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Impact of workspace change on organisational outcomes

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CHAPTER ONE - INTRODUCTION

1.1. INTRODUCTION TO THE STUDY

Recently, there has been a drastic change in organisational practices with the focus now being on adopting environmentally friendly practices (Butler, 2011). This is primarily due to increasing pressures from economic, social and legal practices (Butler, 2011). Globally, environmentally friendly practices and sustainability legislation are becoming an increasingly popular research area (Rashid, Spreckelmeyer & Angrisano, 2012). Organisations worldwide have started pursuing the implementation of green design in buildings due its effect on the economy, environment, organisations and individuals and thus resulting in long-term benefits that are associated with the environment, the positive impact on individuals and the organisation as well as the organisation's reputation (Butler, 2011; Richardson & Lynes, 2007). Additionally, sustainable buildings may assist organisations in enhancing job satisfaction, well-being and productivity of employees (Rashid et al., 2012).

The World Commission on Environment and Development (1987) defines sustainable development as the development that addresses the needs of the present, without compromising the capability of the future generations to address their own needs. Sustainable development addresses three main factors, which are environmental responsibility, economic profitability and social awareness (Smith & Pitt, 2011). Thus, it should be noted that implementing a green building will not only benefit environmental sustainability but will also have an impact on employees working in the organisation (Smith & Pitt, 2011; Heerwagen, 2000).

Proponents of a sustainable design have argued that in order for an organisation to be effective, it is essential to succeed across three levels, namely, environmental sustainability, organisational effectiveness and human well-being (Heerwagen, 2000). This can be achieved through the design and use of green buildings (Heerwagen, 2000). Paul and Taylor (2008) argued that there are specific features of the green building design that contribute to a more comfortable and satisfying work environment and these may influence organisational effectiveness and well-being.

In the modern era, interactions with nature and human well-being and development are compromised and are diminishing (Kellert, 2005). Therefore, through well thought-out and deliberate design, this association can be mended and restored (Kellert, 2005). Green building standards and benchmarks

are put in place in order to govern and support the success of the design, construction and the building industry, such as LEED from the US, BREEAM from the UK, Green Star from Australia and Green Star for South Africa which is based on the Australian system but customised for the South African context (Green Building Council, 2012).

The primary aim of constructing a green building or a sustainable building is to reduce the negative impact it has on the environment, to assist the organisation in reducing its operating costs as well as benefiting the employees, through better indoor environmental quality (IEQ) which in turn may result in greater levels of productivity, job satisfaction and well-being (Rashid et al., 2012; Heerwagen, 2000; Von Paumgartten, 2003). Research illustrated that improved IEQ has shown to have a positive impact on employee well-being (Singh, Syal, Grady & Korkmaz, 2010). Singh et al. (2010) argued that poor IEQ such as insufficient ventilation, poor air quality and irregular temperature, as well as inadequate acoustics and lighting can affect psychological well-being of employees and can negatively affect employees physical well-being and result in a decrease in employee productivity.

In terms of the green building benchmarks set, there is a rating tool for office design as well. This tool evaluates the environmental attributes of new office buildings and the refurbishment of existing facilities across South Africa (Green Building Council, 2012). This tool assesses the environmental qualities of an office facility in the design phase (which is the design rating), and the post-construction phase (which is the as-built rating) (Green Building Council, 2012). Therefore, it is essential to understand the way in which the physical design of the office impacts on everyday users which in turn has an impact on the way the organisation functions.

This research focused on how the physical workspace design influences perceived productivity, job satisfaction and employee well-being in a green building. Moreover, by concentrating on how a newly designed workspace is seen and used can produce effective and well-used workspaces for the future. Focusing on workspace design may aid in understanding the levers that an organisation can pull to increase productivity and thereby increase profits. The following physical workspaces aspects will be reviewed in this study namely collaboration with colleagues, technological facilitation and space to work and operate without interruptions. This study will take on a mixed method approach, which consists of quantitative and qualitative data collection. The aim of incorporating qualitative data is to gain an in-depth and more detailed understanding of the phenomenon of interest by understanding participants' feelings and experiences to aid and support the quantitative data and to

shed light when results obtained are unexpected (Johnson & Onwuegbuzie, 2004). This study investigated green building design features, such as the physical workspace environment, on employees' perceived productivity, job satisfaction and well-being. The building that was analysed in this study is the Ernst and Young (EY) building in Sandton (Johannesburg, South Africa). Employees were first situated in the EY building in Wanderers (Johannesburg, South Africa), however in January 2014 they moved to the building in Sandton. This building has achieved a Green Star South Africa, office v1 design rating of a 4-star certification (Green Building Council, 2012).

1.2. RATIONALE

Previously, buildings were built without any regard for the environment and employees, but the focus is now shifting, as many buildings are taking a sustainability stance (Rashid et al., 2012). In recent times the work environment is seen to be undergoing a major shift due to a growing economy and technological advancements, which presents new challenges and opportunities for people (Stringer, 2009). Bearing all these changes in mind, people's perceptions concerning their jobs are also changing, which in turn is forcing organisations to make changes as they rely on their workforce to achieve their ultimate outcome (Stringer, 2009). Employees that are committed and satisfied are the greatest assets of any organisation. Therefore, it is pivotal that organisations accommodate their employees by making changes in their physical workplace to successfully meet their needs and enhance productivity, job satisfaction and well-being of employees in the workplace.

In terms of sustainable buildings, it is essential to focus on how the physical workspace has changed over the years, and the influence it has on the occupants. Attention needs to be centered on how employees are impacted by their physical workspace environment. This is largely due to the fact that the workspace environment influences everyday users, and this may shape organisational behaviour and the way in which people communicate and interact in an organisation (Sailer, Budgen, Lonsdale, Turner, & Penn, 2010). Therefore it is pertinent to understand the way in which the physical design of the workplace may impact productivity and the way the organisation operates (Sailer et al., 2010).

Previous studies on sustainable buildings focused on how sustainable buildings have impacted on job satisfaction, perceived productivity and employee well-being. However, little has been written on how the physical workspace intervention influences perceived productivity, job satisfaction, and well-being of employees. The way in which the workspace is designed can boost efficient knowledge sharing which can enhance productivity as well as stimulate innovation, which is essential for a company's survival and progression (Sailer et al., 2010). However, in a South African

context there is limited research on the outcomes of green building office tools and on the physical workspace and its impact on the organisation and its employees. Therefore this research aims to fill the gap identified in current literature.

CHAPTER TWO – LITERATURE REVIEW

The aim of this chapter is to contextualise the research within the theoretical framework. It will focus firstly on understanding the facets surrounding what sustainable and green buildings are, followed by an explanation of the different systems and guidelines that have been put in place in order to be accredited and certified as a green building. Thirdly a brief description of the EY green building in Sandton will be given, which will then be followed by the organisational outcomes that are being researched in this study such as workspace aspects, perceived productivity, job satisfaction and well-being. Fifthly, prior research and literature will be discussed and evaluated, and lastly reasons will be provided as to why qualitative data is incorporated into this study.

2.1 THEORETICAL FRAMEWORK

2.1.1. Sustainable and Green Buildings and Ergonomics

Sustainable buildings and ergonomics are linked in terms of the social dimension of sustainability that adds to corporate social responsibility and global value creation (Attaianese, 2012). It is important to establish the link between sustainable building design and ergonomic/human factors (Zink & Fischer, 2013). Sustainable building design places emphasis on the resources that are used in the building process whereas ergonomic/human factors are associated with the building design requirements, which considers the diversity of people involved such as the capacities and limitations in a broad context of situations (Zink & Fischer, 2013). Additionally, ergonomics is referred to as the interaction and understanding of the human elements of a system, thus focusing on a design that enhances or even elevates human well-being and the entire systems performance (Thatcher, 2013).

Sustainable buildings and green buildings are used interchangeably. The aim of these buildings is to be able to meet current needs without compromising or diminishing the ability of future generations to meet their own needs (Attaianese, 2012).

Sustainable buildings refer to environmental responsibility issues, the way in which the building is designed constructed and demolished (Attaianese, 2012). Green buildings place greater focus on building users, taking into consideration people's abilities, which varies over time such as age, and physical and mental well-being (Attaianese, 2012). Green buildings can therefore be seen as an association between sustainable development and ergonomics (Attaianese, 2012). The goal of green building design is to reduce the overall impact of the built environment on human health, safety and

comfort as well as the natural environment (Attaianese, 2012). Thus it is imperative to take into consideration the human perspective when designing a green and sustainable building as this has an influence on occupant well-being, comfort and productivity (Hedge, 2008). As a result of the increased focus on green buildings, a number of organisations are now investing and placing more emphasis on the impact it has on the environment, organisations and their occupants (Hedge, 2008; Kats, 2003; Singh et al., 2010). Therefore, it is pivotal to understand what a green building design is and what it entails and the consequences it will have on its occupants, as this is the focus of this study.

2.1.2. Green Building Rating Systems

Worldwide benchmarks and guidelines have been put in place to aid with the design and operations of green buildings to ensure that the correct features and elements are used in order to gain the potential benefits. The aim of these guidelines is to lessen the negative effects that the construction of the building has on the environment as well as to improve the practices of the building user, ensuring that all South African's can work and live in a healthy, effective and productive environment (Green Building Council, 2012).

Green buildings take into account various aspects such as the environment; resources and energy consumption; financial impact and indoor environmental quality, which can have an impact on occupants (Kats, 2003). The goals of green buildings are aimed at increasing occupant comfort as well as enhancing health and productivity for both the organisation and individuals (Heerwagen, 2000).

In 1993, the certification for the United States was launched and is known as the Leadership in Energy and Environmental Design (LEED) (Kats, 2003). The Building Research Establishment's Environmental Assessment Method (BREEAM) is the rating system developed in the United Kingdom and Green Star is from Australia (Van Wyk, 2010).

In 2008, the Green Star South Africa rating system was launched in South Africa, which is adopted from Green Star Australia (Van Wyk, 2010). The Green Star South Africa rating system consists of nine categories, which are: Management, Energy, Transport, Water, Materials, Land Use and Ecology, Emissions, Innovation, and Indoor Environmental Quality (Van Wyk, 2010). IEQ takes into account the building ventilation rates, thermal comfort, day-lighting, use of electrical lighting,

and external views (Green Building Council, 2012). IEQ focuses on issues relating to productivity and the health of employees. Singh et al. (2010) illustrated how IEQ can impact negatively on occupant's well-being which in turn can have a negative impact on job satisfaction and productivity. Several studies conducted on IEQ illustrated an association between the building characteristics such as ventilation, thermal comfort, lighting and indoor environment which impacts on workers performance, comfort and well-being (Hedge, 2000; Kats, 2003; Fisk, 1999; Cakir, 2009 & Wyon, 2003; Thatcher & Milner, 2012).

In terms of Green Star South Africa there is a certain rating tool that is used in order to receive the accreditation and certification of a green building. Additionally, there are different rating tools for different market sectors, such as office, retail, multi-unit residential public and education (Green Building Council, 2012). This rating tool measures the 'green features' in a specific building and if it matches certain criteria it is then awarded points (Green Building Council, 2012). The building can be classified into three categories known as a 4-star, 5-star or a 6-star rating and is determined by its weighted score (Green Building Council, 2012). The weighted score is the sum of each of the crucial factors and is based on a scale rating. This score is then compared to the guidelines set out by Green Star South Africa (Green Building Council, 2012).

Illustrated below is the rating tool for Green Star South Africa Office v1:

Table 1: *Office v1 rating tool*

Certified Rating:	Weighted Score:	Recognises:
4-Star	45-59	Best Practice
5-Star	60-74	South African Excellence
6-Star	75-100	World leadership

The above rating tool is used to rate the environmental qualities of an office facility, which is used for both the design and post-construction phase (Green Building Council, 2012).

2.1.3. Building used in this Study

The building that was analysed in this research is the EY building. EY was first located in Wanderers, and then moved to a green building on 102 Rivonia road, Sandton in January 2014. The

Wanderers building was a conventional building and was situated in an office park. The building consisted of two floors and all the employees from the various divisions/departments were located on these floors (Personal communication). Additionally, the building had an open-plan workspace design and employees could just stand up and see everyone walking and working on that floor, there was no privacy. The new EY green building has achieved a Green Star South Africa, office v1 design rating of a certification rating of a 4-star (Green Building Council, 2012). Moreover, the building design is aligned with EYs Vision for 2020 in creating the 'workplace of the future' in terms of design interventions. The aim of the EY green building was to create an experience of working that is associated with comfort, convenience, inspiration, efficiency and pride (Personal communication). Therefore the workspace design went from being a horizontal layout in the Wanderers building to a vertical layout in the Sandton building.

The EY building has a number of green building features, which complies with the Green Star South Africa rating and is depicted in the table below (Personal communication):

Table 2: *EY Green Building Features, Sandton*

Features:	Energy and Environmental strategies	Brief descriptions
1. Environmental strategy	1.1.Energy efficiency	There is natural light filtered into the office spaces, the lighting has occupancy sensors and has energy efficient features enabling this building to save approximately 50% more energy than a notional building
	1.2. Water conservation	Rain water is harvested and captured in a tank, which is then used in toilets
	1.3. Resource efficiency	There are easily accessible recycling waste storage stations
2. IEQ	2.1. Noise levels	Certain design elements were incorporated in order to achieve

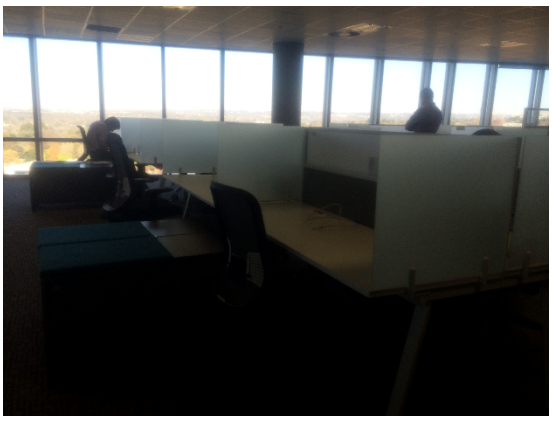
		comfortable noise levels
	2.2. Volatile organic compounds (VOC's)	VOC's, which are carbon-based compounds, are commonly used for various finishes from paints and glues to carpets. Therefore materials and finishes with low VOC content has been cautiously picked and used in the building
3. Air Quality	3.1. Ventilation	The EY building complies with The South African National Standards (SANS 10400-O) which has a specified minimum permissible ventilation rate that considers health and ventilation amenity
	3.2. Air conditioning system	Pumps are used to circulate cool water to decentralised air handling units on each floor
4. Electrical Systems	4.1. Lighting	The building is primarily glass, hence allowing natural light to enter the building, reducing the need for artificial lighting
	4.2.Lighting zones	The open plan office lighting is controlled via automatic occupancy sensors that control areas of not more than $100m^2$, thus, when no one is in the office, the lights automatically switch off

(Source: Personal communication)

Furthermore, when designing the EY building in Sandton, it was ensured that there was convenient access to facilities and services. A vast amount of time was spent on designing the interior of the EY green building and consideration was given to the flow of the office, the layout and furniture as well as the technology and services that operate within the office (Grange, 2014). The focus of designing

the interior was to build a better working world (Grange, 2014). The purpose of focusing on the interior design of the building was to create an environment that makes a positive and lasting impact on both the people working in the building and those visiting, as well as to create an energising and innovative workspace (Personal communication). Figures 1 to 4 below illustrates the working environment, which stimulates the employees, and not only the work they do (pictures below were taken by the researcher).

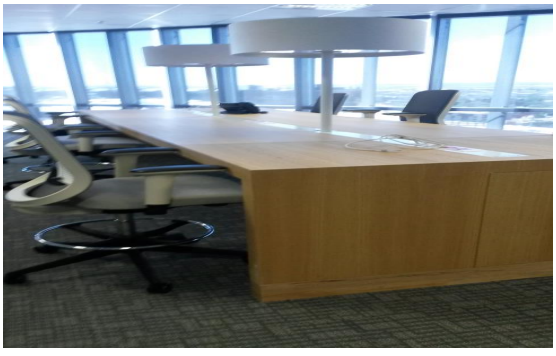
Figure 1: Workspace area of desks

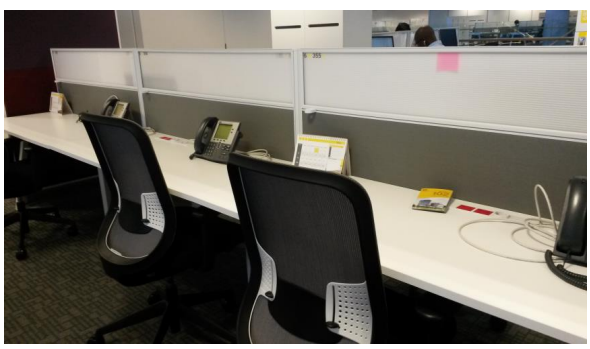














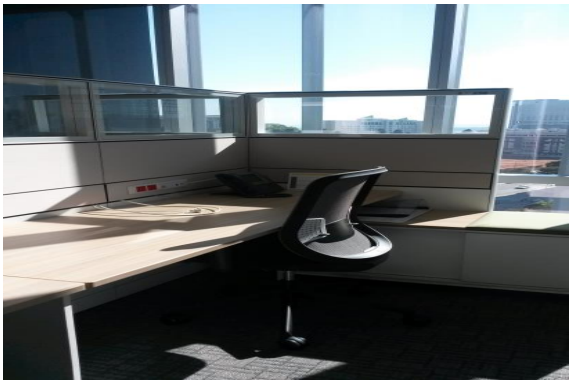


Figure 1 above, depicts a variety of workspace areas for employees. The purpose of designing the workspace area in this manner was to create a professional working environment that fits all purposes and to enable employees to select a work setting that best suits their activity.

The entire building is surrounded by glass and as a result there is natural lighting in almost every workspace area, which can also be seen in the images above. Natural lighting is shown to be positively correlated with increased productivity and is also associated with employee's attitude and well-being (Kats, 2003; Singh et al., 2010). Furthermore, it is believed that a daylight environment is better for health and psychological functioning such as enhancing mood (Kats, 2003; Singh et al., 2010, Heerwagen, 1990).

Figure 1.1: Variety of meeting spaces and rooms









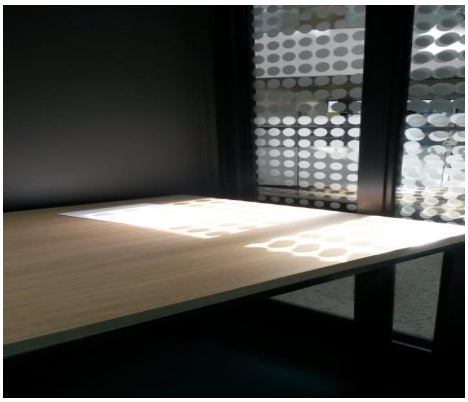


Figure 1.1 illustrates the diverse range of workspace settings that can be used to accommodate meetings, privacy and reduce noise. The EY building has a minimum of eight different types of workspace settings, ranging from formal to informal meeting rooms, which provides distinct space that is conducive to different types of work. The private rooms are essentially designed for more focused work whilst the more shared spaces are designed to stimulate interaction and collaboration among employees and clients. Additionally, the entire office layout is open-plan and has the latest technology installed.

Figure 2: Natural lights and the blinds



The EY building has automatic blinds installed throughout the building. These blinds operate at different sections and times depending on the position of the sun. In figure 2, one can see the blinds coming down from the left hand side

Figure 3: Reception area



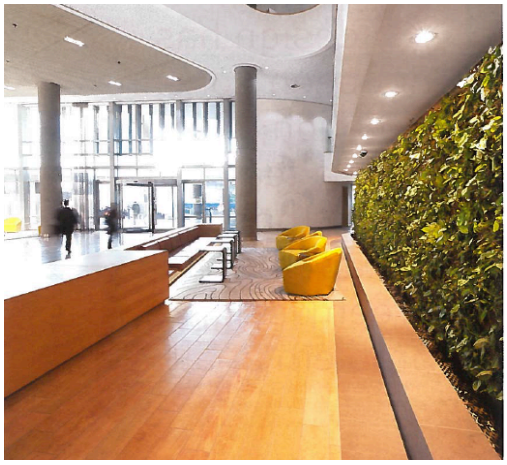


Figure 3 illustrates the reception area; the green wall welcomes staff and visitors into the building. This can be seen as a form of contact with the natural world, which has an impact on human well-being (Kellert, 2005). In literature this is known as 'biophilia', which refers to humans' inherent attraction for the natural world (Kellert, 2005). The tendency to value nature can affect human's physical, material, emotional, intellectual, and moral well-being (Kellert, 2005). Ulrich (2002) argued that the benefits of viewing greenspace has an influence not only on aesthetic enjoyment but also on emotional well-being, stress levels and in some instances it even leads to improved health.

