groups, currency fluctuation, etc., also have an effect on the apparel industry (Saheed, 2005).

Environmental responsibility is fast becoming a major determinant of sustainability of any business in the world. As David Birnbaum (2010) states end-consumers begin to see that global warming and other environmental problems that directly affect the quality of their lives and those of their families; they will shun products which are perceived to have been made in conditions that pollute the planet. Therefore, green buildings will become a necessary for the survival of apparel industry. In this respect, establishment of green factories has become imperative to reduce environmental burden imposed by the use of the raw material and energy resources, waste generation and chemical emission. Many organizations are adopting Leadership in Energy and Environmental Design (LEED) certification²⁰, as a global benchmark for high performing green buildings.

²⁰ LEED is an internationally recognized rating system that acts as third party verification for green building certification (USGBC, 2002).

Although this concept is new to Sri Lanka, responding to demands of the buyers, three green factories have already been established in apparel industry with LEED standards. Brandix Green Factory at Seeduwa was the first apparel manufacturing facility in the world to be rated Platinum certification under LEED. MAS Holding's *Thuruli* factory in Thulhiriya, and CKT apparel of Hidramani Group are the other green factories in Sri Lanka. It is important for these organizations i.e. top management and other interested parties, to understand the benefits of green building environment from the employees' perspective. According to The Royal Institution of Chartered Surveyors (2005), the green building benefits relate to increased occupant productivity and satisfaction, exceeding even the projected environmental benefits. However, the lack of worker awareness, communication problems, and the lack of supporting research about reported employee benefits, may reduce expected benefits. Therefore, this study was carried out to examine the perceptions of employees regarding their green environment and its impact on their performance in one of the green factories in export apparel industry.

2 Material and Methodology

2.1 Towards Green Buildings

The green building movement as a sustainable development strategy is fast becoming a necessity (Prakash, 2005). Kibert (2007) defines Green Building as a healthy facility, built in a resource efficient manner using ecologically based principles. According to LEED-EB Reference Guide (2006), "Green" has become a shorthand term applied in building construction industry to denote high performance buildings innovated with the objective of to be environmentally responsible, economically profitable and healthy place to work and live.

According to a study done in the United States, buildings annually consume more than 30 percent of the total energy and more than 60 percent of the total electricity. Green building practice can substantially reduce negative environmental impacts through high performance, energy saving, and market leading design, construction and operations practices. The added benefits of green operations and management include reduced operating costs, enhanced building marketability, increased workers' productivity, and reduced potential liability resulting from indoor air quality problems (LEED-EB Reference Guide, 2006).

2.2 Green Building Assessment Schemes

When attention and awareness regarding development of the sustainable constructions is increased, it was very important to have an assessment system for green buildings. The most often building environment assessment schemes that are used today include Building Research Establishment Environmental Assessment Method – BREEAM, Comprehensive Assessment System for Building Environment Efficiency – CASBEE, Green Star, and Leadership in Energy and Environmental Design – LEED (Prakash, 2005).

BREEAM scheme is the most widely used building environmental rating scheme in the UK, which was voluntarily started in 1988. It assesses the building impact on the environment including management, health and wellbeing, energy, transport, water, materials, waste, land use, ecology, and pollution and gives credits up to maximum of 102 under each category (Roderick, *et al*, 2010). CASBEE was started in 2001 that can be applied for many types of buildings, such as offices, schools, retail stores, restaurants, halls, hospitals, hotels and apartments under various categories such as planning, design, completion, operation and renovation (Endo *et al*, 2007). Green Star is the most followed voluntary building environmental assessment scheme in Australia. It was developed to accommodate the need of buildings in hot climates where cooling systems and solar shading are of major importance (Roderick, *et al*, 2010). The Green Star rates a building with corresponding to its management, the health and wellbeing of its occupants, accessibility to public transport, water use, energy consumption, the embodied energy of its materials, land use and pollution (GREEN BIM, 2007)

LEED is an internationally accepted benchmark for the design, construction and operation of high-performance green buildings. According to LEED-EB Reference Guide (2006) LEED-EB refers to LEED Certification for Existing Buildings that cover building operation and system upgrades in existing buildings where the majority of interior and exterior surfaces remain unchanged. This certification process envelops whole-building cleaning and maintenance issues including chemical use, indoor air quality, energy efficiency, water efficiency, recycling programs, exterior maintenance programs, and system upgrades to meet green building energy, water, air, and lighting performance standards. It aims to maximize the operational efficiency while minimizing the environment impacts.