Figure 4: Layout of the stairs

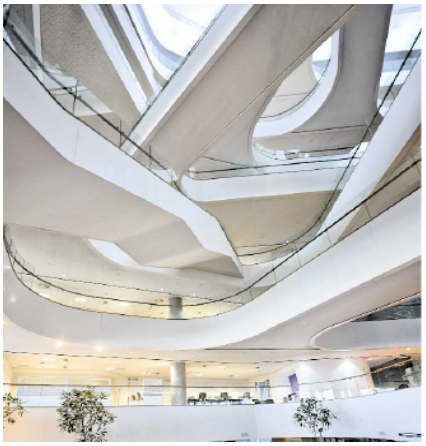






Figure 4 illustrates the staircase. The staircase was designed this way in order to establish interconnectivity and interactions between employees on different floors.

2.1.4. Workspace Aspects

Currently, workspace aspects are more focused on open space structures, which is aimed at facilitating the creation and transfer of knowledge between members in an organisation (Haynes, 2007). The nature of business is shifting from a top-down approach to a more open-plan structure to foster collaboration, team orientation and group engagement, as well as this design is beginning to replace closed door offices (Stringer, 2009). The open-plan workspace area is more in sync with the demands of the work type and knowledge of the workers, thus it is essential to support the collaborative nature of work, as it will ensure reduced environmental demands which in turn will increase productivity (Stringer, 2009). In terms of the EY building, the open-plan workspace facilitates communication, interaction and collaboration between employees (Personal communication). This supports the nature of work demands by EY, as they often are required to work within groups and consult with clients and colleagues on various matters.

Bitner (1992) argued that the physical setting could impact on the behaviour of its occupants; and recognises that designing an environment for multiple distinct behaviours is complex; this is because the ideal design created for one person or group may not be ideal for another person or group. Bitner (1992) identified a framework of three environmental dimensions, which are ambient conditions, space and functions, and signs, symbols and artifacts. Ambient conditions, and space and function, focus on the physical environment, which is associated with the comfort and layout of the environment, whereas signs, symbols and artifacts takes into account the individual within the environment such as the personal artifacts and décor. Well (2000) illustrated that reducing the employee personalisation in the workspace can be related to decreased levels with satisfaction in the physical work environment, thus in turn can lead to reduced levels of job satisfaction and well-being. It has been argued that the workspace should be designed and adapted to support the work process, thus aimed at reducing the mismatch among the office environment and work process (Haynes, 2007).

Therefore to ensure that the physical environment is beneficial for the organisation and individual, attention should be focused on the types of behaviour the office needs to exhibit. In this research, workspace environment refers to the physical spatial aspects of a workspace such as the office layout, which includes the work area, desk, informal and formal meeting areas, privacy, quiet areas

and overall office layout (Haynes, 2007). It has been shown that when workspace areas provide a connection to nature and comfort, it results in increased individual productivity (Stringer, 2009).

2.2. ORGANISATIONAL OUTCOMES

Organisational outcomes consist of variables that were analysed in this study. The purpose of this study was to examine whether there is a relationship between the physical workspace intervention and organisational outcomes which are perceived productivity, job satisfaction and employee well-being.

2.2.1. Perceived Productivity

In order for organisational survival, improvements in productivity should rank high on their agenda. Organisational survival is highly dependent on productivity and profit. Enhancements in productivity have been shown to have an influence on economics and social phenomena (Miller, Pogue, Gough, & Davis, 2009). Building features can either improve or hinder productivity. Leaman and Bordass (1999) defined productivity as the capability of people to improve their work output level by increasing the quality or quantity of the product or service they provide. Productivity is affected by a variety of dimensions within an organisation, including the physical and behavioral environment (Miller et al., 2009). Indoor environmental quality has shown to have an impact on occupants in an organisation. Poor indoor environmental quality resulting from insufficient air circulation, poor lighting and temperature variance can lead to health problems, thus decreased productivity and increased absenteeism (Singh et al., 2010). Indoor environmental quality has a significant impact on the reduction of respiratory illness, allergy and asthma symptoms as well as worker performance (Fisk, 2000). Therefore, improvements in the indoor environmental quality may have a positive impact on employee's well-being as well as enhance productivity in an organisation.

Studies have shown that the main contributing factor impacting on productivity is an office building that has crowded workspaces, job dissatisfaction and the physical environment occupied by employees (Clements-Croome & Baizhan, 2000). Clements-Croome and Baizhan (2000) conducted research focusing on the relationship between IEQ and productivity in the office. When measuring productivity, other factors such as occupational stress indicators were taken into account. Evidence was found that the main complaints impacting on productivity were thermal problems, stuffiness, SBS factors and crowded workspaces. Furthermore it was found that office environment with

workspace being crowded, job dissatisfaction and dissatisfaction with IEQ results in lower levels of productivity. Furthermore the results indicated that by improving the office environmental conditions could increase productivity by 4-10% (Clements-Croome & Baizhan, 2000). Therefore this study will look at how the physical workspace aspect impacts on perceived productivity.

2.2.2. Job Satisfaction

Job satisfaction is an important driver in the work environment. The way in which an employee experiences their work environment may have an impact on job satisfaction. Job satisfaction is defined as a pleasurable or a positive emotional state, which results from the appraisal of one's job or job experiences (Shrivastava & Purang, 2009). Porter, Steers, Mowday and Boulian (1974) indicate that job satisfaction is an attitude that is related to particular tangible aspects of the work environment. Therefore, the environment in which employees work in, influences their overall job satisfaction (Scarpello & Campbell, 1983). If employees enjoy and feel comfortable in their work environment, they will be more satisfied. Paul and Taylor (2008) contrasted two conventional university buildings with a green university building, which was assessed on occupant's comfort and satisfaction. The results illustrated that thermal comfort has an influence on overall satisfaction of occupants in the workplace environment. However, differences in occupant's comfort depend on the occupant's work setting. Prior research conducted reported satisfaction with the workspace environment is positively associated with job satisfaction (Lee, 2006). Thus it is essential to take into consideration how job satisfaction is influenced in the workspace, because this in turn may affect productivity in an organisation.

2.2.3. Psychological and Physical Well-being

Well-being in the work environment should be a major concern to the employer, because this has implications on productivity, absenteeism and job satisfaction of employees. On average an adult spends about a third of their waking life at work, therefore as much as a quarter of a person's life satisfaction can be an explanation for satisfaction at work (Harter, Schmidt, & Keyes, 2002).

Psychological well-being refers to the mental or emotional aspects that are experienced by employees (Danna & Griffin, 1999). Physical well-being refers to the physical health of employees. Psychological well-being is essential in the work environment, because positive emotional states and positive appraisals of the worker heightens work performance and the quality of life. Therefore the

presence of positive feelings would result in happier and more productive employees (Harter et al., 2002).

The physical well-being in this research will focus on physical symptoms that are experienced by employees in the work environment such as fatigue, a congested nose, dry/strained eyes, dry skin, nausea and headaches (Hedge, Erickson & Rubin, 1996). Symptoms such as mental fatigue, headaches, eye, nose and throat irritation, nausea, dizziness and skin irritation has been shown to be related with occupancy of certain workspaces (Hedge et al., 1996). These symptoms are shown to disappear when away from work. Although in some instances these symptoms are shown to appear at work, this could be triggered by exposure to something within the work environment such as ambient conditions (Hedge et al., 1996). Indoor air quality has been shown to correlate with physical and psychological wellbeing (Hedge, 2000; Stringer 2009). The indoor environmental quality that has an effect on psychological and physical well-being are indoor air quality, temperature, light, noise, and overcrowding (Evan, 2003).

Furthermore, the physical features in the workplace such as the glare, lighting and positions of the work surfaces (i.e. the screen displays), has been associated with visual strain and musculoskeletal complaints amongst occupants, therefore decreasing employee well-being and thus in turn may have an impact on productivity (Klitzman & Stellman, 1989). Cakir (2009) illustrated that daylight reduces the number of health problems, which is a result of rapid changes in the light output that is a common feature with electric lighting and discharged lamps. Therefore, it is significant to consider the indoor environmental quality because it can impact negatively on occupant's physical well-being, thus resulting in a decrease in productivity.

2.3. EVALUATING WORKSPACE ENVIRONMENT ON ORGANISATIONAL OUTCOMES

There is a growing body of research focusing on the positive effects of exposure to nature in the workplace setting (Kellert, 2005). Research has indicated that the workspace setting with natural lighting and ventilation, and the presence of natural materials has a positive impact on the physical and mental well-being of occupants, and results in increased productivity and higher levels of satisfaction (Kellert, 2005). By taking into consideration the natural lighting qualities for individual work settings, it can lead to improvements in job satisfaction and employee performance (Lee & Kim, 2008). Research conducted in a European office on a factory worker, illustrated improved emotional well-being and reduced job-related stress due to simply being exposed to nature (Kellert,

2005). This was supported by another study with European workers in a windowless environment, which resulted in finding fewer allergies among participants who were randomly given plants compared to those participants that were not given plants (Kellert, 2005). Moreover, another study conducted on American office employees reported that employees who had a window view had better physical and mental well-being, and less work-related frustration compared to those employees who did not have a window view (Kellert, 2005).

The above studies illustrated that exposure to natural aspects in the work setting has a positive impact on employees physical and mental well-being and leads to increased levels of productivity and job satisfaction. Therefore, employee's workstations are an essential environment to focus on because it leads to improvements in well-being, and by improving employee well-being it will in turn result in higher levels of productivity (Hillier, Fewell, Cann, & Shepard, 2005).

Kato, Too and Rask (2009) conducted research on perceptions of occupiers of green workplace environments. There were a hundred and twenty-eight respondents that consisted of employees and managers who occupied a Green Star rated office for over twelve months. The Green Star rating was based on 'Office Design', 'Office as Built' and 'Office Interiors' (Kato et al., 2009). The findings illustrated that there was a positive effect on psychological well-being in the green office. Above ninety-five percent of respondents agreed with such statements "I have positive opinions about my workplace", "My office makes good impressions on guests/visitors", and "I believe green building is a credential to my organisation's sustainability effort". The results in this study showed a positive relationship between a green workplace and occupant's well-being and productivity (Kato et al., 2009). About seventy eight percent agreed that their office "Suits my need to get a job done". Fifty one percent partly agreed to the question when asked if their 'Office enhances their productivity'. Over fifty percent reported only sometimes they experience "Strained or Dry Eyes" and "A sense of fatigue and lethargy" in their office. However twenty-one percent agreed to the question "I believe that my office has positive effects on my health and well-being". Office satisfaction was scored well in overall satisfaction level with regards to workplace design, although personalised issues in the workspace resulted in lower satisfaction levels. The main issues that led to lower satisfaction levels were the ability to control personal comfort to their liking, level of surrounding noise, and level of privacy. This study illustrated the link between workspace and workplace on organisational outcomes; only psychological well-being depicted a positive relationship between the green workspace and psychological well-being (Kato et al., 2009). This study is supported by a

longitudinal study conducted by Thatcher and Milner (2012). This study compared two groups; one group that moved into a Green Star South Africa- accredited green building and one group that did not move. The results indicated that the green accredited building did not illustrate better physical or psychological well-being and there was no increase in productivity when compared to the group that did not move (Thatcher & Milner, 2012).

Furthermore, a study conducted by Danielsson, Chungkham, Wulff, and Westerlund (2014) focused on the effect of office type on sickness absence among office employees of approximately one thousand eight hundred and twenty five employees working in cell-offices; shared-room offices; small, medium size and large open-plan offices; flexible and combi-offices. Sick leave was self-reported two years later as the number of short, long (medically certified) sick leave and a total number of sick leave days. In the gender separation analysis, the results showed that the open-plan office had a negative impact for the total sample and women separately based on short leave, however for men short-term sick leave were more correlated with flexi-offices. Furthermore, women had a greater risk of filing for sick leave in large open-plan offices, although for men the total numbers of sick days were higher in flexi-offices.

Danielsson et al. (2014) suggested that traditional open-plan offices are less effective for sharing workspace health. This could be due to risk of infections which are greater among people sharing workspace as well as environmental stressors namely the noise level and the ability of personal control. There was a non-significant result with regards to cell and combi offices, which could indicate that there was higher personal control. The concept of personal control over the surrounding environment is pivotal for human well-being. Personal control has been shown to relate to office employees, environment satisfaction and the perception of privacy (Danielsson & Bodin, 2009).

According to Danielsson et al. (2014), only two studies have been conducted in which employee health has been studied over a longitudinal period relative to the office environment. The first study was conducted by Meijer, Frings-Dresen, and Sluiter (2009) and focused on the health status of employees from a cell-office to a flexi-office. Furthermore, the second study was conducted by Pejtersen, Feveile, Christensen and Burr (2011) which focused on individuals sharing workspace and sickness absenteeism.

The first study demonstrates employees reporting better overall health and less severe cases of health after moving into the flexi-offices. Conversely the second study showed that employees in the cell-

offices reported lower levels of sick leaves compared to the employees in open offices with more than six people in it.

The workspace aspects in the environment is essential for employees as this may have an impact on the way they perform their jobs. For instance, for concentrated solitary work, visual and acoustic privacy is paramount whilst it is less applicable if the job requires employees to interact and collaborate with each other. Therefore, current workspace is undergoing a rapid change and it is argued that the office in its numerous forms binds the organisation together in ways that were not seen previously (Thompson & Jonas, 2008).

Thompson and Jonas (2008) argued that a well-designed office will have different meanings to different organisations as it is highly dependent upon their business, culture and their approach towards work. Furthermore, Thompson and Jonas (2008) in trying to identify the best workplace for employees in the United States (US) found various attributes which were found to have improved productivity and employee morale. These workspace attributes are presented below in Figure 5.

Figure 5: (adapted from Thompson & Jonas, 2008)

Attribute	**Best places to work typically**
Distraction-free work	Allow individuals to perform such work through use of privacy partition panels, non-assigned private spaces and ample meeting rooms
Collaboration and interaction	Provide ample congregating spaces, cafes, coffee stations, conference rooms, huddle spaces and side chairs at workstations
Undistracted teamwork and meetings	Provide various types and sizes of open and informal gathering spaces, conference rooms, dedicated team or project rooms and mobile furnishings
Accommodation of personal workstyles and workstation personalisation	Demonstrate this characteristic through use of mobile furnishings and adjustable desks

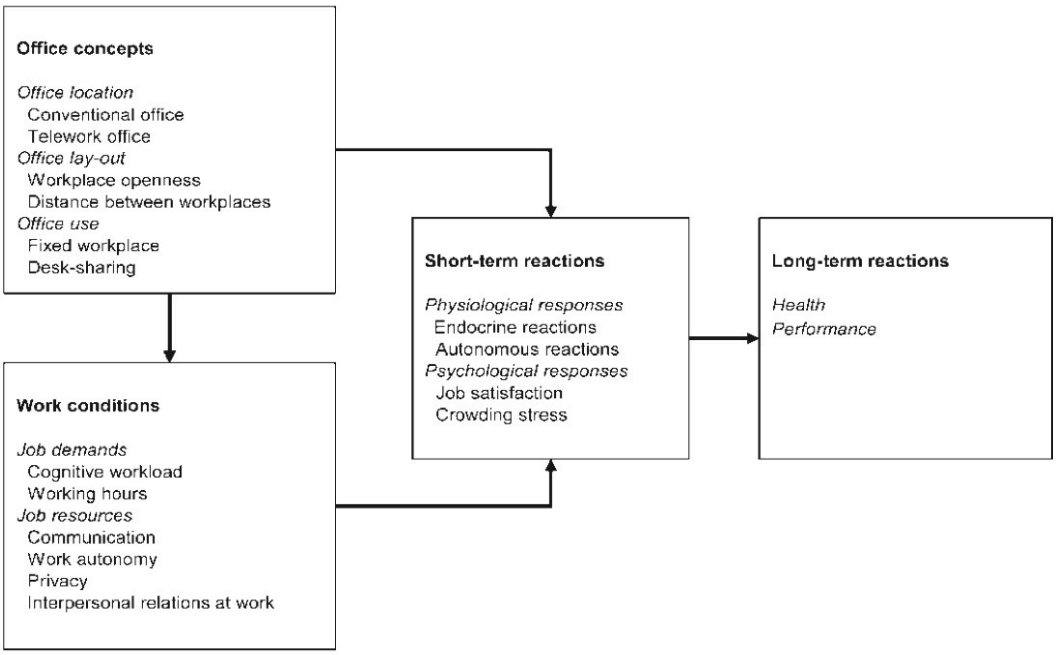
Attention to thermal comfort	Enable individual devices to augment environmental controls and incorporate small heating and cooling zones with accessible thermostats
Access to daylight	Provide direct visual access to natural light for the majority of employees
Workplaces allocated by function	Continued to allocate size and type of workstation based on hierarchy or title
Adjacencies that support work flow	Adopt highly efficient and functional planning where most adjacencies are met
Accommodation of changing technology	Provide full access to power and data, wireless technology and cable management allowing rapid changes of requirements
Expression of culture	Supported and expressed the culture well

(Source - Thompson & Jonas, 2008)

Aforementioned, a well-designed workspace is highly subjective and is dependent on the organisation it houses. However, from the study conducted by Thompson and Jonas (2008), it is found that successful companies share common traits regarding the way in which their workspace is designed, managed and used.

Additionally, a literature study conducted by De Croon, Sluiter, Kuijer and Frings-Dresen (2005) focused on conventional and innovated office concepts and its impact on workers job demands, job resources as well as the short term and long term reactions. There were three dimensions that were examined, namely office location, office layout in terms of open plan versus cellular offices, and office use in terms of fixed spaces versus shared workspaces. This model is illustrated below in figure 6, and depicts how the office concept can either have a direct impact on the short-term reactions and then a long-term reactions as well as how the office concepts can impact on work conditions, and then on short-term reactions which then may have an impact on the long-term reaction.

Figure 6: The effect of old and new office concepts on health and performance (adapted from De Croon et al., 2005)

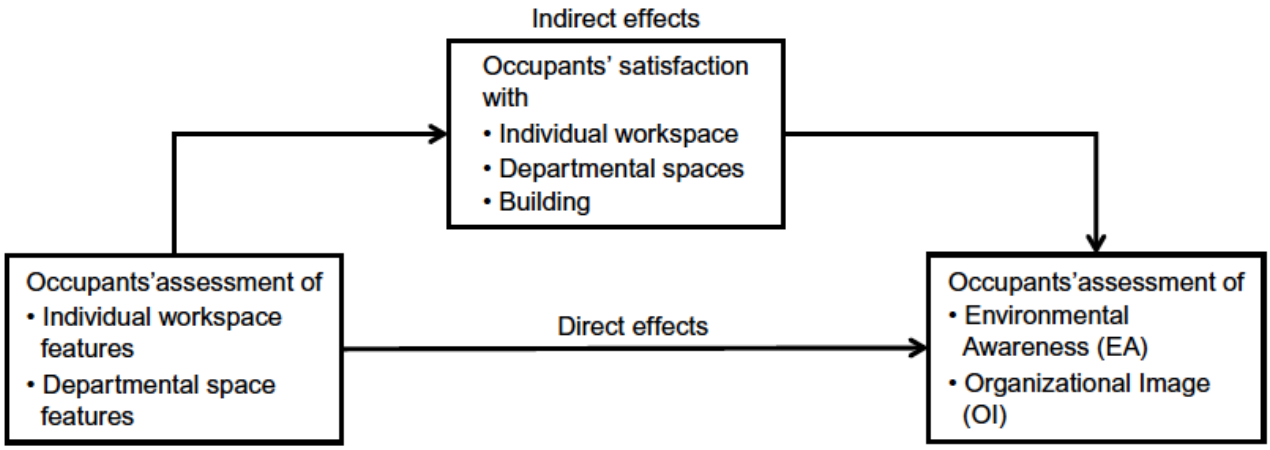


(Source - De Croon, Sluiter, Kuijer & Frings-Dresen, 2005)

De Croon et al. (2005) found strong evidence that privacy and job satisfaction decreases when working in an open workplace. Partial evidence illustrated that working in open workplaces increases cognitive workload and worsens interpersonal relations. De Croon et al. (2005) also illustrated that the close distance among workstations results in increases in cognitive workload and reduces privacy. However, desk sharing is shown to improve communication. There was no evidence found of an effect of the three office dimensions impacting on long-term reactions.

Moreover, Rashid et al. (2012) investigated the direct and indirect effects of environmental design features of a LEED certified green building on employees' environmental awareness and organisational image. The results suggested that there was no direct effect of environmental design features on employees' environmental awareness and organisation image. However, indirect effects were found. This indicated that individual workspace and departmental space designs impacted on employees' satisfaction with their workspace, which in turn impacted their environmental awareness and organisation image. The effects are depicted in figure 7.

Figure 7: (adapted from Rashid et al., 2012)



(Source – Rashid et al., 2012)

Therefore, Rashid et al. (2012) focused on how the individual and departmental workspace features impacts on employee satisfaction which in turn impacts on their environmental awareness and organisational image whereas De Croon et al. (2005), focused on office location, layout and use and its impact on employee job demands, resources, and well-being. Thus, both of these studies are vital as they focus on the impact of workspace design and its impact on employees. Although these models do not focus on productivity, it is the ultimate outcome that firms invest in. The Thompson and Jonas (2008) study focuses on the best workspace factors influencing productivity. Although all the models identify different factors, they all have a defining impact on workspace design.

There has been a growing body of research surrounding green building design initiatives (Heerwagen, 2000). It is essential for green building designs to have a balance between the benefits to the environment and the benefits to its occupants in order to be effective and efficient, thus it should not be one-sided (Heerwagen, 2000).

From the above studies it is evident that workspace environment design has an impact on well-being, job satisfaction and productivity. Therefore in order to enhance productivity, well-being and job satisfaction it is essential that organisations take these factors into consideration so as to minimise absenteeism and improve productivity and job satisfaction of employees. In the past a few studies focused on this specific research area, however given the impact the design of the workspace has on employees, it is now a significant consideration as it could also have an adverse impact on the

organisation.

2.3.1 Qualitative data: Part of this study

The qualitative data will consist of interviews, which aims to validate and substantiate the quantitative data collected from the questionnaires sent to the employees at EY (Stangor, 2011). For instance, if a workspace aspect was found to be significant, the qualitative data provided possible suggestions as to 'why' the result occurred (Stangor, 2011).

2.4. OBJECTIVES OF THE STUDY

This study aimed to investigate whether employee's perceptions of workspace changes has an impact on perceived productivity, job satisfaction and well-being of employees in a green building. This study firstly investigated whether there is a change in the perceptions of workspace design with regards to employees moving from a conventional building to a green building. This was followed by examining if a relationship between perceptions of workspace design and the organisational outcomes exist. Furthermore, an in depth analysis was conducted on employees' experiences based on their perception of workspace change and its influence on organisational outcomes.

The results of this research will assist in understanding employee's insights about the environment that is created for them as well as create value for the business and efficient and well-used workspaces for the future (Sailer et al., 2010).

2.5. RESEARCH QUESTION

To what extent does the perception of the workspace influence organisational outcomes as a result of a change in buildings?

CHAPTER THREE – METHODOLOGY

The methodology chapter consists of various sections, which explains how the research was accomplished in terms of what the data consisted of and the manner in which the data were collected, sorted and analysed. These various sections will be presented in a logical and sequential order. Firstly an explanation of the research design of the study will be discussed. Since, this study opted for a mixed method approach (quantitative and qualitative methods), every section that will be discussed will consist of both quantitative and qualitative explanations. Secondly, the sample of the study will be elaborated on, followed by a detailed description of the instruments used. Fourthly, the steps within the procedure will be discussed followed by an in depth description of the data analyses conducted. Lastly the ethical considerations for this study will be elaborated on.

3.1. RESEARCH DESIGN

This study investigated how perceptions of workspace aspects influence job satisfaction, perceived productivity, and psychological and physical well-being of employees. Therefore, the research method used in this study was a case study, which is a comprehensive analysis of an individual (or case) that accentuates developmental factors relative to the context (Stangor, 2011). In order to facilitate this case study outcome, a mixed method approach was adopted. A mixed-method approach is one that involves collecting, analysing, and integrating qualitative and quantitative methods into the study (Creswell, 2003). A mixed method approach allows for superior research to be obtained through its thorough methodological style, thus providing a detailed understanding of the research problem (Johnson & Onwuegbuzie, 2004). The mixed method approach allows for information to be collected using various sources and methods and provides a more thorough understanding of the phenomenon of interest (Berg, 1995; Johnson, Onwuegbuzie & Turner, 2007). Additionally, by employing different methods to collect information increases the validity of the study if different results converge to common patterns. Empirically, this is known as ‘triangulation’, in which greater confidence can be held in conclusions generated by the study as well as increasing the study’s credibility (Berg, 1995; Hussein, 2009).

In terms of the quantitative approach, it enables the researcher to establish the existence of broad patterns, trends, and frequencies that can be expressed numerically (Newman, 2000), thus, enabling the researcher to correlate and compare the time 1 and time 2 results of the impact of workspace aspects on perceived productivity, job satisfaction and employees well-being. The research design

for the quantitative approach was formulated as a longitudinal non-experimental, correlation study. Moreover there was no manipulation, no control groups or random assignment of participants (Stangor, 2011). There was no control group due to the fact that all the employees in the potential sample moved into the new building. Therefore there was no random assignment of employees as well as no manipulation since all the employees from the Wanderers building moved to the Sandton building. Thus, the researcher did not manipulate the independent variable (Creswell, 2003).

The time 1 data collection was conducted on the 28th November 2013 and closed on the 19th February 2014 (time 1) and was completed by Professor Andrew Thatcher (researcher's supervisor). The same questionnaire was administrated at time 2 on the 31st October 2014 and closed on the 15th November 2014 (time 2).

In contrast the qualitative approach enabled the researcher to gain an in-depth understanding of employees' perceptions on the workspace aspects impacting on perceived productivity, job satisfaction and employee well-being. This allowed the researcher to identify differences and patterns that arise among the employees and obtain rich detail on employee's perceptions. The research design for the qualitative approach was formulated through a thematic content analysis on the data obtained from the interview schedule (Stangor, 2011).

Therefore, the overall research design of the study was a non-experimental, between-subject-group, longitudinal and correlational design that employed both quantitative and qualitative data collection and analysis methods in the form of a mixed method approach (Stangor, 2011). The qualitative data that was collected will contribute to a greater understanding and interpretation of the quantitative data especially when the quantitative data illustrates results that are unforeseen. This method follows a sequence that firstly collects and analyses the quantitative data, which is then directly followed by the collection of qualitative data (Creswell, 2003). The qualitative data is specifically collected and analysed to assist in the interpretation and understanding of the quantitative data, and is pivotal especially when quantitative data project results that are unexpected (Creswell, 2003).

This study was part of a larger study and therefore not all the data that is captured is used for the purposes of this research report.

3.2. SAMPLE

The sample obtained for this study was employees that were first in the EY building in Wanderers and then moved into the EY green building in Sandton. The quantitative approach consisted of two groups in which self-report measures were taken before the employees moved to the green building in Sandton (time 1) and were taken eight months after the move (time 2). The online version of the questionnaire in Time 1 yielded a hundred and ninety-seven responses and was from respondents that were situated in the Wanderers building. At Time 2, the same online version of the questionnaire was administered and yielded responses of two hundred and fifty eight employees situated in the green building in Sandton. Furthermore, for the qualitative approach, ten employees were recruited. These employees worked in the green building in Sandton but also had exposure to the EY building in Wanderers.

The sampling strategy that was utilised was non-probability sampling. This was due to the focus being on employees who have undergone a change in buildings. The type of non-probability sampling that was utilised was purposive sampling, in which the researcher selects participants based on the knowledge of the population and the purpose of the study (Teddlie & Yu, 2007). For the quantitative data, purposive sampling was used and was achieved by sending out emails to approximately 2000 employees within the population group at EY building in Wanderers and in Sandton. Additionally, for the qualitative data, stratified random sampling was used (Stangor, 2011). The sample was divided into subgroups, which were the different divisions in the building. These subgroups are referred to as strata. The sample was then selected randomly from the strata (Stangor, 2011). This was done by randomly emailing approximately fifteen employees in different divisions in the EY building in Sandton.

The sample in this study came from different service lines or functional areas. The sample in this study focused on employees that have undergone a change in buildings from a conventional building to a green building. Thus, these participants have the experiences and knowledge required to achieve the outcome of this study.

3.2.1. Quantitative Sample

The quantitative sample consisted of participants between the ages of 19 and 62 years, of different genders, different racial groups, different tenure, different organisational positions, and different service lines or functional areas. Furthermore, employees were asked to describe their EY ‘work’

area which was a pertinent question to ask due to the transformation in workspace layout in the new EY building. In the new EY building there was a large increase in the diversity of workspace areas, compared to the previous EY building in Wanderers. The various types of workspace areas in the new EY building consisted of open-planned areas, cubicles, closed offices, hot desks, resident/owned desks, formal and informal workspace areas and multiple meeting rooms. The prior EY building consisted of open-plan offices and resident/owned offices. Thus, assessing whether perceptions of workspace areas had an influence on employees well-being, job satisfaction and perceived productivity.

The following tables illustrate the demographic information for each sample of time 1 and time 2.

Time 1: Descriptive statistics of the sample

Descriptive statistics were acquired for the sample from the biographical questionnaire. The total number of participants for time 1 was hundred and ninety-seven and was from the EY building in Wanderers. The average age of participants was 37 years (standard deviation was 9.123 years). The average tenure in the organisation was 8.45 years, which ranged from a minimum of 1 year to 49 years, with a standard deviation of 8.82 years. Moreover, additional descriptive statistics for the sample are presented in table 2.

Table 2: *Descriptive statistics of sample at time 1*

Time 1 Sample	Frequency	Percentage (%)
Gender	**197**	
Male	73	37.06
Female	124	62.94
Race	**197**	
White	120	60.91
Coloured	9	4.57
Indian	27	13.71
African	37	18.78
Other	4	2.03
Organisational Level	**197**	
Executive	40	20.30
Senior Management	40	20.30
Middle Management	64	32.49
Lower Management	0	0.00
Admin	53	26.90
Functional Area	**164**	
Advisory	71	43.29
Assurance	48	29.27
CBS	11	6.71
Tax	22	13.41
Transaction	12	7.32
Talent and Human Capital	0	0.00
Finance	0	0.00
IT	0	0.00
Climate Change and Sustainability Services	0	0.00
Marketing	0	0.00
Type of Workspace	**197**	
Open-plan	0	0.00
Cubicle	0	0.00
Hot desk	55	27.92
Closed office	0	0.00
Resident/owned	142	72.08

Time 2: Descriptive statistics of the sample

Descriptive statistics were acquired for the sample from the biographical questionnaire. For time 2, the total number of participants was two hundred and fifty-eight and was from participants from the EY building In Sandton. The average age of participants was 34.47 years and the standard deviation was 8.75. The average tenure in the organisation was 5.16 years, which ranged from a minimum of 1 year to 29 years, with a standard deviation of 5.79 years. Moreover, additional descriptive statistics for the sample is presented in table 3 below.

Table 3: *Descriptive statistics of sample at time 2*

Time 2 Sample	Frequency	Percentage (%)
Gender	**258**	
Male	91	35.27
Female	167	64.73
Race	**256**	
White	158	61.72
Coloured	12	4.69
Indian	34	13.28
African	45	17.58
Other	7	2.73
Organisational Level	**256**	
Executive	25	9.77
Senior Management	53	20.70
Middle Management	57	22.27
Lower Management	53	20.70
Admin	68	26.56
Functional Area	**252**	
Advisory	53	21.03
Assurance	74	29.37
CBS	17	6.75
Tax	53	21.03
Transaction	5	1.98
Talent and Human Capital	33	13.10
Finance	9	3.57
IT	4	1.59
Climate Change and Sustainability Services	2	0.79
Marketing	2	0.79
Type of Workspace	**257**	
Open-plan	149	57.98
Cubicle	53	35.57
Hot desk	52	98.11
Closed office	3	5.77
Resident/owned	0	0.00

3.2.2. Qualitative sample

The qualitative sample consisted of 10 participants who volunteered to partake in this study. These participants were randomly selected from various departments that hold various organisational positions and work in various types of workspace areas. Table 4 below presents the biographical information of the qualitative sample obtained from the interviews.

Table 4: *Biographical information of the qualitative sample*

Participant	Gender	Current Position	Current Workspace
1	Male	Director - Assurance	Assigned Desk
2	Male	Senior Auditor	Hot Desking
3	Female	Resource Manager - Assurance	Assigned Desk
4	Female	Resource Manager - Assurance	Assigned Desk
5	Female	Trainee/Articles Clerk	Hot Desking
6	Male	Consultant - Climate Change	Hot Desking
7	Female	Junior Consultant - Climate Change	Hot Desking
8	Female	Junior Consultant - Climate Change	Hot Desking
9	Female	Senior Manager - Audit	Assigned Desk
10	Male	Partner/Auditing	Assigned Desk

3.3. INSTRUMENTS

The quantitative data were acquired through self-report questionnaires. The first part of the questionnaire captured biographical information **(See Appendix F)**, and the second part of the questionnaire captured the variables of interest, which are workspace aspects **(See Appendix G)**, perceived productivity **(See Appendix H)**, job satisfaction **(See Appendix I)**, perceived psychological and physical wellbeing **(See Appendix J and K)** and aspects of the perceived physical work conditions **(See Appendix L)**. The Cronbach's alphas for the workspace aspects scale, psychological well-being scale, physical well-being scale and perceptions of physical work conditions scale will be reported in the results section.

The qualitative data were attained through a structured interview schedule, consisting of fifteen open-ended and close-ended questions (**See Appendix M**). The interview schedule entailed questions that focused on the variables of interest such as perceptions of the workspace, perceived productivity, job satisfaction and employee well-being.

3.3.1. Quantitative Instruments

1) Biographical details (see Appendix F)

The questionnaire captured biographical details and consisted of questions such as gender, age, tenure, department, organisational level and type of workspace area.

2) Workspace Aspects (See Appendix G)

The workspace aspects scale was self-developed, which derived from several places including Sanders and McCormick (1993), Kim and de Dear (2013) and from discussions with the client as to what aspects were important. This is the first time this scale was piloted. Workspace aspects were assessed using a 13-item scale. Each item was measured on a five-point likert-type scale ranging from very dissatisfied (1), dissatisfied (2), neutral (3), satisfied (4) and very satisfied (5). Sample items include questions such as 'my "work" area meets my work needs in terms of its physical layout' and 'gives me the space to work/operate without interruptions'.

3) Perceived Productivity (See Appendix H)

Perceived productivity was measures by asking participants to rate their productivity at two different times. Participants were asked "how well you have been working over the last month in relation to your full capacity", and "how well you have been working over the last 2-3 months in relation to your full capacity" (Thatcher & Milner, 2012). This was rated on a scale of 0 to 100 percent, in which a 100 percent is full capacity. Participants were also asked "what is the single most important factor that impacted (increased/decreased) your productivity during this time?"

4) Job satisfaction (See Appendix I)

Job satisfaction was measured by a single-item, which asked, "taking everything into consideration how do you feel about your job as a whole?" This was rated on a five-point response scale ranging from very dissatisfied (1), dissatisfied (2), neutral (3), satisfied (4) and very satisfied (5) (Wanous, Reichers & Hudy, 1997). Overall, job satisfaction is measured on a single-item measure even though internal consistency cannot be estimated. Scarpello and Campbell (1983) and Wanous et al. (1997) found that a single-item that measures overall job satisfaction was not unreliable. This was supported by Nagy (2002) in his study, which suggested that a single-item of overall job satisfaction is as

reliable as that of a multiple-facet item scale. Additionally, Nagy (2002) states that multiple-facet item scales often leave out specific sub-scales, which are key to an in-depth understanding of job satisfaction as a whole. Nagy (2002) further asserts that single-item measures seem to contain more face validity, and can permit greater flexibility when measuring job satisfaction through additional items. Wanous et al. (1997) suggested that a single-item of job satisfaction is highly correlated with that of multiple measures of job satisfaction and is representative of global constructs. Therefore using a single-item scale is acceptable when compared to other global measures of job satisfaction (Scarpello & Campbell, 1983). These findings are important for the proposed study, since job satisfaction was measured using a single-item scale.

5) Psychological well-being (See Appendix J)

The Warwick-Edinburgh Mental Well-being scale (WEMWBS) was used to assess mental well-being, which focuses on aspects that are associated with subjective psychological well-being (Stewart-Brown & Janmohamed, 2008). This scale consisted of 6 items, which focused on accentuating positive mental well-being (Stewart-Brown & Janmohamed, 2008). This scale was assessed on a five-point likert-type response category ranging from none of the time (1), rarely (2), some of the time (3), often (4), all of the time (5) (Tennant, Hiller, Fishwick, Joseph, Weich, Parkinson, Secker & Stewart-Brown, 2007). A good criterion-related validity has been reported for this scale as well as a Cronbach's alpha coefficient of 0.91 for a general population sample of 1749 people, thus illustrating a high level of internal consistency (Tennant et al., 2007). Furthermore, Stewart-Brown and Janmohamed (2008) revealed good internal consistency for this scale with a Cronbach's alpha of 0.89 for a student sample of 348.

6) Physical well-being (See Appendix K)

Physical well-being was measured using the Sick Building Syndrome (SBS) questionnaire. There were 15 items on this scale and it was assessed using a 4-point scale ranging from never (4), 1-3 times per month (3), 1-3 times per week (2), and every day (1) (Hedge et al., 1996). A study conducted by Alli (2013) reported a Cronbach's alpha of 0.82 for a population size of 84 participants, thus revealing good internal consistency.

Additionally, this questionnaire included the perceptions of physical work conditions scale developed by Hedge et al. (1996), which measures the negative facets within the physical working

environment (See Appendix L). It is measured on a fourteen-item scale, and was assessed on a four-point response scale ranging from never (4), 1-3 times per month (3), 1-3 times per week (2), and every day (1). Similar research conducted by Alli (2013) reported a Cronbach's alpha coefficient of 0.76, thus indicating good internal consistency.

3.3.2. Qualitative Instruments

The aim of the qualitative data in this study focused on uncovering and gaining an in-depth explanation of employees' perceptions and experiences which the quantitative data could not obtain (Johnson & Onwuegbuzie, 2004; Jick, 1979). The qualitative data in this study takes the form of a preliminary inquiry whereby the qualitative data is regarded as a supplementary or an auxiliary method for the quantitative data (Jick, 1979). The interviews conducted where based on how the green building impacts on the employees, and their perceptions, attitudes, and how they responded to the changes in the building.

The instrument that was used to attain the qualitative data collection was a structured interview schedule (See Appendix M). The interview schedule consisted of 11 open-ended and close-ended questions that focused on gaining employee insights and experiences about the change in workspace environment. A sample interview question was "Do you think that the workspace set up on your floor is more conducive for work and liaising with your teammates (Do you believe that this new building is more people friendly in terms of the way it has been designed)?''

3.4. PROCEDURE

After obtaining ethical clearance to conduct this study from the University of Witwatersrand, an access letter in a form of a proposal was sent to the organisation explaining the objectives and the requirements of this study **(See Appendix A).** Permission from the organisation was then granted. Moreover, the data for this study was gathered in two stages. The first stage consisted of gathering the quantitative data, which was collected at two different time frames in order to capture and examine data before the employees moved to the green building and ten months after they moved to the new green building (**See Appendix B and F-L).** For time 1 and time 2, the organisation sent out an email to invite all the employees to participate in this study (**See Appendix B)**. The email that was sent out to all employees consisted of a participant information sheet, in which it explained the objectives, purpose and requirements of this study as well as a link to the questionnaire. The questionnaire that was include consisted of a biographical information questionnaire and all relevant

measurement instruments such as the Workspace Aspect Scale; Warwick-Edinburgh Mental Well-Being Scale (WEMWBS); Job satisfaction single item scale; the Sick Building Syndrome (SBS) questionnaire; Perceptions of physical work conditions taken from Hedge et al., (1996); and Perceived productivity (**See Appendix F to L)**. Once participants completed the questionnaire online, they were requested to click the submit button and their responses were sent to a third party, a survey manager based in France, for the purpose of processing the information, which was thereafter sent to the researcher. By submitting their responses online, participant consent is assumed. This process at time 1 was a replica to the process that was used at time 2, thus reducing biases.

It is important to acknowledge that all the information obtained from the individual responses of the questionnaires, was supplied by a third party to the researcher's supervisor and the researcher for the purpose of analysing the information. Thus, the organisation did not have any access to an individual participants response. Furthermore it must be noted that participation in this study was completely voluntary, hence employees were not obligated to partake in this study (Stangor, 2011).

For time 1, the invitation emails were sent out to a total of 2000 employees located in the Wanderers building, with a link directing the employee to the questionnaire **(See Appendix B and F-L)**. The time 1 questionnaire was sent out on Thursday the 28th November 2013 and closed on Wednesday the 19th February 2014. The link for the questionnaire at time 1 closed only after two and half months and this was primarily due to a poor response rate by January 2014 (approximately 100 respondents). Due to the poor response rate, the questionnaire was amended slightly to ask respondents to rate their experiences in the Wanderers building and sent out again on Friday the 31st January 2014. At the end of the period, 197 responses from the online version of the questionnaire were received. It should be noted that although the response rate is below 10%, the company reports that it is typical for this type of survey (Personal communication). The main aim of the time 1 questionnaire was to collect baseline information before staff had actually moved into the new green building situated at 102 Rivonia Road, as well as to analyse whether there was a relationship between perceptions of workspace and the organisational outcomes at time 1.

The time 2 data collection took place 8 months after time 1 data were collected. The same invitation emails as time 1, containing the link to the questionnaire was sent out on Friday the 31st October 2014 and closed on Friday the 15th November 2014 **(See Appendix B and F-L)**. A total of 2000 emails were sent out, and at the end of the period 258 responses were received. The main aim of the

time 2 data were to compare it with the time 1 data to uncover any statistically significant differences, as well as to analyse whether there was a relationship between perceptions of workspace and the organisational outcomes at time 2.

In addition to the quantitative data, the stage two of data collection included the interview process. The organisation used stratified random sampling and selected 15 employees to volunteer to partake and be interviewed for the study. These 15 employees were then sent an email by the organisation and the researcher was included in this email. This email consisted of an information participation sheet, which provided information regarding the objectives of this study as well as the requirements **(See Appendix C)**. Ten employees responded to the email and volunteered to participate in the interview process. The researcher then emailed the interested participants to set up a time and date to conduct the interview.