LEED promotes a sustainable approach by considering the performance of green building on five key areas of human and environmental health: sustainable site development, water savings, energy and atmosphere, materials and resources, and indoor environmental quality. Innovations in operations were also added recently as a key area to the system. This sixth category tries to cover the sustainable building expertise as well as design measures not covered under the five initial environmental categories (USGBC, 2002; LEED Reference Guide, 2006).

2.3 Research Methodology

A survey in the selected organization, *viz.* an export apparel factory that has won a platinum award for LEED, was carried out to achieve the objectives of this research. It was conducted among randomly selected, 30 factory staff members and 30 factory workers. Employee perceptions were obtained through a structured questionnaire, which consisted of employee performance as dependant variable and attributes of the indoor and outdoor environment as the independent variables. Mostly descriptive statistical techniques were used to analyze data through the Statistical Package for Social Science (SPSS) software. The findings were verified through interviews, informal discussions, and participant observations.

3 Results and Discussion

3.1 Characteristics of the Employees

The response rates of factory workers and factory staff members were 100% and 93.33% respectively. Normally the mainstream of the labor force in garment industry is females, thus the majority of the respondents were females (67.8%). Most of the respondents were Machine Operators (43.1%) and a greater part of the factory staff that responded were Production Supervisors (53.6%). Employees, who had less than five years experience in the factory made up 75.9% of the respondents. Around 71% of the employees were at the mid age group (25-35 years old) and approximately similar proportions were belong to under 25 years old (13.8%) and above 35 years old (15.5%) categories respectively. While majority of factory staff members (60.7%) were married, majority of factory workers were unmarried. Considering the group of factory staff, greater part (89.3%) was educated up to G.C.E Advance Level (A/L). Among factory workers that much education qualification was not observed as the majority of them (73.3%) were in the up to G.C.E. Ordinary Level (O/L) category.

3.2 Employee Awareness about LEED

Majority of factory staff members (57%) perceive that they have very good understanding about LEED standards practiced in the factory. In contrast, only 13% factory workers believe that they have very good understanding about LEED. The χ^2 test ($p = 0.004$) shows a significant relationship between employee category and understanding about LEED. This may be due to the presence of close relationship between factory staff members and the key personnel who are responsible for the green project (green project team). There was not such kind of visible relationship between factory workers and green project team.

The results obtained for understanding about the environmental impacts of practicing LEED is somewhat similar to above result. Most of factory staff members (57%) compared to only 14% of factory workers believe that they have very good understanding about environment impacts of practicing LEED. A significant relationship between employee category and understanding about the environment impacts of practicing LEED was seen in the χ^2 test ($p = 0.002$), perhaps again due to the close relationship between factory staff members and green project team. Nevertheless, of the factory workers 69% believed that they have a fair understanding about the environment impacts of LEED. This may due to regularly updates about the factory commitment to protection of environment through the internal communication unit which is operated by the Human Resources Department. None of the employees perceived that they have poor understanding about the LEED standards and their environmental impacts. The management takes a keen interest to update the employees, about their commitment to reduce negative environment impacts through practicing LEED guidelines.

There was also a relationship between level of education and awareness of LEED standards and their impact on environment. When the educational level of the employees increases their perceived understanding regarding LEED also increases. Among the respondents who have studied up to A/L, 52% believed that they have very good understanding about the LEED standards, compared to only 20% of employees who have studied up to only O/L. There was also a relationship between gender and awareness of LEED standards and their impact on environment. A strong rationalization for this relationship could not be found except for the fact that the majority of the factory workers, who had lower education level and contact with green project team, were females.

3.3 Perception on LEED / Green Workplace Environment

3.3.1 Indoor Environment Quality

Since people spend approximately 90% of their time indoors, quality of the indoor environment plays a critical role in people's comfort, health, and work performance. Research suggests that Indoor Environmental Quality (IEQ) improvements can increase worker productivity by as much as 16%, resulting in rapid payback for IEQ capital investments (LEED- EB Reference Guide, 2006).