The interview process started on Monday the 15th September 2014 and ended on Thursday the 23rd October 2014. Prior to the interviews, participants were given the participant information sheet **(See Appendix C)**, a consent form for participant interviews ensuring confidentiality **(See Appendix D),** and a consent form for audio recording, granting the researcher permission to record the interview **(See Appendix E)**. Once these were signed off the interviews commenced in a venue which was arranged by a member within management at EY. The interviews lasted for approximately forty-five minutes. Once all 10 interviews were conducted, the researcher then transcribed the information and used thematic content analysis to analyse the data. The interviews conducted were based on how the building impacts on the employees, and their perceptions, attitudes, and how they responded to the changes in the building as well as used to back up the quantitative data, in terms of creating conclusions and gaining a better understanding of their responses (Jick, 1979).

3.5. DATA ANALYSIS

In order to answer the research question, both quantitative and qualitative data analyses were used. However, the data were analysed in two stages, first being the quantitative data analysis which was then followed by the qualitative data analysis.

3.5.1. Quantitative Analysis

Once the questionnaire data were collected, the data were coded and analysed for missing information and discrepancies. The questionnaire data were then analysed using the SPSS software package to perform the relevant statistical tests. Firstly, reliability coefficients were analysed for all

variables at time 1 and time 2. This was followed by attaining descriptive statistics for all the variables at time 1 and time 2. Thirdly, independent t-tests were conducted to uncover any statistically significant differences from time 1 to time 2 for workspace aspects, job satisfaction, perceived productivity and psychological and physical well-being. Independent t-tests were used to compare the two samples to determine whether there was a statistically significant difference between the means in the two groups (Huck, 2004). In order to conduct a parametric independent t-test, a few assumptions need to be met such as normality, which means that the data is normally distributed; homogeneity of variance which implies equality of variance between the groups; random independent sampling and that the dependent variable must be at least interval in measure (Huck, 2004). If these assumptions are not met a Mann-Whitney U-test was conducted.

Furthermore, correlations, simple linear regressions and stepwise multiple linear regression analysis was carried out to ascertain whether there was a relationship between perceptions of workspace aspects impacting on job satisfaction, perceived productivity and psychological and physical well-being for time 1 and time 2 (Huck, 2004). In order to carry out Pearson's correlations for time 1 and time 2, certain preconditions need be met such as random independent sampling; both variables must be normally distributed and at least interval, and variances should be equal (Huck, 2004). If these preconditions were not met then Spearman's Rho correlations were carried out on the data. Moreover, simple linear regression analysis and stepwise multiple regressions were conducted to determine the extent to which perceptions of workspace aspects are associated with job satisfaction, perceived productivity and psychological and physical well-being for time 1 and time 2. Forward stepwise multiple regressions were used to select the best predictor of the outcome variable such as job satisfaction, perceived productivity and employee well-being. (Coolican, 2009). The various analyses for the quantitative data is presented in the results section.

3.5.2. Qualitative Analysis

The qualitative data were examined using an interpretive epistemology paradigm, which aims to understand employee's experiences (Burrell & Morgan, 1979). This paradigm explains behaviour from the viewpoint of individuals and provides an understanding of the subjective meanings of human actions in various social contexts as well as the manner in which interactions take place (Burrell & Morgan, 1979). Therefore by incorporating the individual's experiences and viewpoints it provides a greater understanding and exploration of the significance or insignificance of the results of the quantitative data.

The qualitative data were obtained through the interviews and these interviews were analysed using thematic content analysis. This analysis allows one to identify, analyse and report key themes within the qualitative data (Greenstein, Roberts & Sias, 2003). Thematic content analysis is useful because it allows one to summarise large bodies of data as well as discover new emerging themes and concepts (Braun & Clarke, 2006). In this study thematic content analysis was utilised to examine employees' experiences and feelings surrounding the perceptions of workspace and how the workspace environment has influenced perceived productivity, job satisfaction and well-being of employees from the change in buildings. The key themes identified from the interviews, formed part of the data set that was used to perform the quantitative analysis thus ensuring that one measures the relationships as accurately as possible (Greenstein et al., 2003).

Using statistical modeling tools and qualitative data not only enables one to accurately test whether a relationship exists but also allows one to forecast and make predictions into the future (Hussein, 2009).

3.6. ETHICAL CONSIDERATIONS

The following ethical considerations were adhered to. In order to carry out this study the researcher applied for ethical clearance from the Human Research Ethics Committee of the School of Human and Community Development of the University of the Witwatersrand. The protocol number is MORG/14/006 IH. Once this was approved, the researcher could carry out the research, thus ensuring that the proper protocol was adhered to (Berg, 1995). Ethical consent from EY management was obtained to ensure that the researcher could use their employees as the representative sample for this study.

In this study participants were informed about the purpose of this research and that it was on a voluntary basis. There are no risks or benefits to the individuals that choose to partake in the study or to those that choose not to. It is essential to assure subjects that participation is completely voluntary and that there is no potential risk or that no participant is coerced or manipulated into volunteering, thus ensuring that the data obtained is accurate and the confidence in it cannot be undermined (Berg, 1995; Stangor, 2011).

The questionnaire consisted of a participation sheet, which explained the purpose of this study and indicated that participation was completely voluntary. Furthermore it ensured that anonymity and confidentiality would be maintained at all times. Once participants submit their questionnaire online,

it was regarded as participant consent. Participants were allowed to withdraw from the study by not submitting their questionnaire. The researcher and supervisor only viewed the questionnaire results, thus they did not have access to names or any other identifying information about the employee. Anonymity and confidentiality was guaranteed by keeping the response data in a password-protected file, ultimately ensuring anonymity and confidentiality from the researcher (Stangor, 2011). The organisation did not have any access to the individual participants' responses. The third party supplied the information and data responses to the researcher's supervisor and researcher and was solely for the purposes of processing and analysing the information. Therefore, anonymity and confidentiality was ensured. However, it should be noted that once respondents submitted their questionnaire online they could not withdraw from the study.

In terms of the interview, participants were given an information sheet with the necessary details of this study, followed by an informed consent form that participants had to sign. Participants were assured that all information received was kept confidential. Participants had the option of being audio-recorded during the interview, by signing the consent form for audio-recording. The advantage of audio-recording is that transcribing the interview information is more accurate than writing out notes (Stangor, 2011). Participants partaking in the interview had the right to withdraw from this study. Anonymity cannot be guaranteed due to the fact that it was one-on-one interviews. A strict code of confidentiality was guaranteed; only the researcher and the researcher's supervisor had access to the data. Pseudonyms were assigned to assure no identifying information would be conveyed (Stangor, 2011). The original recordings from the interviews were destroyed, once the data were transcribed and only kept in the form of electronic transcripts in a password-protected file.

The quantitative data and electronic transcripts were kept in a secured database until all the data is analysed and are no longer required, which will then result in the deletion of the data.

The results were drawn up in the form of aggregated responses. The debriefing in which participant's will receive feedback on the study will be done by the directors of the organisation (Stangor, 2011). The researcher may have the option to publish the aggregated results in a publication journal or to present it at a relevant conference after the researcher has completed the research report.

CHAPTER FOUR – RESULTS

The key aim of this chapter is to present the results obtained from both the quantitative and qualitative data collection. The quantitative data will firstly be presented by examining the reliability coefficients of the relevant scales that were used for the data collection. Thereafter, normality of the data produced will be assessed, which will then be followed by running the appropriate t-tests comparing time 1 and time 2 from the data collected. By conducting these tests, it will assist in determining whether there was a change or not in the employees' workspace aspects, well-being, physical work conditions, job satisfaction and perceived productivity from time 1 to time 2. Furthermore, the results from correlations and regression analysis will be presented and interpreted, in order to determine whether there is a relationship of employees' workspace aspects impacting on organisational outcomes such as well-being, job satisfaction and perceived productivity.

The qualitative data will center on the emergent themes that have emerged from the data, which will provide a better understanding and interpretation of the quantitative results that were obtained.

4.1. QUANTITATIVE RESULTS

The tests that were conducted for this study were that of reliability coefficients, normality tests, independent t-tests, Mann-Whitney U-test correlations and regressions, as well as descriptive statistics to which the results will be discussed in further detail below.

4.1.1. Reliabilities

Table 5: *Cronbach's alpha for the four scales*

Variable	N	Time 1	N	Time 2
Workspace Aspects Scale	13	0.88	13	0.90
Warwick- Edinburgh Mental Well-Being Scale (WEMWBS)	6	0.79	6	0.86
Sick Building Syndrome (SBS) Questions: Physical Well-Being	15	0.91	15	0.90
Perceptions of Physical Work Conditions taken from Hedge et al., (1996)	14	0.84	14	0.86

The results illustrated in the above table, shows the internal reliability of the scales that were utilised in this study. In order for a scale to be reliable, the reliability coefficients should range from 0 to 1 (Huck, 2004). The reliabilities from the above table falls within the reliability coefficient acceptable range (Gliem & Gliem, 2003). The reliabilities depicted in the above table, fits the good to excellent range, which ranges from 0.8 to 0.9, thus indicating good internal consistency reliability (Gliem & Gliem, 2003). However, the reliabilities for job satisfaction and perceived productivity are not listed in the above table, this is due to these variables being measured using a single item scales.

4.1.2. Comparison Tables of Workspace Aspects, Well-Being, Physical Work Conditions, Job Satisfaction and Productivity from Time 1 to Time 2

4.1.2.1. Normality

In order to conduct the relevant analysis, it is vital to first conduct a distribution analysis to examine whether the data is normally distributed. In order to establish normality, skewness coefficients, and Levene's test for homogeneity of variance were examined. Skewness coefficients and kurtosis were calculated to determine whether the data obtained is normally distributed (Huck, 2004). The guideline according to Huck (2004) for normality is between +1 and -1 for skewness and kurtosis values. If skewness and kurtosis values lie between +1 and -1 it indicates that the distribution of the data is normally distributed. For all variables of interest, namely workspace aspects, job satisfaction, perceived productivity, psychological and physical well-being did meet the assumptions of random independent sampling, and the variables were all at least interval scale. Normality and homogeneity of variance were assessed below.

4.1.2.2. Skewness and Kurtosis

Table 6: *Skewness and kurtosis values for all variables for time 1*

Variables	Skewness	Kurtosis
Workspace Aspects	-0.231	0.306
Psychological Well-Being	0.105	-0.038
Physical Well-Being	-0.791	0.118
Physical Work Conditions	0.098	1.958
Job Satisfaction	-0.837	0.342
Productivity (last month)	-1.992	6.368
Productivity (last 2-3 months)	-0.966	0.773

The above table illustrates the results of the distribution analysis, in terms of skewness coefficients and kurtosis values. The skewness coefficients for workspace aspects, psychological well-being, physical well-being, physical work conditions, job satisfaction and productivity (last 2-3 months) are in the acceptable range, which is between +1 and -1. The kurtosis values for workspace aspects, psychological well-being, physical well- being, job satisfaction and productivity (last 2-3 months) are also in the acceptable range. However, the kurtosis value for physical work conditions is 1.958,

which is above the normal criteria range, and thus not normally distributed. There is further evidence to support this, which is provided by the central limit theorem that suggests as the sample size increase, the distribution will approach normality (Walker, 1999). Therefore, if the sample size is greater than thirty participants, it is sufficient for normality to be assumed (Walker, 1999). According to the central limit theorem physical work conditions are normally distributed. Additionally, the variable productivity (last month), has a the skewness value of -1.992 and kurtosis of 6.368, therefore normality cannot be assumed and is due to the fact that the skewness and kurtosis values are not within the acceptable range of (+1 and -1). However, this is reasonable since productivity is answered in a very subjective manner. Therefore, workspace aspects, psychological well-being, physical well-being, physical work conditions, job satisfaction and productivity (last 2-3 months) are all normally distributed with the exception of productivity (last month); hence a non-parametric Mann-Whitney U-test is performed on that data.

Table 7: *Skewness and kurtosis values for all variables for time 2*

Time 2 Variables	Skewness	Kurtosis
Workspace Aspects	-0.213	0.700
Psychological Well-Being	-0.434	1.787
Physical Well-Being	-1.158	2.246
Physical Work Conditions	-0.862	0.484
Job Satisfaction	-0.718	0.405
Productivity (last month)	0.787	14.182
Productivity (last 2-3 months)	0.733	13.434

Table 7 depicts the skewness coefficients and kurtosis values for time 2 data and illustrates that workspace aspects, psychological well-being, physical work conditions, job satisfaction, productivity (last month) and productivity (last 2-3 months) are in the acceptable range for skewness coefficients. The kurtosis for workspace aspects, physical work conditions and job satisfaction are in the acceptable range, although the kurtosis values for psychological well-being, productivity (last month) and productivity (last 2-3 months) are above the acceptable range, however these are supported by the central limit theorem and thus a normal distribution is assumed (Walker, 1999). The skewness coefficient for physical well-being is -1.158 and the kurtosis value is 2.246, which is not within the given range. Hence, the data cannot be assumed to be normally distributed and a non-parametric Mann-Whitney U-test is performed on that data. Thus, for time 2

workspace aspects, psychological well-being, physical work conditions, job satisfaction and productivity (last month) and productivity (last 2-3months) is normally distributed.

It is essential to note, that for perceived productivity (last month) and physical well-being the data that was not normally distributed. Hence, square root transformation, log transformations and other transformation were performed. However it was found that the data were still not normally distributed, therefore Mann-Whitney U tests were performed for perceived productivity (last month) and physical well-being.

4.1.2.3. Levene's test for Homogeneity of variance

As aforementioned the normality of the data is established, however in order to conduct an independent t-test, it is vital to ensure that the variances of the two groups that are being measured are equal. Homogeneity of variance assumes that the variances are equal throughout the data (Huck, 2004).

Therefore, Levene's test for homogeneity of variance was used to determine whether the variances are equal throughout the data. Equal variances are assumed when the p-value is greater than 0.05 level of significance, and equal variances are not assumed when the p-value is less than 0.05 level of significance. In cases where variances were not equal, the equal variances not assumed values were used.

Table 8: *Levene's test for homogeneity of variance time 1 and time 2*

Variable	**Levene's Statistic**	**d*f*1**	**d*f*2**	**Significance p-value**
Workspace Aspects	0.03	1	398	0.85
Psychological Well-Being	0.19	1	396	0.66
Physical Work Conditions	33.91	1	394	0.00
Job Satisfaction	1.25	1	393	0.64
Productivity (last 2-3 months)	0.86	1	355	0.85

Table 8 presents the Levene's test for each of the variables. Workspace aspects, psychological well-being, job satisfaction, and productivity (last 2-3 months) all have equal variances as these variables have a p-value greater than the 0.05 level of significance, thus there were no differences in variance across the groups of variables mentioned. However, physical work conditions did not support the

assumption of homogeneity due to its p-value being less than 0.00, therefore the 'equal variances not assumed' value will be used for the independent t-tests.

Parametric tests were performed for workspace aspects, psychological well-being, physical work aspects, job satisfaction and productivity (last 2-3 months) because the data in time 1 and time 2 was found to be normally distributed. Therefore an independent t-test was performed to establish whether there was a significant difference from time 1 to time 2 for workspace aspects, psychological well-being, physical work aspects, job satisfaction and productivity (last 2-3 months). The non-parametric test of an independent t-test is the Mann-Whitney U-test, which was performed for physical well-being and productivity (last month) because the data were not normally distributed.

The results in the table below indicated whether there was a difference between time 1 and time 2 variables.

***Table 9**: Independent t-test comparing variables of time 1 and time 2*

Variable	Time 1 Mean	Time 2 Mean	T-statistic	P-value	Significance
Workspace Aspects	3.19	3.74	-9.55	0.00	<0.05
Psychological Well-Being	3.55	3.60	-0.89	0.38	NS
Job Satisfaction	3.50	3.57	-0.65	0.52	NS
Productivity (last 2-3 months)	86.81	83.02	2.73	0.05	<0.05

NS (Not significant) < 0.05 (Significant)

The results above illustrates that there is statistically significant differences for workspace aspects and perceived productivity over the last 2-3 months. Workspace aspects were significantly more positive at time 2 (3.19 < 3.74), however perceived productivity (last 2-3 months) was significantly lower at time 2 (86.81 > 83.02). It is evident from the above table that psychological well-being and job satisfaction showed no significant difference between time 1 and time 2, as the p-value > 0.05.

***Table 10:** Mann-Whitney U-tests comparing variables time 1 and time 2*

Variable	Time 1 Median	Time 2 Median	*Z*-value	Significance
Physical Well-Being	3.400	3.333	-0.585	NS
Productivity (last month)	90.000	85.000	-1.585	NS

NS (Not significant), <0.05 (Significant)

A Mann-Whitney U-test was performed to assess the data, which was not normally distributed. From the above table, it is evident that there is no significant difference between physical well-being and productivity (last month) between time 1 and time 2. Additionally, with regards to the open-ended question of perceived productivity, respondents generally reported that their workload (n = 12); tiredness (n = 14); stress (n = 19); year end rush/end of year fatigues/ time of year (n = 15); and traffic (n =21) impacted on their productivity level.

Table 11: *Independent t-test comparing workspace aspects from time 1 to time 2*

Workspace Aspects	**Time 1 Mean**	**Time 2 Mean**	**t-statistic**	**p-value**	**Significance**
Use relevant furniture/appliances in the "work" area without physical space problems	3.46	3.96*	-5.53	0.00	<0.05
My "work" area meets my work needs in terms of its physical layout	3.51	3.77*	-2.55	0.01	<0.05
The technical equipment provided for my individual use meets my needs	3.17	3.99*	-7.77	0.00	<0.05
The technical equipment provided for meetings and collective use meets my needs	3.02	3.98*	-8.91	0.00	<0.05
Personal storage space	3.46	3.30	1.42	0.16	NS
Enables me to interact with colleagues when necessary	3.90	3.97	-0.93	0.35	NS
Enables me to collaborate with colleagues (work on a project together) when necessary	3.45	3.99*	-5.90	0.00	<0.05
The availability of collaborative meeting spaces is sufficient	2.86	3.73*	-8.21	0.00	<0.05
Enables me to meet with clients when necessary	3.22	4.04*	-9.83	0.00	<0.05
Gives me the space to work/operate without interruptions	2.61	3.72*	-5.96	0.00	<0.05
Allows private space when necessary	2.45	3.41*	-8.70	0.00	<0.05
Can be adapted to my individual preferences (within my "work" area)	2.87	3.30*	-4.14	0.00	<0.05
Allows me to move throughout the "building' without being impeded by "work" area obstacles such as furniture and office equipment	3.49	3.85*	-3.67	0.00	<0.05

*Workspace aspects that improved

Table 11 depicts the comparisons of the workspace aspects between time 1 and time 2, which produced an interesting set of results. Workspace aspects in table 9 was significant as t_{392}=-9.55, p-value < 0.05, thus furthering the analysis and comparing each item from the workspace aspects to establish the change between each item at time 1 and time 2. The majority of the results were

significant when looking at workspace aspects. From the mean values for the significant results established above, it can be noted that the mean scores at time 2 yielded higher values than that of time 1, thus indicating more positive reflections on the workspace. Four of the most significant positive changes from time 1 to time 2 of workspace aspects were "enables me to meet with clients when necessary" as t_{392}= -9.83, p-value < 0.05; "the technical equipment provided for meetings and collective use meets my needs" t_{392}= -8.91 p-value<0.05; "allows private space when necessary" t_{392}= -8.70, p-value < 0.05 and "the availability of collaborative meeting spaces is sufficient" t_{392}= -8.21, p-value < 0.05. The only two non-significant results were "personal storage space" and enables interacting with colleagues when necessary.

Table 12: *Comparing physical work conditions for time 1 and time 2*

Physical work conditions	Time 1 Mean	Time 2 Mean	t-statistic	p-value	Significance
Temperature not too warm	2.38	3.26*	-8.90	0.00	<0.05
Temperature too cold	2.98	2.47**	4.70	0.00	<0.05
Lighting not too dim	3.27	3.30	-0.15	0.88	NS
Lighting too bright/glaring	3.60	3.40**	2.19	0.03	<0.05
Sufficient ventilation	2.44	3.04*	-9.02	0.00	<0.05
Not too drafty	3.56	3.63	-0.91	0.36	NS
Enough air movement	2.69	3.41*	-7.18	0.00	<0.05
Air not too dry	3.23	3.41	-1.80	0.07	NS
Air not too humid	3.58	3.82*	-3.29	0.00	<0.05
No distracting ambient noises	2.07	2.85	-0.62	0.54	NS
No unpleasant odour in the air	3.13	3.38*	-2.90	0.00	<0.05
No stale air	3.02	3.54*	-5.50	0.00	<0.05
No dusty air	3.32	3.68*	-4.11	0.00	<0.05
No electrostatic shocks	3.69	3.85*	-2.55	0.01	<0.05

* physical conditions that were better

** physical conditions that were worse

An independent t-test was performed for physical work conditions in order to establish the differences between time 1 and time 2. Physical work conditions produced interesting results as well which is depicted in table 12. Significant results, with an improvement at time 2 were namely: temperature not too warm, sufficient ventilation, enough air movement, air not too humid, no unpleasant odour in the air, no stale air, no dusty air, and no electrostatic shocks. However, the significant results, where the mean scores of the physical work condition actually got worse at time 2 were temperature too cold (2.98 > 2.47) and lighting too bright/glaring (3.60 > 3.40) (mean scores

significantly lower at time 2). The non-significant results whereby the mean scores were slightly higher and showed improvements at time 2 were lighting not too dim (3.27 < 3.3), not too drafty (3.56 < 3.63), air not too dry (3.23 < 3.41) and no distracting ambient noises (2.07 < 2.85).

4.1.3. Correlation and Simple Linear Regressions and Stepwise Multiple Regressions for Time 1 and Time 2

This study aimed to determine whether perception of the workspace aspects influences well-being, job satisfaction and perceived productivity due to the change in buildings. In the above tables the difference between the change in workspace aspects, well-being, job satisfaction and perceived productivity of time 1 and time 2 were illustrated. However, in order to determine the workspace aspects impacting on well-being, job satisfaction and perceived productivity, correlations and simple linear regression and stepwise multiple regression analyses were conducted using the perceptions of the workspace aspects measure as the predictor variable for time 1 and time 2. In order to conduct correlation analysis a few assumptions need to be met, such as random independent sampling, both variables must be normally distributed and at least interval and homogeneity of variance must be present (Huck, 2004). The assumptions of random independent sampling were met for all variables, however for time 1 perceive productivity (last month) and time 2 physical well-being assumptions of normality were not met, thus non-parametric correlation analysis tests were conducted on these variables.

4.1.3.1. Correlation Matrix for Time 1

Correlations were used in order to examine the relationship between workspace aspects and well-being, job satisfaction and perceived productivity. Workspace aspects is the predictive variable for the correlations. The correlation matrix is presented in table 13 below, which provides Pearson's correlation coefficients. However, for time 1 a Pearson's correlation could not be performed on productivity (last month) because the data were not normally distributed, thus a non-parametric correlation analysis was used for this variable.

Table 13: *Time 1: Pearson's Correlations with workspace aspects*

Variable	r
Psychological Well-Being	0.135*
Physical Well-Being	0.042
Job Satisfaction	0.001
Productivity (last 2-3 months)	0.011

*. Correlation is significant at the 0.05 level

**. Correlation is significant at the 0.01 level

Table 13 depicts the Pearson correlations coefficients that were obtained for workspace aspects impacting on well-being, job satisfaction and productivity. When looking at these coefficients it is evident that many of the primary variables demonstrated insignificant relationships with workspace aspects, particularly physical well-being (0.042), job satisfaction (0.001) and productivity (last 2-3 months) (0.011). However, the relationship between workspace aspects and psychological well-being was found to be positively significant, though it is a weak relationship (0.135). Therefore, it can be established that the only factor that has a relationship with workspace aspects is psychological well-being.

Table 14: *Time 1: Spearmans Rho Correlation with workspace aspects*

Variable	ρ
Productivity (last month)	-0.038

*. Correlation is significant at the 0.05 level

**. Correlation is significant at the 0.01 level

Table 14 depicts the relationship between workspace aspects and productivity (last month), and it is observed that there was a negative weak relationship, which is not significant. Thus, workspace aspects had no impact on productivity according to Spearman Rho correlations.

4.1.4. Correlation Matrix for Time 2

Table 15: *Time 2: Pearson's Correlations with workspace aspects*

Variable	r
Psychological Well-Being	0.152*
Job Satisfaction	0.250**
Productivity (last month)	0.061
Productivity (last 2-3 months)	0.090

*. Correlation is significant at the 0.05 level

**. Correlation is significant at the 0.01 level

Table 15 illustrates the Pearson correlations for time 2 and it is evident that there are two positive significant relationships with workspace aspects, which were psychological well-being (0.152) and job satisfaction (0.250). However, the relationships between workspace aspects and psychological well-being and job satisfaction illustrate weak positive relationships. Additionally, the relationship between workspace aspects and productivity (last month) and productivity (last 2-3 months) were found to be insignificant at time 2.

Table 16: *Time 2: Spearman's Rho Correlation with workspace aspects*

Variable	ρ
Physical Well-Being	0.051

*. Correlation is significant at the 0.05 level

**. Correlation is significant at the 0.01 level

In the above table, the Spearman's Rho correlation for workspace aspects and physical well-being is shown to have a negative weak relationship which is insignificant. Therefore, it can be concluded that there was no relationship between workspace aspects and physical well-being at time 2.

4.1.4.1. Simple Linear Regression and Forward Stepwise Multiple Regression

This study aimed to determine whether the perceptions of workspace aspects influenced employee well-being, job satisfaction and perceived productivity at time 1 and time 2. In order to achieve this, simple linear regression analysis was performed, to assess whether there was a relationship between workspace aspects and the dependent variable of well-being, job satisfaction and perceived productivity. Furthermore, forward stepwise multiple regressions were conducted to determine

which of the workspace aspects, if any, significantly impacts well-being, job satisfaction and perceived productivity of employees. Essentially, a stepwise multiple regressions considers only the variables that explain the distribution the best, and removes variables that have weak correlated relationships (Coolican, 2009). Table 17 and 18 below depicts the results of five simple regressions, which were conducted to identify whether workspace aspects had a significant impact on well-being, job satisfaction and perceived productivity. In terms of the simple linear regression it is essential to note, or take into account that for time 1 perceived productivity (last month) and time 2 physical well-being, the data were not normally distributed. However, regressions were still conducted.

Table 17: *Simple linear regression for time 1 of workspace aspects*

Variable	F	Beta	Significance	R-Squared
Psychological Well-Being	3.025	0.135	0.084	0.018
Physical Well-Being	0.289	0.042	0.592	0.002
Job Satisfaction	0.000	0.001	0.994	0.000
Productivity (last month)	0.075	-0.022	0.785	0.000
Productivity (last 2-3 months)	0.016	0.011	0.899	0.000

The result of the simple linear regression analyses for time 1, shown above in table 17, indicates that none of the variables were statistically significant. When looking at psychological and physical well-being it is seen that the model only accounts for 1.8% and 0.2% of the variation in psychological and physical well-being. Additionally, looking at job satisfaction, productivity (last month) and productivity (last 2-3 months), it is observed that the model does not account for any of the variation (having an R-squared value of 0%). Thus, it can be concluded that psychological well-being, physical well-being, job satisfaction, productivity (last month) and productivity (last 2-3 months) are not significant predictors of workspace aspects. The condition index for each of the models and intercept for time 1 were less than 30, therefore indicating that there was no multi collinearity between variables (Huck, 2004).

Table 18: *Simple linear regression for time 2 of workspace aspects*

Variable	F	Beta	Significance	R-Squared
Psychological Well-Being	5.41	0.152	0.02	0.02
Physical Well-Being	0.60	0.051	0.44	0.00
Job Satisfaction	16.38	0.259	0.00	0.07
Productivity (Current)	0.80	0.061	0.37	0.00
Productivity (2-3 Months)	1.82	0.09	0.180	0.01

Table 18 depicts the result of the simple linear regression analyses for time 2. It is evident that psychological well-being and job satisfaction was statistically significant. This implies that workspace aspects have an impact on psychological well-being and job satisfaction of employees. Moreover, physical well-being, perceived productivity (last month) and perceived productivity (last 2-3 months) was not found to be statistically significant at time 2. Therefore it can be concluded that these variables are not impacted by workspace aspects.

Table 19 and 20 below presents the results of forward stepwise multiple regressions for time 2, which were conducted to identify the factors within psychological well-being and job satisfaction that were significant. When conducting the forward stepwise regression, each of the items in the workplace aspects scale were treated as separate independent variables when entered into the regression equation in order to determine whether it accounted for a significant proportion of variance in each of the dependent variables (psychological well-being and job satisfaction) (Huck, 2004).

Table 19: *Forward stepwise multiple regressions for time 2 of workspace aspects on psychological well-being*

Variable	Beta	R-Squared	t-statistic	Significance
Enables me to meet with clients when necessary	0.296	0.144	4.61	0.00
Gives me the space to work/operate without interruptions	0.266	0.208	4.14	0.00

The results of the regression analyses for time 2, shown above in table 18 indicates that the model fitting for psychological well-being is statistically significant with an $F_{1, 230}$ =5.41 and a p-value of 0.02 which is less than the 0.05 level of significance. The model accounted for 2% of the variation in psychological well-being. Furthermore, since the model was significant, a forward stepwise multiple regression was conducted to identify which factors within workspace aspects were the best predictors of psychological well-being (Coolican, 2009). There were two significant predictors from the workspace aspect model that had an impact on psychological well-being, which were namely "enables me to meet with clients when necessary" which contributed 14.4% of variance explained and "gives me the space to work/operate without interruptions" which together contributed 20.8% of variance explained.

Table 20: *Forward stepwise multiple regressions for time 2 of workspace aspects on job satisfaction*

Variable	Beta	R-Squared	t-statistic	Significance
The technical equipment provided for meetings and collective use meets my needs	0.155	0.061	2.13	0.04
Allows me to move throughout the "building' without being impeded by "work" area obstacles such as furniture and office equipment	0.185	0.085	2.55	0.01
Enables me to meet with clients when necessary	0.155	0.108	2.37	0.02

Table 20, illustrates the model fitting for job satisfaction which is statistically significant with an $F_{1, 228}$ = 16.38 and a p-value of 0.00 which is less than the 0.05 level of significance. Results from the stepwise multiple regression indicated that three predictors had an impact on job satisfaction and these were "the technical equipment provided for meetings and collective use meets my needs" which contributed 6.1% of the variance explained, "allows me to move throughout the building without being impeded by work area obstacles such as furniture and equipment", which contributed

to a total of 8.5% of variance explained and “enables me to meet with clients when necessary”, which contributed a total of 10.8% of variance explained.

The condition index for each of the models in time 2 were less than 30, thus collinearity was not a problem.

4.2. QUALITATIVE RESULTS

The qualitative results consisted of ten in depth interviews that were conducted with employees that have moved into the EY building in Sandton. These interviews were conducted 9 months after the move, with participants that were willing to participate in this study. The interviews conducted were based on the effects of the building and its impacts on the employee's perceptions, attitudes, and experiences towards the change in buildings. The main purpose of the qualitative data is to gain an in depth understanding and provide additional explanation to any contradictory results that were obtained from the quantitative data. Furthermore, it provides a deeper understanding of the dynamics and perceptions surrounding the context or setting in which people behave.

A thematic content analysis was used to analyse the data. The interviews focused on employee's perceptions surrounding workspace aspects, well-being, job satisfaction and perceived productivity. These perceptions were generally based on the change in buildings as well as moving into a "green" building. Numerous themes were derived and analysed from the interviews, and an in depth discussion is provided below, which is presented in the table below.

Summary table of themes

Themes	Brief description of themes
Concept and attitude of 'Green Buildings'	• Employees thoughts about 'green buildings' and recycling materials
Productivity influences	• Resources in the building impacting on productivity
Education and Awareness	• Education and awareness of the features about the green building and its impact on the environment and people
Workspace likes and dislikes	This theme focused on the different types of workspace: • Open space, hot desks and resources; • The different types of meeting rooms; • Conducive and connectedness of employee's
Coffee area	• The variety of coffee area's and its utilisation for employees.
Corporate image	• The image the buildings gives off • Proud to be part of EY
Physical aspect	The physical aspects consist of the ambient conditions impacting on employees', such as: • Acoustics; • Lighting & blinds; • Ventilation & temperature; • Stairs
Job satisfaction	How employees feel about their job in general
Well-being effects	Green Building impacting on employees' well-being: • Physical well-being • Psychological well-being

4.2.1. Concept and Attitude of 'green buildings'

The majority of the participants interviewed had a very positive attitude and concept about the 'green building' in general. This was evident in the responses that were attained, in which most participants accentuated the impact it has on the environment in the long run. As one of the participant said "*I think I enjoy coming to work because it is a green building, you feel like the building is not impacting in a harmful manner on the environment and it benefits the environment first*" (participant 1). This was supported by three other participants saying *"I really like the sustainability and green building, it is a good thing for me, ultimately green buildings, at the end of the day and in the long run (about fifty years), we will see what the impact will be on the environment"* (participant 2), and "*I think it is a good thing that we are working towards green buildings, I think especially in the Sandton area where everything is almost going to become all concrete, I think it is nice that we are trying to be more greener to what we would have been in the past. I think it benefits the environment more, not sure if it benefits people on a day-to-day basis that you can see necessarily"* (participant 4) and *"I think there needs to be a bigger uptake in sustainable development in buildings, I think the impact buildings generally have on the environment is dreadful and very concerning and I think a major impact can be made in that development space"* (participant 7). These responses illustrate the importance of green buildings and the impact it will have on the environment, which depicts the important concerns that employees have for the environment for the future generations.

Furthermore, some participants showed uncertainty of how the green building would benefit the people and that there is no direct impact on the people. One of the participants said, *"It's a nice building but the sustainability of it, is most of the stuff is based on energy savings, so just have to adhere with reducing carbon emissions, that's what the building is all about, that's how I understand the building. So it does benefit the environment but with people it will take time but I don't know" (participant 8),* which was supported by another response *"what the reality, is what people feel is what impacts them, it is very nice to know I am contributing to the overall green and sustainability type of movement but it does not necessarily impact me because I do not feel the direct impact*" (participant 10). This shows that people are aware of the impact the green building may have on the environment but are unclear of the benefits it may have on the people.

It can be acknowledged from the above that the biggest challenge of a green building, is to create an environment where there is an impact on an individual or where an individual feels a direct impact, thus creating the drive for people to partake in it would be a challenge.

4.2.2. Productivity Influences

Overall with productivity influences there were no direct impact from the workspace aspects and the green building. As one of the participant's said *"So productivity I won't say it is much in terms of the workspace and the building but because productivity is literally I sit at my desk and work"* (participant 2). However, another participant had a different view on what would influence their productivity and suggested that when an employees' workspace looks good, it could be the catalyst for higher productivity (participant 4, 10).

Additionally, most of the respondents had a different take on what impacts and influences their productivity. For example, one respondent mentioned the acoustics and traffic of the people in the workspace as being a distraction to their productivity level, a participant said "*At some point you realise that you not as highly productive as you would be, the productivity suffers because of the distraction and the noise and the traffic of people through your workspace so even your work environment, if you sitting at your desk there will always be traffic of people or noise from the photocopier or coffee hub"* (participant 9). Another respondent said *"I think we are more productive in this office, I think we have more closed office places than open planned where before you could see everyone and thought let me go for coffee and go somewhere and now you don't think of it that much, the printing helps my productivity, it is the best add on to the building, can print anywhere with just your access card"* (participant 7).

From the aforementioned, it illustrates that every individual has a different perception of what would influence his or her productivity level and it would also depend on the specific role an individual is in, as well as individuals may need different resources that are essential to enhance their productivity.

4.2.3. Education and Awareness

The theme education and awareness came up a lot during the interviews and it is centered on employees' being aware of the green building features and being educated about what implications these features have on the environment and people surrounding it. This was evident in the responses observed, where one participant said, *"We find our way around the*

whole place but in terms of the green building not really, like I said it is all the things behind that we are not aware of, I think it is an educating process" (participant 2). Another participant supported this, and said, *"I don't know all of the green stuff to be honest. You need to educate people on the green building features, we are not that aware of it, I don't think the green factors about the building is communicated that well to us, we all know it is a green building, but not a lot about the features"* (participant 3), as well as another participant said *"Well in theory it sounds good, anything green sounds good but I don't know much about it, even with this building"* (participant 5).

With regards to awareness about the green building, some participants had an opposing view compared to the above, in which participants are becoming more aware of the environment and the positive impacts of the green building, whereby two participants responded about how conscious they have become in terms of being forced to recycle, thus this has created awareness and consciousness about the recycling (participant 6 and 10), as well as another participant said *"Although we don't see the benefits of the building like the rain harvest or the cooling ventilation we know it is there, it is at the back of the mind"* (participant 1).

However participant 4 suggested that in order to get to know more about the green building and it's features, all the employees' should be taken on a tour around the building.

4.2.4. Workspace Likes and Dislikes

There were a variety of perspectives illustrated by participants on the physical workspace design likes and dislikes. However it must be noted that it is participants' perceptions and it is highly dependent on the workspace area a participant works in (i.e. the allocated/assigned area). A number of different themes came up when analysing workspace design.

General comments of the workspace were where one of the participants commented and said, *"from the workspace point of view I think this is the best workspace I have worked in",* (participant 1), as well as participant 5 said *"Everything in the workspace and the layout is accessible, everything you need is there you can do your job effectively no issues".*

4.2.4.1. Type of Workspace: open space, hot desk and resources

Open space and resources in the workspace design came up quite often, it is an important theme because workspace impacts employees' productivity as well as some employees comparing the new design of the workspace to the old building workspace design.

Some participants felt dissatisfaction with the workspace design in terms of the open space. Participant 3 said, "*I think it is worse, I mean the desks are not as open plan as it used to be in the old building, so even though we think it is open plan and because of the height of the dividers it is actually not so you can't really see who is at their desks or not. A lot of the times you have to kind of get up and see who is there. In the previous building you could quickly see a lot of people and whether there were there or not, and especially because we sit on different floors",* this was supported by another participant 4 saying*, "I think we moved from open planned to high dividers, I prefer the old building more, there is a lot of things that I liked in the old building especially the open plan which is not here, and I feel it takes away networking and communication from the other building".* Furthermore, participant 9 supported the above responses and said, *"so it felt a lot more open whereas this building doesn't. It is more closed. I would prefer the opened. So I really like how nice and modern and new and cool everything in this building is, but the old building had a very fresh, open space type of condition. It is closed. Yeah as well that was open and you could stand at one part of the building and you could pretty much see across the floors and whatever".* It is important to note here, where exactly each participant sits and how the workspace design impacts on their productivity for instance, participant 4 said *"I do not have anything against the building, the modern structure and that but just it impacts my work, there is a disconnect, I think here you feel more isolated and closed because of the pillars and stuff and now we have assurance split into two floors, and I have to watch over some trainees and it is difficult to because it is not fully opened, so I have to get up and go and look around".*

In terms of resources, one of the main concerns received from most participants was not having a dustbin by their desk. Participant 2 said "*we don't have bins by our desk because its recycling and stuff and that's where it is difficult for us to stand up and go to the kitchen and throw away your banana peel or something",* another participant said *"there is no bins at your workspace, it is so annoying"* (participant 4), and this was supported by participant 10 saying "*I do not have a dustbin at my desk now it becomes an irritation for me to get up from my desk and walk to a waste disposal area to throw away a piece of paper, it is about the disruption",* as well as participant 7 who said*, "I think a big problem is that we don't have a bin at our desk, so people have to stand up and go and throw their rubbish away".*

Furthermore most participants commented on the Wi-Fi and printers being the best part of the move and great instructions were emailed (participant 1, 2, 5, 7, 8). One of the participants commented, *"I think the biggest win is the Wi-Fi and printers. You know the ability to have*

the Wi-Fi, to have the video conference rooms compared to the old building, it is almost like there are more here and its new and better and there is white boards everywhere", (participant 9), and this was supported by participant 10, *"the central printing service is amazing, I hit print and go to the nearest printer which is fantastic. In the old building you had to work on a release code, whereby you went to the printer, and keyed in your digit code",* and participant 3 *"we have our printers which are usually stacked for us, whereas in the old office there was an assigned person".*

4.2.4.2. Meeting Rooms

The different type of meeting rooms was a common theme, which participants commented on. Most participants said there was a major improvement from the previous building, largely due to the fact that there are different types of meeting rooms such as informal and formal meeting rooms which can be used, depending on the type of meeting as well as it being easy to book.

Participant 3 said, "*So I think the meeting rooms in this building is much better compared to the previous building especially. It creates a different set up of meeting rooms. We got everything from a quick sit down to formal meetings and stuff. I think that adds more to our working environment and there is spaces to sit which is much easier than the previous building"*. Other participants supported this as well, participant 5 said, *"we have little board rooms all over the floor, which really adds value, we can just book that for meetings and it is always available"*. Furthermore, participant 10 said *"From the meeting room perspective it is a heck of a lot better, again I am comparing to what we had, it works for us as an organisation. From an organisational structural position it is great, the environment that we have on the ground floor and the first floor, seventh floor, and the work floors are fantastic. The work floors, you have a lot more meeting rooms and a lot more quiet places than what we had in the old building, which is definitely an advantage"*. This was supported by participant 9 whom said, *"I appreciate all of the new meeting rooms, and all the spaces on the ground*", as well as participant 7 said *"I like the fact that there is informal meeting spaces and meeting rooms, which are readily available which is also very convenient"*. Therefore, in terms of the new informal and formal meeting rooms, this could link to their task efficiency, which is a plus for most participants in comparison to the old building.