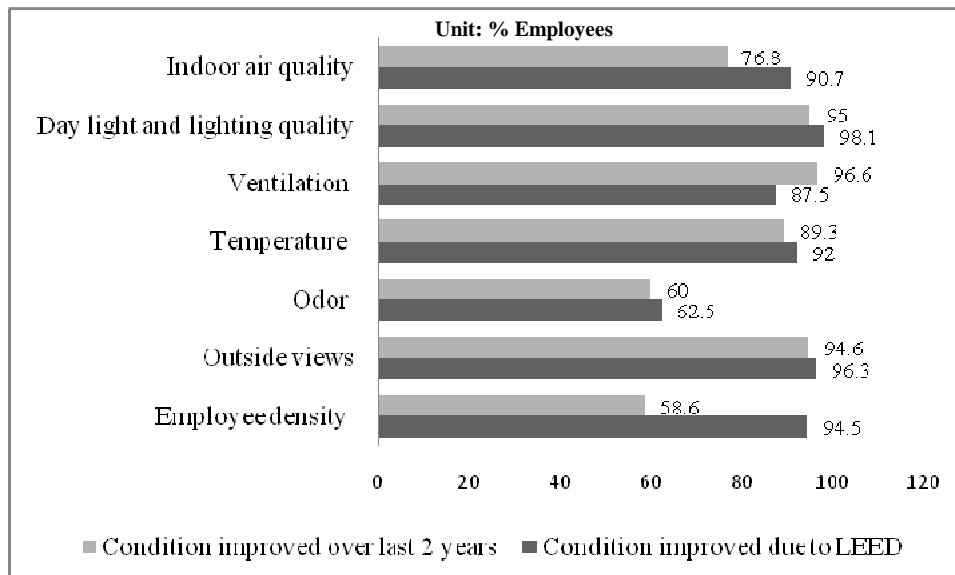


Figure 1: Perception on Indoor Environment Quality (IEQ)

Figure 1 presents the percentage of employees (both factory workers and factory staff members) who perceive that the selected parameters of indoor environment quality (IEQ) improved over the last two years and the percentage of employees who attribute this improvement to the introduction of LEED standards. Heerwagen (2000) stated that there is a direct effect of indoor air quality on performance.

As perceived by the majority of employees, indoor air quality has improved, compared to the condition in the factory before the introduction of the LEED standards (i.e. green workplace environment) in the factory. Out of them, 91% of the employees believe that improved indoor air quality was due to introduction of green workplace environment. The informal discussions with the factory employees also revealed that they are really satisfied about the air quality of the factory. However, some complained about a dustiness of the indoor environment. Dust is normally generated by the garments and there is a probability of accumulation of dust inside the factory due to less number of exhaust fans used. Management has provided masks for the employees, but those were not sufficient sometimes according to the factory workers.

A study done by Fisk (2002) found that improvements in lighting and thermal conditions may lead to additional and even larger productivity gains. Day lighting emerged as an important IEQ factor, which is naturally affected by material and colour selections, which affected employee's perception of performance and productivity (Prakash, 2005). Most of the employees (95%) perceive that there is an improvement in indoor environment due to higher day light usage and lighting quality. Of them almost all (98%) attribute this improvement to introduction of LEED standards. The natural light enables keeping of more plants inside the plants. Employees were highly satisfied not only due to increased quality and quantity of light but also due reduced stress levels as a result of more greenery views in the indoor environment. Majority of employees (95%) believe that there is more possibility to see outside gardens after the factory was converted to a green workplace. In the past employees worked in a more covered or closed environment. Now they can see outside green environment, which has helped them to recover from fatigue and tiredness of their eyes, which the employees appreciate very much. Employees suggested naturalizing the indoor environment by arranging more green plants inside the factory too.