Furthermore, a general theme that most participants mentioned was the seventh floor as well as moving to a bigger place to accommodate more people. Participant 1 said, *"in this*

building there is more space, more hot desks, which can cater for expansion of the firm, which is a good thing. It can accommodate a lot more people, as well as we can have functions and events in this building that you wouldn't be able to have in the Wanderers building. The place where you work can be a place where you play or where you train and meet your clients, I think it is multifaceted; a multiple purpose building, the only thing we don't do here is live". Another participant had a similar comment and said, *"our seventh floor is fantastic, the seventh floor is very very cool like I have had a lot of conferences there, quiet meeting., I have actually had to do two days of brainstorming and whatever as a team. I have actually started booking rooms up on the seventh floor"* (participant 7), as well as participant 3 supported the above by saying, *"on the seventh floor, the training facilities cater for lot more different types of training then what we had in the previous building. It can accommodate a lot of people and we can have events in the building*".

However, two participants commented on the meeting rooms not being used for the correct purpose. Participant 10 said, "*the meeting rooms has created a challenge as well, so what we are experiencing is the rooms are not being used for what they have been designed to. We have a lot of people that are going into the rooms because they are sitting and studying for the day, and you see two people in the room where they sitting and they occupy the room for the entire day".* This was supported by participant 4, *"the informal rooms are really nice, but I have all my unassigned people going and taking those rooms and then I have managers screaming and saying why are they in those rooms, obviously they want to study and stuff so they think it is good in there". Participant 2 said "now it is easier to meet clients here in this office whereas in the old office it was difficult because there was far less meeting rooms. Here it is very attracting, there is more space, you can just sit out on the deck and there is a lot more space to welcome a lot more people in the EY building".* Therefore the meeting rooms have a positive impact on some of the participants whilst other participants notice that it is not being used for the purpose it has been designed for.

4.2.4.3. Conducive and Connectedness

In terms of conducive and connectedness of the physical workspace, most employees were very positive about the connectedness and workspace being conducive. This is an important theme that came up in most of the interviews.

The majority of the participants agreed with the workspace being more conducive, such as participant 1 said, *"Like even if it's a work issue you always got people surrounded by you*

who have been there before, you who can offer advice which is equally important you don't need to schedule those informal discussions you can just have them with people around you and obtain a system, also getting the guidance on certain accounting and technical issues I think that helps also in terms of eyesight and ear shot of you, we sit back to back so we always bounce off ideas and share ideas and seek guidance's that helps due to the workspace". Other participants said, *"Yes I do feel my workspace set up on my floor is more conducive, I like the fact that we have random meeting spaces just around the floor so you don't have to book a meeting room just to grab someone and sit down and talk about something. Whereas in the old office we just had a small coffee area and here you got a four men round desk situated between all desks where someone can pop down there", (participant 2)*. Participant 3 said *"The meeting rooms are nice, the informal and formal. I think it is a good idea in terms of interacting and it is really conducive and I think a lot of people would make use of them. In terms of seating arrangements, it is much better than compared to the previous building, I do like for the more senior people we got a side a credenza, where someone can come and sit we have a lot of conversations by our desk and you want to have a chat you can just sit there and don't have to stand"*. Another participant said, *"I think the workspace is nice, so we are more like equal and more approachable where managers sit and everyone sits anywhere, and the building workspace is more conducive"*. This was supported by participant 6 saying "*in terms of collaboration, it is like you do have more access to people I think a bit, it just feels more open, it feels more like it can flow from your desk to another person's desk as you are walking and just check in with them. Yes it is conducive, there are quiet rooms for when you need to work in silence, they are meeting kind of lounges which are for a more collaborative discussion but there are lots of meeting rooms, I mean I think there are more meeting rooms, and they are just more accessible. The nice thing is that you can kind of find people easily in the meeting rooms as well so if they are sitting by themselves and you need to find them, they're down a hallway so you can look in"*.

The aforementioned illustrates that the new building's physical workspace has had an impact on being conducive and being able to approach other employees; this can be linked to task efficiency. In terms of being able to use a certain type of workspace, for a specific task, thus the workspace has a positive impact on individual productivity levels. Participant 9 supported this by saying "*In this building they have more space so whenever you do your stuff your work you do it more effectively because there won't be like squeezing in a small cubicle somewhere, the desks are okay, so your productivity will be higher"*.

4.2.5. Coffee Area

In terms of the different coffee areas, the majority had positive feedback on them, in terms of having meetings and bringing clients into the building. With the coffee area there are different settings, which creates a different context, thus you would use the most suitable settings according to the type of meeting you are having (participant 1, 4 and 8).

The above was evident, in which participant 3 said, *"I love the coffee area, so previously it did feel awkward to bring your clients into the building especially during lunch time you were kind of sitting with other people having lunch because there isn't enough space in the canteen, so people will sit around you eating lunch and it is quite noisy. I think we now are open to bringing clients to our new building than before, we have the space to now entertain our clients"*.

Therefore the responses obtained illustrated a more positive perception of the coffee area compared to the previous building, and that the coffee area space is being utilised in distinct manners for distinct purposes.

4.2.6. Corporate Image

Corporate image was one of the interesting themes, which came up very often in the interviews. Interviewees generally had a positive take on moving into the new EY building and the corporate image came up quite often with participants.

This was evident in most of the responses. Participant 1 said *"I appreciate the modern architecture the most, the image of our firm has improved it has become more visible, greater awareness, I think you can put this building anywhere in the world internationally and I think it will stand out, for me it is a world class environment holistically the exterior and interior and that it is always a nice thing to have when you want to come to work. It is always nice to work in a world class environment*". To support this participant 2 said*,* "*I appreciate the image it displays, it shows that EY is a company that is looking toward the future either by green or by the growth of the company and also attracting people towards Africa, South Africa". P*articipant 4 said *"this firm just feels more corporate and professional and more just nicer compared to the other one"*.

Therefore the evidence portrays a positive image for the new EY building, and a different outlook of this building in which one of the participants said, "*The building is now the selling point for new graduates, like it is a new building and it can do this and that which is really*

cool, and it works especially if you are targeting younger people and what type of image EY gives off".

4.2.7. Physical Aspects

Physical aspects focus on the ambient conditions impacting on employees' from a change in buildings. There were a variety of factors and perceptions that were mentioned by respondents that impacted on them.

4.2.7.1. Acoustics

Acoustics and the noise level is one thing an open workspace cannot escape. Most of the participants mentioned that the noise levels have increased compared to the previous building. Some of the evidence that participants mentioned were, "*in terms of acoustics, it's a noisy building, the building is extremely noisy even as we sit here (the coffee area: Vida), people speak at different levels and that, what also happens is when there is a lot of people in the building, the building is even more noisy and the people sort of raise their voices over the others so that they can be heard. Also I think the noise factors that I mention include the coffee areas and photocopier are the only irritation areas, like the photocopier becomes a social hub for people who are waiting for copies and that's a normal thing"* (participant 1); *"the acoustics because sometimes it is really nice sitting in your own space because I am sitting and working where there is 3 people all chatting it gets distracting. I would put a barrier*" (participant 2); *"I don't think the white noise is as good as it used to be I think noise travels further than what it used to travel, I can work with the noise, for some people it is distracting, some people in the beginning thought the white noise wasn't on you kind of get used to it by now, but it is not as good as the previous building"* (participant 3). This was supported by participant 9 and 10 *"The acoustics, I don't believe that the white noise system in this building is as effective as what is was in the old building, the acoustic of the building does appear to be louder and it is only appears to be louder, that what it was in the old building"*, (participant 10*), "I think we had noise machines and whatever whereas in the new building, no noise machines, sitting at my desk would actually be so loud and irritating"* (participant 9).

To sum up the above, participants feel the noise levels are not as effective as they were in the previous building. However some participants mentioned they have just adapted to the noise level, *"the acoustics is a problem but you will never escape noise in the building you just have to adapt",* (participant 5). To support this participant 7 said *"you get used to the noise*

level and sometimes when you need to focus you can just go to a meeting room where it is quiet".

Participant 1 gave a suggestion in terms of how to deal with the noise level. Participant 1 said that, *"people speak at different levels and that is an education process or a customisation process, where you have to inform people to speak softer to have conversations in a professional manner".*

4.2.7.2. Lighting & Blinds

In terms of lighting and blinds, there were various perspectives and links can be made in terms of the impact it has on productivity and well-being.

Participants were generally positive about the natural light in the new building and having more windows compared to the previous building. This is evident as participant 1 said, *"in terms of lighting and natural lighting that is great, this buildings has fantastic natural light"; " I think you know with the natural light, it makes me feel kind of more at ease for some reason, its more tranquil in a way"* (participant 6); "*I think the lighting does have a positive impact especially the fact that we have windows around the building and it is not like closed it feels a little bit more opened and relaxed compared to the previous building, where we had no big windows"* (participant 3). Participant 8 said *"before we only had artificial lights no natural lighting, for me it changes that if you could stare out the window for five minutes versus just looking at concrete, so definitely the natural lighting is good".*

In terms of the blinds, the majority of the participants mentioned that the blinds are not effective and that they are not programmed correctly. However, one must note and take into consideration for the blinds, every participant responses will be slightly different because it is highly dependent on where the participants sits and how they are affected by it.

A participant stated that, *"I don't think the blinds are that effective that we have in this building we have electronic blinds that come down at a certain time and I think the blinds are not programmed to come down at the right time so for me that is a major issue because we find in the middle of the afternoon the blinds come down and all of the sudden the building gets dark now that affects work, this impacts on light and when the light goes down you feel a bit more depressed sad seasonal disorder, even in the middle of summer. The programming is wrong"* (participant 1). This was supported by two other participants that said, *"it bothers me when the blinds go down a bit later, say you are sitting in like a darkened space it makes you feel really tired, it is a frustration, so either the blinds don't go down soon enough so the sun*

still reflects on my pc", (participant 2) and *"The blinds are momentarily; it is just a programming issues other than anything else. The blinds need to be dropped down slightly earlier or slightly later so that you don't have that bright sunlight or it being dark, it is momentarily because yes it is dark but you just need 10 or 20 seconds and your eyes have adjusted. The blinds just need to be programmed better*" (participant 10).

From the above information, participants were generally satisfied with the natural lighting, and mentioned it does have an impact on their well-being, but the blinds are not programmed correctly. Therefore to get the best of both natural lighting and the benefit of the blinds, the blinds need to be programmed correctly and take into consideration where the employees sit and how they are affected.

4.2.7.3. Ventilation & Temperature

In terms of ventilation and temperature, there were opposing views. Commonly with the temperature some participants said it was either too hot or too cold, which is evident in the responses received: "*temperature in the building is not the same everywhere, some places is extremely hot and some places is extremely cold",* (participant 2). This was supported by another two participants*, "the temperature in the building is not the same everywhere, some places it is extremely hot and some places it is extremely cold, and different per floor, we didn't have a aircon in the previous buildings now it makes a big difference having one and the ventilation is good*" (participant 3*); "I think temperature is really badly controlled, we have no personal control over it, but it is not consistent throughout the building"*, (participant 6).

Some participants had an opposing view and felt the building was extremely cold. Participant 4 said that, *"the temperature is very cold, sometimes I have allergies and I always have to carry a jersey with me"*, and another participant supported this, *"one thing that bothers me is that this building is very cold, I have a scarf at my desk everyday*" (participant 7).

However participant 10 said, *"There is no way that this building is too cold, I have a slightly different outlook in life you should make it colder it keeps you fresher and if someone is really cold they can put a jersey on, but the reality of the matter is you get more fatigue and lazier in a warmer environment than what you do in a cooler environment".* Therefore, the different temperature is dependent upon different individual preferences, where some participants felt too cold or some felt it was warm. However this creates a link between

temperature and well-being of the employee's, although participants are different and it is purely based on their preferences.

Participants did comment on the ventilation, and on the whole participant's did mentioned the ventilation is good, it feels comfortable and fresh, as well as some employees mentioned that in the previous building there was no air conditioning system put into place so it definitely did make a difference moving into the new building (participant, 1, 3, 5, 8, 9, 10).

4.2.7.4. Stairs

The staircase was one of the major concerns for most of the participants, in terms of making use of them, and the time it takes to come down from different floors. This is evident in terms of the participant's responses, *"I did notice in the new building like in the old building where I used the stairs and now the stairs are so zig zag that it takes longer to get up than the lifts. But like on the personal side of things I would rather take the stairs but ultimately I have to use the lifts, that's the only thing with the layout I would change"* (participant 2). This was supported by three other participants, *"I would love to use the stairs because then I would get the daily dose of exercise but because it is all over the show, it is so ridiculous*", (participant 4); "*The staircase is annoying, it is interesting in the way it works, when you want to get somewhere really quickly you have to like walk across the floor and then down again it is a bit annoying"* (participant 5); and *"the stairs are actually like on opposite ends so you will come down from one level to here and then you will have to walk across the whole level to get to the stairs on this side and so it will go like that the whole way from the top of the building to the bottom which in a way it is supposed to make it a more collaborative space, you are meant to be engaging, interacting with people along the way and stuff like that but what it essentially does is you end up not wanting to take the stairs because it takes so long and you sometimes get lost"* (participant 6).

Though, participant 10 had an alternate view of the staircase, and said, "*My thoughts and perception of it is very simple we have an extremely lazy organisation; they should be forced to use the stairs. I know you have a technical challenge of disable bodies and individuals but the lifts should not stop on the first floor to go down to the ground floor and go on the second floor. You should be forced to use the stairs I am a firm believer that you should be moving on a daily basis because it is good for you posterior just for your general well-being, it is good to get off your posterior every now and then and just walk around, it clears the cob*

webs. I find people just sitting there and they become mesmerised because they just don't move, the staircases takes some getting used to".

To sum up the theme on staircase, it is rather based on the individuals' perception. Some participants did not would like to use the stairs but find it inconvenient to walk from one level to another, whereas another participant disagreed with this and felt that using a staircase was good for your well-being.

4.2.8. Job Satisfaction

In terms of job satisfaction, it was based on the way participants felt about their job in general and whether working in a green building has impacted the way they feel about their job.

Overall participants said it did not change their job satisfaction in any way, it did not increase or decrease due to the change in buildings (participant 2, 3, 8 and 9). However participant 1 and 4 had a different view on job satisfaction. Participant 1 said, *"My job satisfaction has increased you feel more in touch with your employer, it is happiness to come to work and to use the building like to stay longer in the building than any other building because the building accommodates that". P*articipant 4 said *"It did increase my job satisfaction a bit, it feels like finding a home and we know we are not going to move for the next 10 to 15 years".*

4.2.9. Well-being Effects

Well-being effects consist of the physical and psychological well-being.

4.2.9.1. Physical Well-being

Generally participants had no positive or negative impact on their physical well-being in the new building or have not felt anything directly impacting on themselves (participant, 2, 4, 5, 6, 9, 10). One of the participants said *"I expected when working in an open plan you would be more exposed to say like to cold and flu viruses, but nothing has impacted on my physical well-being"* (participant 1).

4.2.9.2. Psychological Well-being

On a whole with psychological well-being, participants were very positive about the change in building, and psychologically felt positive coming to work. Some evidence of what participants said were, *"what I like is the green wall that we have at the reception area that's also a reminder, also the colours, brightness and architecture makes a difference, the external and internal, does make me feel positive, I always feel energised, always feel*

enthusiastic in the building. I don't think so on my health, from an emotional point of view I think it is more uplifting psychologically. I think the work environment is more pleasant and is more welcoming, from that point of view" (participant 1). Another participant said "*it is a new building in that respect I do enjoy coming to work, it is a nice building I think that in terms of accessibility and everything you need is there. In that respect it is a nice place to be in, very positive, feels like it is just a nice place to work in, it gives a positive feeling,* (participant 5). Another participant said "*what I can say is that we work with a lot of different clients and it is always welcoming to come to the office which is a nice environment because now you get to the office and it's a modern building and like not specifically the green portion of it but just it is so nice and new it feels like your home like when you are away with a client for six weeks* (participant 2). This was supported by a participant saying *"psychologically I feel better, it is bright and I love the fact that there are plants everywhere. It is a beautiful building I quite enjoy the building"* (participant 7).

One of the participants gave a general comment of the company and the impact on psychological well- being, in which the participant said *"It feels, you know what at the end of the day you feel that the company is prioritising your well-being a little bit more. It feels like they have actually put in a lot of effort to make us feel more comfortable and that makes me probably more productive because like you know I want to do a good job. I feel like I owe, like it is almost like a better relationship with the company through the building if that makes sense because it feels that they are actually taking us seriously, they want to give us a good working environment, you know employee well-being features*" (participant 6).

However on the other hand, some participants had an opposing view of the impact on psychological well-being, in terms of not feeling positive coming to this building. This was evident when participant 4 said, *"I'm happy, but I don't get a warm fuzzy feeling when I come in here it is very clinical and cold; I don't feel it is like warm and welcoming. In the old office when you entered the reception areas, I was like wow this is the place where I want to work and retire and grow old at and I don't know here you don't get that feeling. It supposed to be your second home but I don't feel that psychological feeling".* This was supported by another participant *"the positive feeling that you have when you walked into the old building is not here"* (participant 9).

To sum up well-being effects, it illustrates that physical and psychological well-being is purely dependent on individual perceptions and what they feel.

CHAPTER 5: DISCUSSION

The discussion section is the final chapter of this study, which aims to integrate the results obtained (qualitative and quantitative) with the theoretical and empirical research foundations. This section will highlight and expand on the key findings which this study aimed to investigate, in order to completely understand the extent to which the perceptions of workspace influences organisational outcomes as a result of a change in buildings. Firstly, this section will focus on explaining whether there was a change in the perceptions of workspace design due to the move from a conventional building to a green building. Secondly, focus will be directed to analysing the relationship between the perceptions of the workspace design on the organisational outcomes prior to the move to the green building and after. Lastly limitations of this research will be discussed and recommendations for further research will be provided.

5.1 INCORPORATING QUANTITATIVE AND QUALITATIVE DATA

The discussion below will integrate the quantitative and qualitative results, in order to understand the subjective underlying aspects of the quantitative results that were obtained. Leaman and Bordass (2007) suggested that it is pertinent to understand subjective views of employees, as this may aid in improving their circumstances, hence it is essential to conduct post-occupancy interviews. Moreover, the qualitative results can be used to support and explain some of the quantitative results.

The research that was conducted on green buildings, mainly focused on the impact of green buildings on productivity, job satisfaction and well-being of employees. Research conducted by Thatcher and Milner (2012), and Paul and Taylor (2008), illustrated that there was no significant evidence in terms of job satisfaction, productivity and well-being of employees in a green building. However, there have been contradictory results with some research illustrating that green buildings do have a positive impact on productivity, job satisfaction and employee well-being (Singh et al., 2010; Rashid et al., 2012; Heerwagen, 2000; Von Paumgartten, 2003). However, little research has been conducted on how the workspace area in a green building has an impact on employees' well-being, productivity and job satisfaction. Sailer et al. (2010) and Lee (2006) stated that greater focus need to be placed on the impact of the physical workspace on employees as this may influence employees' environment satisfaction and work outcomes. Therefore this research was innovative as it employed a

mixed method approach and focused on the workspace intervention and its impact on productivity, job satisfaction and well-being of employees in a green building within South Africa. The following section will analyse and explain the results from the quantitative analysis while integrating the qualitative analysis to gain a deeper understanding.

5.2 RESEARCH QUESTION

The research question was 'to what extent does the perception of the workspace influence organisational outcomes as a result of a change in buildings?' In order to meet the objectives of this research question, the discussion will firstly analyse the changes in workspace aspects, productivity, job satisfaction and well-being of employees from time 1 to time 2. Secondly, it will analyse the relationship between workspace aspects impacting on productivity, job satisfaction and well-being of employees at time 1 and time 2.

5.2.1 Workspace aspects, productivity, job satisfaction, physical aspects and well-being changes from Time 1 to Time 2

The first analysis that was conducted aimed to see whether there was a significant difference in workspace aspects, productivity, job satisfaction and well-being from time 1 to time 2. The results illustrated that there were a significant difference with workplace aspects and productivity (last 2-3 months) from time 1 to time 2. The workspace aspects depicted rather interesting results as the mean score increased from time 1 to time 2 (3.19 to 3.74), thus illustrating improvements in the workspace design (see Table 11). Improvements in the workspace design are essential as this has an impact on employees as research suggested that employees that are more satisfied with their physical workspace environment are more likely to produce better work outcomes (Lee 2006; Lee & Brand 2005; Sailor et al., 2010). Moreover it was stated that previously when designing the workspace it was designed in such a manner as to ensured optimum productivity. However in contemporary work it is now essential to ask what occupiers require for the business, instead of expecting firms to fit into a textbook model of space (Thomson & Jonas, 2008).