A study conducted by Kumar, et al, (2002) found that inadequate ventilation systems negatively affect employee health, well-being, and productivity. Performance (speed and accuracy) of typical office tasks improves with increased ventilation rate (Lawrence Berkeley National Laboratory, 2009). Most of the employees (96.6%) perceive that ventilation of the indoor environment is better than previous level of ventilation thanks to the introduction of LEED standards (88%). The company has installed sensors in every occupied area to monitor the CO₂ concentration and to operate fresh air dampers to maintain at 900 ppm with aim of maintaining proper ventilation inside the plants. Employees also believe that there is an improvement in the thermal comfort after the introduction of green workplace environment.

Majority of employees, but lower percentages compared other IEQ parameters perceive that odor noticed in the factory and density of employees within a plant were decreased after the introduction of LEED. Most of the employees are now enjoying more space for each individual than past.

3.3.2 Outdoor Environment Quality

As mentioned in the LEED-EB manual for operations and maintenance (2008), sustainable sites, water efficiency, energy and atmosphere, and resource and material use are considered as criteria of measuring the outdoor environment quality. The percentages of employees who perceived that the selected parameters of outdoor environment quality (OEQ) improved over the last two years and the percentage of employees who attribute this improvement to the introduction of LEED standards are presented in Figure 2. When considering minimization of water wastage and practices of water recycling, approximately all the employees agreed those were improved mainly because of the LEED standards. The company has been able to save water up to 58.3% after the introduction of LEED in the factory through increasing water use efficiency, water recycling and rain water harvesting.

Similarly, majority of employees perceive that there is an improvement in energy efficient operating strategies within the factory and most of them think that this was happened due to introduction of green workplace environment in the factory. The company replaced the air conditioning system with an energy efficient system and installed skylights to reduce artificial light requirements. It has also

replaced two vans operated on auto diesel to transport cut fabric pieces and daily office use by two electric vehicles.

Reduction of contributions to air pollution and to global warming is also believed improved after the introduction of green workplace environment. The factory has successfully reduced the emission of CO₂, SO₂, NO_x gases to the atmosphere by 78.6%, 71.2%, and 92.2% respectively. Employees' positive response regarding reduction of harmful chemical and toxins usage, environmentally sensitive buildings, sustainable landscape management and condition of outdoor environment of the factory were also very high. Most of them agree that this improvement is a result of implementation of green project.

When comes to the solid wastage management and recycling, greater parts of the employees believe that that factory has improved after the green project. The factory was able to reduce the waste generation by 100% either by recycling or reuse. They are not only focused on typical wastes management techniques but also on processing wastes to come up with various products. Employees suggested improving the outdoor environment by increasing greenery area, planting medicinal plants and renew the garden time to time.