In terms of workspace aspect changes, three specific workspace aspects that illustrated a great improvement from time 1 to time 2 will be discussed. Firstly, 'Enables me to meet with clients when necessary'. This was supported by participant's subjective view in terms of the coffee area, which creates different settings for the type of meetings employees, and clients

are having. As a participant said 'previously it did feel awkward to bring your client to the building, but we are now open to bringing clients to our new building than before, we have space to entertain our client' (participant 3). Additionally, participant 2 commented on this, saying *'it is easier to meet clients here in this office whereas in the old office it was difficult because there were far less meeting rooms'*. Therefore the EY green building facilitates and allows employees to bring clients into the building, since there are different types of spaces for meetings (see figure 1.1). This is consistent with prior research conducted that stated flexible use of space is essential as this increases communication and contributes to higher group cohesiveness, thus leading to a positive relation with satisfaction and the physical work environment (Lee & Brand, 2005). The research conducted by Lee and Brand (2005) measured flexible use of space as the ability to adjust one's workspace, the diverse work environments that are essential for one's job being available, and the ability and convenience of meeting rooms when required (Lee & Brand, 2005). Therefore, at the EY green building there are multiple and diverse workspace areas to collaborate and interact.

Secondly, 'The technical equipment provided for meetings and collective use meets my needs' the mean at time 1 was 3.02 and increased to 3.98 at time 2. This illustrates a great improvement at time 2. This was supported by interviewed participants, in which the majority of the participants commented on the Wi-Fi and printers being a great improvement from the previous building and felt that the video conferencing facilities were much better and found the white boards in them useful. Thus, reiterating that the technical resources and facilities available in the new building improved (participant 1, 2, 5, 7, 8, 9). Organisations will have to continue to change rapidly with technology enhancements and innovative communication approaches as this plays an essential role in the working environment (Lee & Brand, 2005). Thompson and Jonas (2008) reported on a list of attributes in which employees completed a questionnaire for the best companies to work based on the workspace designs that were considered to enhance productivity. In the list it was illustrated that accommodation of changing technology is essential, this involves providing full access to power and data, wireless technology, and cable management, allowing for changes in requirements when necessary. Furthermore this was supported by Haynes (2011) who stated that in order to enhance productivity, the organisation needs to supply employees with the appropriate technical support.

Thirdly, 'allows private space when necessary', illustrated an improvement from time 1 to

time 2 (see figure 1.1). This view is supported by the meeting room facilities, which the interviewees commented on. The majority of the participants said there was a major improvement from the prior building due to the fact that there is a diverse range of meeting rooms from formal to informal meetings room, which can be easily booked and are very convenient to access. Additionally, this links to private space as it was supported by participants who suggested that there are a lot quieter spaces than the previous building, as well as participants commented on the seventh floor in which training and conferences can take place, thus providing the appropriate private spaces when necessary (participant 3 and 7). However, this was inconsistent with research conducted by Lee (2006) in which employees expected to have more quiet undisturbed spaces in their organisation. There has been an increasing trend in terms of open-plan work environments, which aims to increase collaboration. However, this results in a loss of individual private spaces for concentration (Lee, 2006). Furthermore, Ferguson and Weisman (1986) found that satisfaction and privacy were positively related. Therefore, the EY green building illustrated an improvement in accommodating employees when private space is required through the meeting rooms, and this may result in increased levels of employee satisfaction with respect to workspace aspects. Thompson and Jonas' (2008) list of attributes also reported on private spaces impacting on productivity, in terms of distraction-free work in which it allow employees to perform their work through the use of non-assigned private spaces.

The aforementioned meeting room facilities also relate to an additional workspace aspect that illustrated an improvement from time 1 to time 2 (2.61<3.72), which was 'gives me the space to work/operate without interruptions'. This allows booking a meeting room, either a formal or informal room, to allow for private space to work in without interruptions and was also supported by participant 3. Furthermore, meeting rooms and private space may facilitate and encourage group and social cohesion (Haynes, 2011). However, the private spaces such as the meeting rooms presented a challenge for EY employees as the meeting rooms were not always being used for their stated purpose. For instance, employees were booking meeting rooms and occupying it for the entire day for uses such as studying. However, with regards to private spaces in the EY green building it can be concluded that there has been a significant improvement from the previous building.

Most of the workspace aspect transitions from time 1 to time 2 illustrated an improvement. However, 'personal storage space' and 'enables me to interact with colleagues when

necessary' illustrated non-significant differences from time 1 to time 2. Personal storage depicted a decrease from time 1 to time 2 (3.46 >3.30). This decrease can be attributed to fewer personal storage spaces and smaller locker sizes, which were implemented by EY directors and managers to prevent employees from storing unnecessary items. In terms of storage space, research conducted by Lee (2006) illustrated that employees would expect more adequate storage spaces in the workspace environment compared to what they were previously accustomed to. Furthermore it was found that storage space is positively related to satisfaction in the workspace (O'Neill, 1994). However, in order to gain a better understanding of the decrease in personal storage space, further research needs to be conducted in this area for more clarity to be provided on the effectiveness of such a measure.

Moreover, 'enables me to interact with colleagues when necessary' increased slightly from time 1 to time 2 (3.90<3.97). In attempting to gain an in-depth understanding of this workspace aspect, a link can be made to what the interviewees said in terms of open spaces. Participants felt dissatisfied with the workspace design and felt that the layout of the desks were not as open as it was previously, preventing them from seeing who is at their desk and who is not. Furthermore, previously employees all sat on one floor and now they are separated on different floors, which inhibits the employees' ability to network and communicate (participant 3 and 4). This point was emphasised by participant 4 who said '*I think we moved from open planned to high dividers'* (see figure 1) and also supported by participant 9 who said '*So it felt a lot more open plan whereas this building does not, you could stand at one part of the building and could pretty much see across the floors'.* Thus, from the qualitative data it can be gathered and understood that employees cannot easily interact compared to the previous building and that the design of the office layout could have impacted on the way colleagues interact when necessary. Haynes (2011) suggested that organisations could enhance productivity through the working environment. Results illustrated that workers perceived that their productivity could be enhanced through their work environment if it facilitates interaction with other people (Haynes, 2011).

Comparisons of productivity (current) and productivity (last 2-3 months) from time 1 to time 2 produced interesting results. Productivity (current) illustrated a decrease from time 1 to time 2 (90.00>85.00), however this result was insignificant. This is consistent with research conducted by Thatcher and Milner (2012) and Paul and Taylor (2008), whereby green buildings do not necessarily lead to significant results in the outcomes. Moreover, productivity (last 2-3 months) decreased from time 1 to time 2 (86.81>83.02) and this

difference was found to be significant. This finding was substantiated by the interviewees, who suggested that the acoustics and traffic of people in the workspace is a distraction, as well as respondents comments from the open-ended question of productivity suggested that workload, tiredness, stress, year-end rush/end of year fatigue/time of year and traffic had an impact on their productivity. This is consistent with research conducted by Singh et al. (2010), who found that poor IEQ might result in lower levels of productivity. It must be noted that this decrease in productivity contradicts some of the interviews, which suggested that there are more spaces and meeting rooms than the previous building, in case if one needs a quiet place to work thus this should facilitate higher levels of productivity.

Additionally, there was a rather interesting comment that was made during the interviews and it can be linked to the decrease in productivity. Participants 2, 4, 7 and 10 stated that they do not have a bin at their desks and it is a distraction for them to get up to throw something away especially if they are busy, which could have been a key factor and contributor to the decrease in productivity. However, the main purpose of not having bins at desks was to place emphasis on the importance of recycling and served as a mechanism to encourage employees to recycle. Moreover, research conducted by Tucker (2010) suggested that micro-breaks or taking short breaks may have a positive impact on employees' performance and in managing fatigue. Therefore it could be beneficial to the employees to actually get up and throw their dirt in the dustbin.

The manner in which the workspace is designed could have also led to a decrease in productivity. For instance, in the previous building the workspace was open planned and everyone sat on one floor whereas in the current building employees sit on different floors (participant 4 and 9). This change had an impact on productivity and was confirmed by an interviewee who stated that the workspace layout impacts their work and often leads to disconnect because some employees are on one floor and some are on another. Additionally, this can be related back to the change in workspace aspects from time 1 to time 2 in terms of 'enables me to interact with colleagues when necessary' which did not show a significant result but improved slightly at time 2 (3.90< 3.97), thus resulting in a decrease in productivity. Thompson and Jonas (2008) reported results on the top three factors, which managers believed would improve employee productivity namely; more breakout/meeting space; better light/daylight, and more personal space/better use of space. However, in the EY green building this is not the case as all three factors mentioned improved from time 1 to time

2, but perceived productivity still decreased.

Comparisons of psychological and physical well-being and job satisfaction produced results which are fairly consistent with previous research. These variables from time 1 to time 2 illustrated non-significant results and are consistent with research conducted by Singh et al. (2010), Paul and Taylor (2008), and Thatcher and Milner (2012). Psychological well-being increased slightly at time 2 (3.55<3.60) but was insignificant. However, interviewees' comments suggested that they felt positive coming to work; they felt that the environment was pleasant and welcoming as well as that the building was bright and had plants everywhere thus giving off a positive feeling. This is consistent with research conducted on biophilia, whereby contact with the natural world has a positive impact on emotional well-being (Kellert, 2005). Biophilia is illustrated at the EY green building in Sandton (see figure 3) with the plants in the reception area which creates a positive and welcoming feeling that the interviewees commented on (Kellert, 2005). A contradictory finding that was found was that although interviewees felt a positive and welcoming feeling at the EY green building in Sandton, they felt that it was not as strong as in the previous building.

In terms of job satisfaction, there was a slight increase from time 1 to time 2 (3.50<3.57) but the increase was found to be insignificant. The insignificant difference was supported by the majority of the interviewees that suggested that their job satisfaction did not change in anyway. However, a few interviewees did say their job satisfaction increased in the sense that they stayed longer in the building and noted that they will not be moving over the next few years.

In relation to job satisfaction and productivity, interesting and surprising results were obtained from time 1 to time 2. Job satisfaction increased from time 1 to time 2, however productivity decreased from time 1 to time 2. Thus there was an inverse relationship between job satisfaction and productivity. Van der Voordt (2003) explains that there is a link between job satisfaction and productivity. The statement 'a satisfied worker is a productive worker' does not hold in this study (Van der Voordt, 2003, p. 133). Employees may be very satisfied but not be very productive or vice versa. Therefore the inverse relationship between job satisfaction and productivity can be attributed to various factors such as employee's workload, tiredness, stress, year-end rush/end of year fatigue/time of year and traffic. Thus, it would be recommended that the same research survey be

conducted at least 8 months after the last survey was sent out to verify the results and to obtain a better understanding of productivity or the decrease in productivity.

The physical work conditions in the workspace from time 1 to time 2 produced intriguing results as the majority of the physical work conditions aspects were found to be significant. The aim of a green building is to create a better IEQ and to provide better physical work conditions for occupants to work in (Singh et al., 2010; Paul & Taylor, 2008). The physical work conditions that improved from the previous building were namely, temperature not too warm (2.38<3.26), sufficient ventilation (2.44<3.04), enough air movement (2.69<3.41), air not too humid (3.58<3.82), no unpleasant odour in the air (3.13<3.38), no stale air (3.02<3.54), no dusty air (3.32< 3.68) and no electrostatic shocks (3.69<3.85). Thatcher and Milner (2012) found temperature not too warm, sufficient ventilation, and enough air movement to be significantly better in a green building. Therefore the finding from this study in terms of the IEQ is consistent with Thatcher and Milner (2012) findings. Therefore some of the finding from the physical work conditions is contradictory to previous research, which found no significant difference in the physical work conditions such as IEQ'S in green buildings (Singh et al., 2010; Paul & Taylor, 2008).

The main concerns from the interviewees surrounding the physical work conditions were the acoustics, even though in table 12 distracting ambient noises was insignificant from time 1 to time 2, it must be noted that there was an improvement from the previous building the employees were situated in (2.07<2.85). However, interviewees did mention that the building is noisy due to the open workspace and that the white noise machines are not as effective as the previous building, and thus since one cannot escape the noise level, they just have to adapt to it. It has been reported that one of the problem of open space offices is the noise level (Lee 2006). However Lee and Brand (2005) reported on the predictive relationship between distraction and performance and found that there were no significant effects of perceived distractions on performance.

The comparison of physical work conditions that were significant but actually got worse at time 2 were namely lighting too bright/glaring and temperature too cold. Lighting too bright/glaring decreased from time 1 to time 2 (3.60>3.40) as seen in table 12. However, this finding is inconsistent with the findings from the interviews. Interviewees were generally positive about the natural light in the EY green building, since the entire building is surrounded by glass windows, whereas in the previous building there was more artificial light and fewer windows (See figure 1 and 2). Interviewees suggested that the natural

lighting makes them feel at ease, tranquil and relaxed. This is aligned with previous research suggesting that natural lighting enhances psychological functioning in terms of uplifting moods (Kats, 2003; Singh et al., 2010, Heerwagen, 1990). Inadequate lighting in the environment can lead to symptoms such as fatigue, headaches, dry eyes and allergic reaction (Ghodrati, Samari, Wira & Shafiei, 2012). Therefore it is essential to achieve a good lighting environment. Building designers must consider the luminance, the control of glare and the distribution of light (Ghodrati et al., 2012). Additionally, Abbaszadeh, Zagreus, Lehrer and Huizenga, (2006) suggested when designing a sustainable building it is important to make use of the daylight that reduces its dependency on electric lighting. Moreover, the findings on lighting too bright/glaring and lighting too dim illustrated in table 12 could be due the blinds not being programmed correctly (see figure 2). This view was substantiated by the interviewees, which suggested that the blinds could be programmed better, since the blinds sometimes go down at a certain time, leaving the building dark and results in employees feeling tired and depressed. However, the lighting that comes into the building is highly dependent on where employees sit, thus resulting in varying responses from interviewees with regards to lighting.

Furthermore, temperature too cold worsened from time 1 to time 2 (2.98>2.47). It must be noted that there was mixed responses from the interviewees, with some commenting that the temperature was too cold whilst others stating that it was extremely hot in some places. Thus the temperature is not consistent throughout the building. Nevertheless, it could be said that temperature is highly dependent upon individual preferences, where some individuals feel warmer or colder than others. However, it could be recommended that some personal control over temperature be given to employees as this may impact on their job satisfaction (Danielsson & Bodin, 2009). This is consistent with research-conducted by Singh et al. (2010) that stated that irregular temperatures could impact on employee's psychological and physical well-being as well as their productivity level.

In terms of the physical work conditions, when employees were asked if they could change three things with regards to the workspace layout, the majority of the interviewees mentioned the staircase (see figure 4). The majority of the interviewee's suggested that it is interesting in the way it works, however it takes rather long to go down or come up a few stairs. The stairs were designed with the purpose of facilitating employee interaction between employees on different floors but this is not the case as many are opting rather to use the lifts.

Therefore, physical work conditions had significant and insignificant differences from time 1 to time 2, but it has been stated that the IEQ impacts on occupant's psychological and physical well-being (Evans, 2003; Singh et al., 2010). The section discussed above focused on the change in workspace aspects, perceived productivity, job satisfaction, psychological and physical well-being as well as physical work conditions moving from a conventional building to a green building. The next section will further discuss the findings surrounding the extent of the relationship between workspace aspects with perceived productivity, job satisfaction, and psychological and physical well-being from time 1 and time 2.

5.2.2 Relationships of workspace aspects on perceived productivity, job satisfaction and psychological and physical well-being for time 1 and time 2

Sailer et al. (2010) stated that the physical design/layout of the workplace could influence the productivity and the way in which the organisation operates. Furthermore, De Croon et al. (2005) created a model (see figure 5) that focused on how conventional and innovative office concepts impact on workers' job demands, job resources as well as the short term and long term reactions. In the EY Wanderers building for time 1, the findings illustrated no significant predictors of workspace aspects impacting on perceive productivity, job satisfaction, and psychological and physical well-being. The above finding from time 1 is not consistent with previous studies that stated that the workspace aspects have an impact on employees' well-being which in turn results in higher levels of productivity (Kellert, 2005; Hillier et al., 2005; De Croon et al., 2005).

The findings for time 2, in the new EY building in Sandton, illustrated a relationship between workspace aspects and psychological well-being and job satisfaction. The workspace aspects that were found to have a relationship with psychological well-being were, 'Enables me to meet with clients when necessary', and 'gives me the space to work/operate without interrupts'. The above workspace aspects had a positive relationship with psychological well-being and this was supported by interviewees in terms of 'gives me the space to work/operate without interruptions', by stating that the multiple meeting rooms are an advantage compared to the previous building, thus if there is noise or you need to focus one can go to a meeting room. Furthermore, interviewees also commented that the new building has more space to entertain clients and is more welcoming. Therefore, this is consistent with research conducted by Kato et al., (2009) which illustrated a positive relationship between

green workspaces and psychological well-being, as well as with Meijer et al. (2009), which illustrated better overall health in flexi-offices. These results were aligned with the De Croon et al. (2005) model in terms of the close distance among workstations, which results in reduced privacy. However in the new EY building there are multiple meeting rooms that employees can book if privacy is required as mentioned by interviewees.

In terms of the relationship with workspace aspects and job satisfaction at time 2, an interesting set of results was produced. This is consistent with prior research conducted, which reported satisfaction with the workspace environment is positively associated with job satisfaction (Lee, 2006). There were three workspace aspects at time 2 that illustrated a relationship with job satisfaction. Firstly 'the technical equipment provided for meetings and collective use meets my needs'. This was supported by interviewees which stated that the resources such as the Wi-Fi and printers were the biggest improvements in the new building, as well as the central printing service. Therefore this illustrated that employees are satisfied with the technical equipment provided. Secondly, 'allows me to move throughout the building without being impeded by work area obstacles such as furniture and office equipment' illustrated a relationship with job satisfaction. However interviewees did not directly comment on this, but it can be related to the workspace layout as interviewees did mention that the new EY building is larger and can therefore accommodate more people.

Thirdly 'enables me to meet clients when necessary' depicted a relationship with job satisfaction. As mentioned before, employees seem satisfied as they are able to meet with clients and this was supported by the 'Coffee area' theme, as an interviewee who stated that *"in the previous building it felt strange to bring clients to the building because there was not enough space in the canteen, thus resulting in people standing around you while you ate your lunch"* (participant 3). Therefore, this led to increased noise levels whereas now employees are more open to bringing clients to the building (participant 3). Therefore, these results suggest that some workspace aspects have an impact on job satisfaction and were contrary to De Croon et al. (2005), which found that job satisfaction decreases when working in an open space.

Furthermore, the results surrounding the relationship between workspace aspects, physical well-being and perceived productivity were found to be insignificant at time 2.

Therefore in conclusion, workspace aspects were only found to have a relationship with psychological well-being and job satisfaction at time 2. The following section will be

centered on the employee's thoughts and concerns which were mentioned in the interviews with respect to the green building.

5.2.3 Additional Comments from the Qualitative Data

The aim of the qualitative data were to understand employee's feelings and experiences as well as the challenges that they are presented with on a daily basis regarding the transition to the EY green building. Moreover, there were three general themes that consistently appeared during the interviews, namely: 'concept and aptitudes of 'green buildings''; 'education and awareness' and 'corporate image'.

The first theme 'concept and attitude of 'green buildings'', was based on interviewees thoughts on the 'green building'. On a whole, most of the interviewees had a positive attitude about the impact of 'green buildings' on the environment. Interviewees mentioned that by moving into a green building, they believe that their workspace is more environmentally friendlier. However it is important to note that green buildings do not only benefit the environment, but also have an impact on the employees working the green building (Smith and Pitt, 2011; Heerwagen, 2000). Interviewees mainly mentioned that green buildings would benefit the environment, and this links to the second theme of 'education and awareness', which appeared a few times during the interviews. On the whole interviewees stated that they know it is a green building, but are unaware of the specific features and the impact it has on the environment and people. Thus it is an education process, which involves teaching and communicating the effects of the Green building features to employees. Some interviewees had a contradicting view in terms of becoming more aware of the environment and the positive impact of the green building. Interviewees stated that moving into a green building made them more conscious of the environment and awareness has been created due to recycling. However, the greatest challenge that is posed for green buildings would be the challenge to create an environment where there is an impact on an individual or where the individual feels direct impact, thus creating a drive for people to partake would be the challenge. Therefore, in order for occupants to feel the benefits, it is vital for them to believe in the concept as an individual's personal experience is a powerful driver of change (Yudelson, 2007).

Lastly, a pertinent theme called 'corporate image' appeared to be very common among the interviewees when they were asked what they appreciate most about the new building in comparison to the previous building. This was very interesting as interviewees stated that

they appreciate the image it displays, as it feels more corporate and professional as well as stating that the EY green building is a world-class environment. This illustrates that employees had a positive view on their building. Gatewood, Gowan and Lautenschlager (1993) stated that a good organisational image may send a message of power, stability, quality, vitality and pride to all, as well as to its employees. Organisations with a good corporate image would also be considered good employers, as the employees would hold a positive perception towards their work as well as being a good predictor of employee's decisions to join the organisation (Riordan, Gatweoon & Bill 1997; Gatewood et al., 1993). This viewpoint is supported by interviewees who stated that the image of the EY green building is now more focused on the future growth of the company, attracting people towards Africa, South Africa, and is increasingly becoming the selling point for attracting new graduates to the company.

Moreover, the three themes mentioned above link closely to the research conducted by Rashid et al. (2012) in which evidence was found of individual and departmental workspaces impacting on occupants' satisfaction with regards to the individual workspaces and the building which in turn impacts occupants environmental awareness and organisational image.