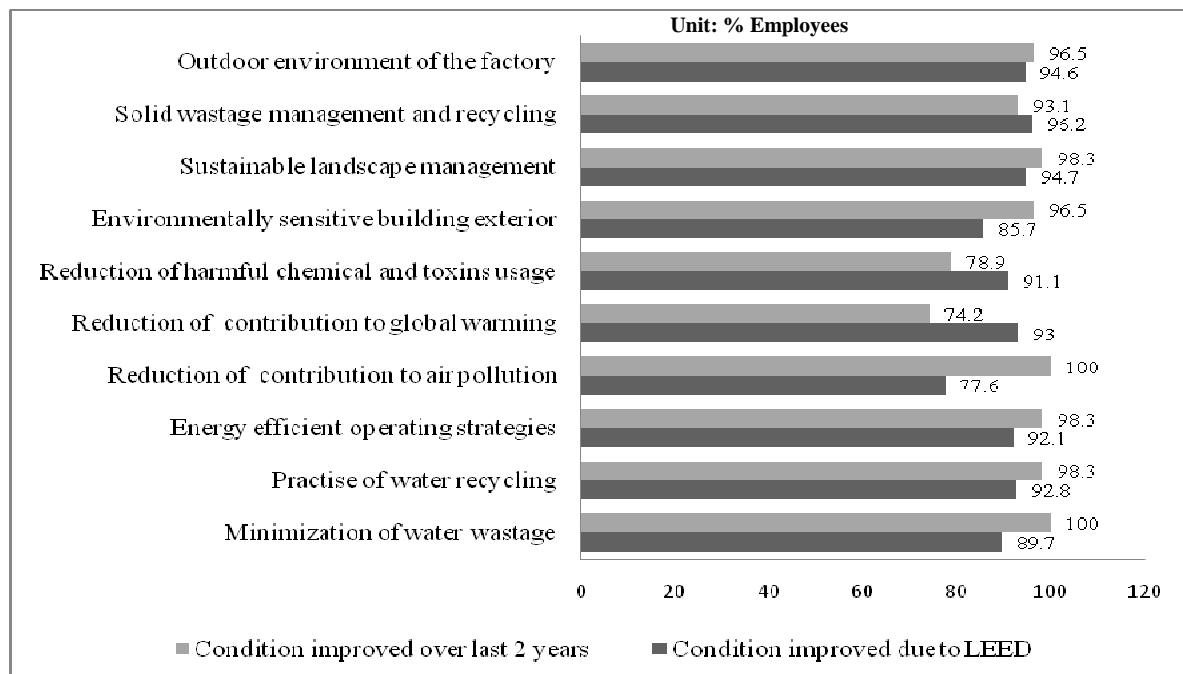


Figure 2: Perception on Outdoor Environment Quality

3.4 Impact on Work Life

A green workplace environment benefits different stakeholders of an organization. There are many financial outcomes resulted by the green workplace environment through reducing resource utilization, maintenance costs, risks and health hazards, absenteeism, and turnover while increasing the overall productivity. It improves the process innovation and increase the work process efficiency. From the shareholders point of view, it may help to improve public image, enable to sell to pro-environmental customers and attract high quality workers, and improve ability to work with community stakeholders. Not only that but it may also help employees to improve quality of work life, personal productivity, and well being (Heerwagen, 2000; Soundarapandian, 2007).

Figure 3 shows the specific impacts of green workplace environment on the performance of employees. All the respondents perceive that complaints regarding environment issues were reduced after the implementation of green workplace environment. The greater part of them (88.7%) believes

the green project as the main reason for this change. Many health issues often arise due to poor indoor and outdoor environments of the workplaces. Poor IEQ has been related with sick building syndrome (SBS) symptoms, respiratory illnesses, sick leave, and loss in productivity (Seppanen and Fisk, 2006). According to the Department of Labour of Sri Lanka, Rs. 65.9 million has been spent as compensation to settle 265 industrial accidents in 2008. However, in this factory 97% of the employees perceive that there was a reduction of their health care cost after the introduction of green workplace. Majority of employees believe that the main reason for reduction of health care cost was the safe, hygienic and comfortable environment gifted by the green project.

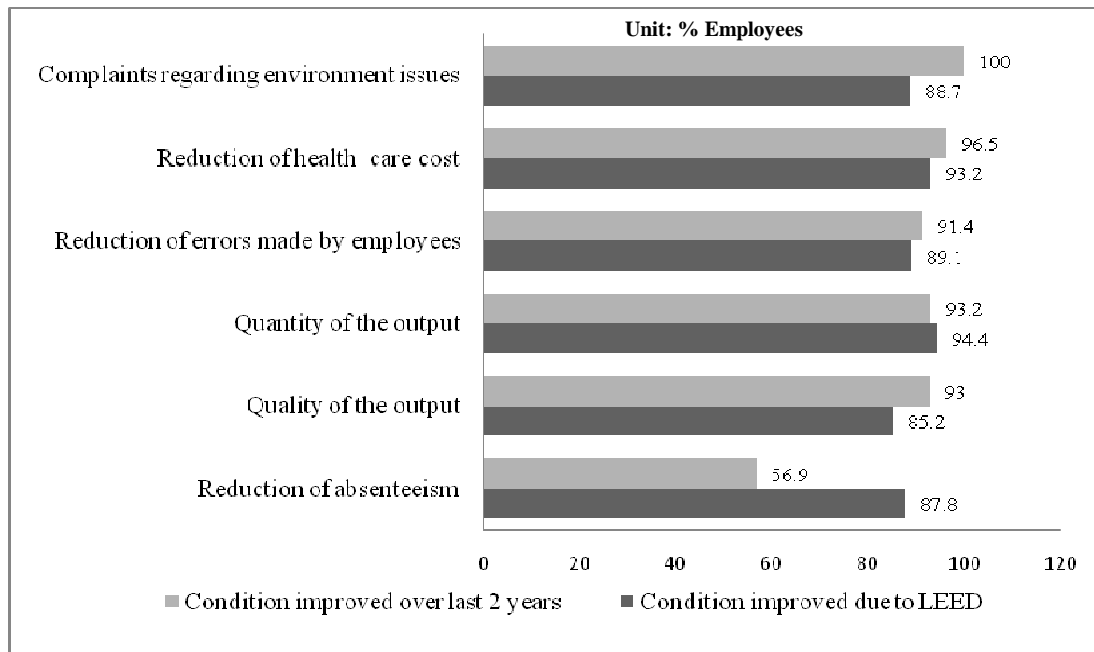


Figure 3: Performances of the Employees

Errors made by employees were reduced as perceived by the employees themselves after the implementation of the green workplace environment. Many employees stated that their mental satisfaction, clear mind and reduced stress improved their concentration on work, consequently reduced errors made by them. When considering the quality and quantity of the output, approximately 93% of employees from each employee category believe their performances were improved after the implementation of green workplace environment. More than half of the employees perceived that their absenteeism rate was also reduced than past. However, there was a significant difference between employee categories and absenteeism rates as 71% of factory staff members perceive reduction in absenteeism is due to introduction of green environment, whereas only 43% of factory workers perceive the same way.

Both factory workers and factory staff members perceive that there is an improvement in comfort of the working environment to perform better in day to day work. When considering the overall perception about performance of employees, majority of employees (86.2%) believe that their performances at workplace have improved after the introduction of green workplace environment to the factory. Furthermore, 89% of the factory staff members perceive that performance of employees under their supervision has improved significantly after LEED (green project).

When considering the job satisfaction, greater part of the respondents (around 90%) believe that their job satisfaction increased after the implementation of LEED standards. There was not a significant difference between employee categories on perception of comfort of the working environment or perceived job satisfaction. As indicated by the employees, in addition to the physical benefits, they were highly satisfied with the psychological benefits of green workplace environment. This supports the findings of Hikari Kato *et al.* (2009) of green workplace offers greater psychological benefits,

mental and job satisfaction to employees in addition to physical improvements, health and productivity gains. Vicki Heath (2006) has also stated that there is a heavy influence of employee's workplace environment on their error rate, level of innovation and collaboration with other employees, absenteeism and, ultimately, how long they stay in the job.

Having a green workplace is not only healthy for the environment, but it will contribute to the general wellbeing of employees and they will feel more inspired and motivated, leading to improved productivity while creating a perception on employee to be more environmentally friendly and to be greener at home. Past studies have revealed that office workers believe they would be 21% more productive if given a better working environment. Nearly 90% of senior executives, feel that a better physical working environment would have a positive impact on their company's bottom line. Over 90% say that the quality of their working environment affects their mood and attitude about their work. Almost as many (89%) believe that the quality of their working environment is very important to their sense of job satisfaction (Kirsten, 2007, Kato *et al.*, 2009)

4 Conclusion

The green workplace environment (adoption of LEED standards) has rewarded the apparel company by improving their employee performance and job satisfaction, creating a better public image and maintaining the market, while helping to minimize the environmental damage. Both factory staff members and factory workers believe that introduction of green workplace environment created a good impact on their work lives. Subsequently, this positive attitude regarding green workplace environment, in future would be helpful to attract talent laborers and reducing labor turnover, a serious problem in the apparel industry.

The results were also useful to managers and interested parties by highlighting areas of perceived deficiency in green workplaces and ensuring a more targeted effort in meeting the needs and expectations of employees. It was found that factory staff members are more aware about the LEED and the environmental impacts of practicing LEED than factory workers, perhaps due to their differences with relationship with the personnel implementing the green project and education levels. Employees perceive that there is a deficiency in attitudes regarding benefits of the green workplace environment, thus there should be an attitude change of employees and update employee knowledge. The turnover of the employees, particularly the factory workers should be addressed to make the green workplace more successful in this company.

Finally, the researchers believe that these results helped identifying strengths and weaknesses of establishing green workplace in factories in employees point of view, a relatively new concept in Sri Lanka. Further research on green workplaces in Sri Lanka in comparison to traditional workplaces would enable generalization of these findings.

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