Therefore from the above results it can be concluded that workspace aspects, productivity (2-3 months) and most of the physical work condition aspects were significant. Furthermore, it was established that a relationship exists between workspace aspects and psychological well-being as well as job satisfaction.

5.3 LIMITATIONS

It is essential to note all the limitations of the study, as these may have had an impact on the results. The first limitation of this research was the sample size. The aim of this research was to run matched t-tests, however the number of employees that matched or answered in both time 1 and time 2 was only 35 participants. Additionally, this results in another limitation as the research was independently sampled at time 1 and time 2 although the sample may not have been independent as participants that answered in time 1 could have also answered in time 2 (n=35). Thus, there will be differences in the performances of variables mainly due to the results of participant differences (Coolican, 2009).

Moreover, the time in which the survey was sent out online may have had an impact on the results and the response rate. The first survey was sent out on the 28th November 2013 and

only closed on the 19th of February 2014 because of a poor response rate. It must be noted that employees had already moved into the EY green building in January 2014 which meant participants had to then refer back to how they felt when they were in the Wanderers building which could have impacted the results. Furthermore, the period in which the survey went out could have also impacted the sample size as many employees could have been on leave as it was pre-festive season and although a reminder was sent out when the office opened in January 2014 employees could have been busy as they moved offices, and it was the start of the work year.

With regards to the interviews, the sampling strategy that was used was stratified random sampling, as EY randomly selected participants to partake in the interviews. Although participants were randomly selected it could have been biased in the sense that not all individuals in the firm were included in the sample. For instance, there could have been more employees in senior positions or from certain departments, leading to a sample, which is not necessarily representative of all the employees in the firm. It would have been beneficial if the sample consisted of a more diverse range from lower and upper level positions, as this would have been a better representative sample.

The variables that were measured were job satisfaction, perceived productivity, job satisfaction and workspace aspects. Specifically with job satisfaction and perceived productivity, other instruments should be used in order to strengthen the results, not a single item scale, for instance it would be recommended to use actual productivity and absenteeism reports to strengthen the results. All these variables mentioned above were self-reported measures and could be prone to bias as well as could have been affected by other factors that are not directly linked to it. For instance, factors such as attitudes, moods, emotions, cognitive processes and personality of the respondent could have had an impact on the results of the variables being measured (Spector, 1999). Therefore, having a negative attitude towards your workload could impact your productivity and job satisfaction indirectly. Additionally, regressions were performed on data that was not normally distributed, which could have led to bias in the results.

Furthermore, the findings of this research may be limited, as the design features of the EY green building differ across the building. For instance one employee may receive a lot of sunlight, whereas another may not, thus it is highly dependent on where the participant sits. Therefore, it is vital for the location of every employee to be considered as it leads to

different results and views, which may have an impact on the overall results of the study.

5.4 RECOMMENDATIONS

In terms of the recommendations, it is essential for the EY green building directors and management to consider all the recommendations as they may have an impact on employee job satisfaction, perceived productivity and well-being.

There were a number of issues discussed in the results with regards to the ambient work environment and physical layout of the workspace that had an impact on employees. Firstly, there needs to be better communication on the green building features. Employees know it is a green building but are uncertain of the features. Therefore, giving a tour of the building and explaining the features and benefits may assist in creating awareness and educating the employees.

Secondly, the ambient work conditions such, as thermal control and lighting of the building were a problem. With regards to the temperature, employees either felt too hot or too cold. Therefore, work and research needs to be conducted to ensure that there are suitable thermal conditions for employees. Additionally, the lighting problem could be due to the automated blind system. Thus, it is vital to ensure that the automated blind system is functioning properly. However, the lighting problem varied among employees as it was dependent on where the employee actually sat. There is a clash between indoor lighting conditions and external lighting conditions. For example, if it is hot and sunny outside it would bring the blinds down and make the work environment darker which in turn impacts how the employees feels.

Another problem area for employees was the physical layout of the staircase design. Greater emphasis should be placed on it, in terms of the benefits such as interacting and collaborating with different employees.

In terms of directions for future research it is essential for researchers to focus on how the workspace environment impacts specific work types or specific divisions in the organisation. For example, researching how workspace design impacts the employees in the accounting or human resource department, since one organisation may need a distraction free environment, whereas another might need to thrive on interaction and collaboration of teamwork.

Therefore research should center on whether the workspace accommodates the different divisions or units in the organisation. This is because a well-designed office environment is highly subjective and relative to the organisation and the type of work they are performing.

Furthermore researchers should focus on investigating users' expectations of their workplace and can also look at the physical environmental aspects as they have an impact on employee productivity, job satisfaction and well-being. Another area in which more research could be conducted is in the usage of personal storage space and the impact it has on employees' productivity and job satisfaction.

Moreover, researchers should also focus on this research area in a South African context, as this area is still under-researched. This will be valuable to South Africa as it is still an upcoming development, and thus enhancements and newer findings from research could be implemented in the upcoming developments.

5.5 CONCLUSION

This study investigated the relationship between the perception of the workspace aspects and its influence on perceived productivity, job satisfaction, and psychological and physical well-being as a result of a change in buildings. This research opted for a mixed method approach, using quantitative and qualitative analysis. The aim of using a mixed method approach was to gain an in-depth understanding of employees' experiences and feelings regarding the change in workspace and the impact it has on them.

There have been a few studies conducted on how the workspace environment impacts on employee well-being, productivity and job satisfaction. However little research has been conducted in a South African context and not a lot of studies have incorporated a mixed method approach. Additionally, this study went a step further by focusing on workspace aspects especially in a green building.

The quantitative and qualitative analysis revealed an interesting set of results, as there were great improvements in the new building that were perceived by the employees that moved into it.

The new building was found to have improved workspace aspects in terms of the workspace design and layout, technology and the meeting room facilities. It was also found to have an improved ambient physical environment in which most of the ambient conditions were significantly better than the previous building. Moreover, the results indicated slightly better psychological well-being and improved job satisfaction from time 1 to time 2 even though the change was not significant. Additionally, interviewees felt that their new building gave off a better corporate image and it was very professional.

Furthermore, in the previous building where employees were situated, the results indicated no relationship between workspace aspects on perceived productivity, job satisfaction and psychological and physical well-being. However at time 2, where employees were in the new building, the results illustrated a relationship between certain workspace aspects and psychological well-being, as well as a relationship between certain workspace aspects and job satisfaction.

Additionally, results also indicated perceived problems within the new building, with regards to workspace aspects. It was found that not being able to interact with colleagues was a slight problem, personal storage space and not having bins at the desks was also a perceived problem. In terms of the ambient work conditions, thermal control and lighting was a problem and lastly the results indicated a decrease in perceived productivity from time 1 to time 2.

Therefore, from this study it is evident that workspace aspects have a relationship with psychological well-being and job satisfaction. This is partially consistent with previous literature that found a relationship between workspace aspects and job satisfaction. However more focus should be placed on the change and impact of the workspace aspects as these may have an impact on perceived productivity, job satisfaction, and well-being. The findings suggest that green buildings do aim to improve the environmental conditions for employees. Since it is the employees that drive the business, if organisations can successfully ensure that their employees are satisfied and happy with their working environment it could lead to higher levels of job satisfaction, productivity and well-being. This in turn would then benefit the organisation as they will become more productive and competitive.

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Appendices

Ethical Considerations

Appendix A: Permission Consent Form

Appendix B: Participant Information Sheet for Questionnaires

Appendix C: Participant Information Sheet for Interviews

Appendix D: Consent Form for Participants Interview

Appendix E: Consent Form for Audio-Recording of Participants

Appendix A: Permission Consent Form

Psychology
School of Human & Community Development
University of the Witwatersrand
Private Bag 3, WITS, 2050
Tel: (011) 717 4500 Fax: (011) 717 4559

Good Day,

My name is Harsha Chunilal, and I am conducting research for the purposes of obtaining a Masters Degree in Organisational Psychology at the University of the Witwatersrand. As part of my Masters Degree I am required to complete a research project. The more responses I receive, the greater the strength of my research. My research aims to focus on investigating employee's perceptions of workspace changes that impact on perceived productivity, job satisfaction and well-being of employees. I am requesting permission to possibly carry out my study at Ernst and Young in Sandton.

Participation in this research will involve employees completing a questionnaire and an interview. The interview requires five to ten participants. The questionnaire can be completed by all the employees employed at Ernst and Young. The questionnaires will take approximately **10-15 minutes** to complete and will be required to be taken at before the move and after the move to the new building in Sandton. The interviews will take approximately **45 minutes**. **Please note that participation will be completely voluntary and will not advantage or disadvantage employees in any way if they choose to complete the questionnaire or not.**

No identifying information, such as employees' names or I.D. numbers, will be asked for. Employees will therefore remain completely anonymous and the data they provide will not be linked to them as individuals in any way. At no point will we have access to your name or any other identifying information about you other than what you provide us and as such, you will remain anonymous. The organisation will not have any access to the individual participants' responses; the third parties will supply the information and response data for the purposes of processing, and analysing the information to The University of the Witwatersrand.

If employees choose to participate in the study, they will be asked to complete the questionnaire as carefully and honestly as possible either at home or in their free time at work. By distributing a link electronically to your organisation's employees via email, they will be able to complete the survey online and no IP addresses will be recorded. This will ensure their anonymity. If they complete the questionnaire, this will be considered consent to participate in the study. Feedback will be given in the form of a summary of the overall findings of the research to the organisation. Furthermore, the researcher and supervisor will only process the information obtained; and the responses will only be looked at in relation to all other responses. There are no foreseeable risks or benefits to taking part in this study.

This research will contribute to psychological information, as there appears to be little research in South Africa regarding this specific topic that focuses on perceptions of workspace impacting on organisational outcomes. If you choose to allow the study to be conducted in your organisation with those employees who are willing, it would be greatly appreciated. If you have any questions or concerns, please feel free to contact me or my supervisor as per the details below.

Kind Regards

Harsha Chunilal
harsha.chunilal@gmail.com

Supervisor: Andrew Thatcher
Andrew.thatcher@wits.ac.za

Appendix B: Participant Information Sheet for Questionnaires

Psychology
School of Human & Community Development
University of the Witwatersrand
Private Bag 3, WITS, 2050
Tel: (011) 717 4500 Fax: (011) 717 4559

Good Day,

I am Harsha Chunilal, and I am conducting research for the purposes of obtaining a Master's degree in Organisational Psychology at the University of the Witwatersrand. This study looks at the "Impact of workspace changes on organisational outcomes".

It is essential to understand the workspace environment because this affects everyday users and may in turn shape organisational behaviour as well as have an impact on employees' productivity, job satisfaction and well-being.

You are invited to participate in this study.

Participation in this study will involve completing the following questionnaire which should take approximately 15 minutes. Participation is voluntary, and no one will be advantaged or disadvantaged for choosing to participate or not. There are no direct benefits to participants anticipated from participation in this study. While there is a question asking for your employee number this is to enable us to connect any Time 1 responses (taken in November 2013 to January 2014) to Time 2 responses and to collect certain biographical information. At no point will we have access to your name or any other identifying information about you other than what you provide us and as such, you will remain anonymous.

By completing this survey, you provide consent to the following: My information and response data will be supplied to third parties who processes and analyses the information analyses, in order to derive reports that will be utilised by The University of the Witwatersrand. The appointed third parties will retain my information and response data

(confidentially) for as long as is deemed necessary, in order to provide context and previous responses/information that will allow the trending of perceptions over time. Your completed surveys will not be shared with your organisation and your responses will be saved in a neutral and secure database which is password protected. Thus, your confidentiality is guaranteed. Your responses will only be looked at in relation to all other responses which means that feedback given to Ernst and Young will be in the form of aggregated responses and not individual perceptions.

An executive summary of the results of this study will be made available to you via your organisation. The University also will have the option to publish the aggregate results once the study is complete in a student's research report and/or as a research publication in a journal. If you choose to participate, please click on the link at the bottom of this page. Submitting your responses will be taken as your consent to participate in this study. You may withdraw from the survey at any point before pressing the submit button by closing the survey.

Your participation in this study would be greatly appreciated. This research will contribute to our understanding of how our built environment contributes to our well-being, productivity and job satisfaction and how our surroundings shape us effectively as employees in organisations.

Kind Regards

Harsha Chunilal
harsha.chunilal@gmail.com

Supervisor: Prof. Andrew Thatcher
Andrew.thatcher@wits.ac.za

Appendix C: Participants Information Sheet for Interviews

Psychology
School of Human & Community Development
University of the Witwatersrand
Private Bag 3, WITS, 2050
Tel: (011) 717 4500 Fax: (011) 717 4559

Good Day,

My name is Harsha Chunilal and I am conducting research for the purposes of obtaining a Masters Degree in Organisational Psychology at the University of the Witwatersrand. My area of focus is on impact of workspace changes on organisational outcomes in a green building.

This research is aimed at investigating perceptions of the workspace that influence perceived productivity, job satisfaction and well-being of employees, as a result of change in buildings. This research will assist in creating efficient and well-used workspaces for the future. I would like to invite you to participate in this study.

Participation in this research will entail being interviewed and with your permission, the interview will be audio recorded. Participation is voluntary, and you will not be advantaged or disadvantaged in any way for choosing to participate or not participate in the study. There are no personal benefits for participating in this study.

If you agree to participate in the study, direct quotations of things you have said in the recording may be used in the final research report, and in subsequent presentations and publications based on the study. However, all participants will be assigned pseudonyms so as to ensure that identifying information is kept confidential and unknown to anyone other than me. In addition, although characteristic information may be used in the research report, this will be of a very broad nature and will only be used when these characteristics are fundamental to the analysis of the research. The interview material (recordings and transcripts) will not be seen or heard by any person at any time other than myself and my supervisor. The recordings will be destroyed following the completion of the study and only

electronic anonymous transcripts will be kept. Electronic copies of the recordings will be protected in a secured database. Therefore, your participation will be kept confidential in the research report, and the data will be protected against potential breaches.

Should you choose to participate, you will be requested to sign an informed consent form agreeing to participate and a consent form agreeing to your recorded conversation being used in the study. If you agree to be a part of the study, and at any point decide you no longer wish to be a part of the study, you may choose to withdraw from the study and your conversation will be removed from the data.

After the completion of the study, you can obtain a copy of the research report by contacting me by e-mail which is listed below.

Your participation in this study would be greatly appreciated.

Kind Regards

Researcher: Harsha Chunilal
harsha.chunilal@gmail.com

Supervisor: Prof. Andrew Thatcher
Andrew.thatcher@wits.ac.za

Appendix D: Consent Form for Participants Interviews

Psychology
School of Human & Community Development
University of the Witwatersrand
Private Bag 3, WITS, 2050
Tel: (011) 717 4500 Fax: (011) 717 4559

Consent Form for the Interview

I, _____ consent to be interviewed by Harsha Chunilal, for her study on "Impact of workspace changes on organisational outcomes"

I understand that:

- Participating in this interview is voluntary.
- I have the right to not answer any questions that I do not feel comfortable with
- I have the right to withdraw my participation in the research at any time
- No information that may identify me will be included in the research report, and my responses will remain confidential. Therefore, I will only be identifiable by the researcher, and no other personnel.
- Direct quotations from the transcript may be used as long as my identity is kept confidential.

Signed …….. Date……

Appendix E: Consent Form for Audio-Recording of Participants

Psychology
School of Human & Community Development

University of the Witwatersrand
Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559

Permission for audio-recording

I _____ consent to being audio-recorded by Harsha Chunilal for her study on "Impact of workspace changes on organisational outcomes"

I understand that:

- The audio tapes and transcripts will not be seen or heard by any person besides the researcher and her supervisor, and will only be processed by the researcher. This will be assured as electronic transcripts will be transferred to a database which will be password protected and only be accessible by the researcher and supervisor.
- All tape recordings will be destroyed after they have been transcribed.
- No identifying information will be used in the transcripts or the research report.
- I give permission for the researcher to use direct quotations from the tape recording provided my identity is kept confidential.

Signed: …….

Date: …….

Questionnaires and Interview Schedule

Appendix F: Biographic Questionnaire

Appendix G: Workspace Aspects

Appendix H: Perceived Productivity

Appendix I: Job Satisfaction

Appendix J: Psychological Well-Being

Appendix K: Physical Well-Being

Appendix L: Perceptions of Physical Work Conditions

Appendix M: Green Building Interview Schedule

Appendix F: Biographic Questionnaire

BIOGRAPHICAL DETAILS	
Gender (Tick the one that applies)	
Male	
Female	
Race (Tick the one that applies)	
White	
Coloured	
Black African	
Indian	
Other (Please Specify)	
When did you first start working for EY?	
Organisational level:	
Executive	
Senior Manager	
Middle Manager	
Lower Manager	
Admin	
Department/Unit	
How many hours a day on average do you spend in your current office?	
How many hours per day on average do you spend working at your EY desk/work station?	
How many days per week on average do you spend in the current EY building?	
What is the best description of your EY "work" area (e.g. hot-desk, open-plan office, cubicle, closed office)	

Appendix G: Workspace Aspects

(Assessed using a self-developed scale; aspects from Sanders & McCormisck (1993), Kim & de Dear 2013 and communication with the client)

How satisfied are you with the following workspace aspects at the current EY offices?

	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Use relevant furniture/appliances in the "work" area without physical space problems					
My "work" area meets my work needs in terms of its physical layout					
The technical equipment provided for my individual use meets my needs					
The technical equipment provided for meetings and collective use meets my needs					
Personal storage space					
Enables me to interact with colleagues when necessary					
Enables me to collaborate with colleagues (work on a project together) when necessary					
The availability of collaborative meeting spaces is sufficient					
Enables me to meet with clients when necessary					
Gives me the space to work/operate without interruptions					
Allows private space when necessary					
Can be adapted to my individual preferences (within my "work" area)					
Allows me to move throughout the "building' without being impeded by "work" area obstacles such as furniture and office equipment					

Appendix H: Perceived Productivity

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.	
What is the single most important factor that impacted (increased/decreased) your productivity during this time?	
On a scale of 0-100 percent (where 100% is full capacity), rate how well you have been working over the last 2-3 months in relation to your full capacity.	
What is the single most important factor that impacted (increased/decreased) your productivity during this time?	

Appendix I: Job Satisfaction

Please tick the appropriate box:

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Taking everything into consideration how do you feel about your job as a whole					

Appendix J: Psychological Well-Being

(Assessed using the Warwick-Edinburgh Well-Being)

Please answer the following questions in relation to how you have been feeling while in the office in the last month:

	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future					
I've been feeling useful					
I've been dealing with problems well					
I've been thinking clearly					
I've been feeling close to other people					
I've been able to make up my own mind about things					

Appendix K: Physical Well-Being

(Assessed using Sick Building Syndrome (SBS) questions)

In the last month how often have you experienced the following physical symptoms while at work:

	Never	1-3 times /month	1-3 times /week	Every day
Excessive mental fatigue				
Headache in your forehead				
Dry eyes				
Irritated or sore eyes				
Tired/strained eyes				
Nervousness or irritability				
Tiredness or lethargy				
Stuffy or congested nose				
Sore or irritated throat				
Runny nose				
Hoarseness				
Dry skin				
Dizziness				
Wheezing or chest tightness				
Nausea				

Appendix L: Perceptions of Physical Work Conditions

(Assessed using a scale from Hedge et al., (1996))

In the last month how often have you experienced the following conditions while in your office in the last month:

	Never	1-3 times /month	1-3 times /week	Every day
Temperature too warm				
Temperature too cold				
Lighting too dim				
Lighting too bright/glaring				
Insufficient ventilation				
Too drafty				
Too little air movement				
Air too dry				
Air too humid				
Distracting ambient noises				
Unpleasant odour in the air				
Stale air				
Dusty air				
Electrostatic shocks				

Appendix M: Green Building Interview Schedule

1. What are your views around sustainable development and green buildings in general? Do you think that they are legitimate and logical?
2. Describe specific aspects that are associated with your green building that enhance your everyday working experiences?
3. Do you believe that working in the green building has changed the way you feel about your job in general? What reasoning underpins this change or lack of change?
4. How has the workspace environment has had an impact on your productivity in anyway, (in terms of the different types of workspace: enhanced/hindered productivity) and if how so?
5. Do you feel that the green Building has impacted on your health (psychological and physical)? What aspects contribute to this feeling?
6. Do you think that the workspace set up on your floor is more conducive for work and liaising with your teammates (Do you believe that this new building is more people friendly in terms of the way it has been designed)?
7. Is there anything in this new building that has improved your life from a personal and lifestyle perspective i.e going to the gym?
8. Describe your biggest challenge/s associated with being able to adapt to the new green building and how you overcame it or intend to meet this challenge professionally? (Did the company assist you in anyway)
9. Do you believe that by implementing the green Building, your organisation has supplied you with better 'resources' that help you work more efficiently? If so, what are these resources that come to mind?
10. If you could redesign or change your workspace environment to enhance your productivity, what would you change (in terms of meeting all your needs)?
11. What do you appreciate about the new building compared to the old building, do you believe that working in a green building has had an impact or changed how you feel about your job generally (In what way)?
12. If there were three things you could change about this building/workspace, what would you change (Any positives and negatives about the workspace)?