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Employees' Experiences with New Workspace Layout: A User-Centred Approach



The University of the Witwatersrand

Research Report

(MA in Industrial/Organisational Psychology)

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Date: 6 June 2017

DECLARATION

I, **Nicolette Zackey (Student no: 675062)**, am a student registered for **MA in Industrial/Organisational Psychology** in the year 2016/2017.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above course is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thought and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature: _____ Date: _____

ACKNOWLEDGEMENTS

I would like to thank the following people for their contributions towards this research report:

- To my fiancé, Michael Jovan Visser, for his continuous support and motivation until the early hours of the morning on a number of occasions. You were (and still are) my pillar of strength throughout the years.
- To my sister, Nadine Backos, for her encouragement and unending support throughout my academic career. I truly appreciate everything that you supported me with. I would not have gotten this far without it.
- To my parents, Tyrone Zackey (Snr) and Bernadette Zackey, for their guidance, support and motivation. Your constant reassurances and votes of confidence helped drive me forward and motivate me to consistently do my best.
- To my brothers, Tyrone Zackey (Jnr) and Gerard Zackey, as well as the rest of my family, for their constant motivation and encouragement.
- To my friends who stood by me during my journey, for their emotional support, advice and invaluable assistance.
- To my supervisor, Andrew Thatcher, for his guidance and advice with my research report and throughout the year.
- To the insurance company and research consultancy company who allowed me this opportunity to assist with the pilot.
- To the participants at the insurance company who took part in my research report, for their time, patience and valuable information.

ABSTRACT

Numerous studies have shown that the office workspace environment can have an effect on employees' performance, satisfaction, psychological wellbeing, and other such factors. As such office workspace design has gained more traction in international research and amongst organisations globally. The office space is an organisation's second largest expense, it is therefore pertinent that organisations, who have chosen to focus on the office to enhance employee wellbeing, choose the most appropriate and optimal environment for their employees. One of the methods to ensure employees are satisfied with the space is to utilise a user-centred approach that allows employees the opportunity to comment on the space and to communicate their needs for the space. A South African organisation that has chosen to develop its space was a health insurance company that was undergoing a workspace redesign for their new buildings. The aim of this research report was to make use of a mixed method design that may have assisted the company, and the other parties involved, in gaining greater insight into whether the layout change had performed its functions effectively, as well as to ensure that the layout had accomplished the company's goals. The research report focused on the following variables: psychological wellbeing, physical wellbeing, work engagement, job satisfaction, perceived productivity (performance), satisfaction with the workspace layout, and collaboration/interaction. The study consisted of 158 participants. The results of the study had indicated that there was a main effect relationship between department/team groups and job satisfaction. Other results of the study had found that satisfaction with the workplace layout was related to psychological wellbeing, job satisfaction, work engagement, and productivity. The results revealed that the higher the employees' satisfaction with the workplace layout, the higher their psychological wellbeing, job satisfaction, work engagement and productivity. The qualitative component resulted in themes that were explored both theoretically and inductively. After analysis of the themes, four main themes were devised. Based on exploration of these themes it became apparent that satisfaction with one's workplace can be contingent on factors such as, noise and distractions, privacy, operational technology (e.g. it software/hardware/systems and WIFI), functional and up-to-date technical equipment, facility accessibility, honouring of commitments/meeting expectations of the space, personal feelings and attitudes towards change and flexibility, time consumption of activities surrounding flexibility, storage facilities that are accessible, territorialism or sabotage, and interaction/communication.

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CHAPTER ONE

1. Introduction

"The main purpose of any building is to provide a safe and comfortable environment that neither impairs the health of its occupants nor hinders their performance"

— (Deuble & de Dear, 2014, p. 112)

1.1.Background

The workspace environment can have a direct impact on employee health and wellbeing, as well as their productivity. Thus for organisations who pay particular attention to the health of employees, the office workspace design and evaluations of the built environment would be of particular interest to them (Thompson & Jonas, 2008). As the above quote indicates, a workspace that is occupied by any person is required to ensure the safety, health and comfort for its users (Vischer, 2008); all of which are imperative to the performance of employees (Ajala, 2012). Furthermore, the office workspace needs to be able to foster employee performance, as well as the aforementioned needs (Balachandran & Chandrasekaran, 2009). Literature has often indicated the effect of workspace design on employee performance, health, comfort, satisfaction and other such variables (Vischer, 2007a). General studies in this area of research have often focused on the design layout of the space itself or Indoor Environment Quality (IEQ) as determinants of employee health, satisfaction or performance. However, there are still gaps in research that focus on specific factors/features of the space that can affect employees and why they do so, for example features of the functional space (Davenport, 2005). Furthermore, general South African research in this area of research is completely underwhelming and needs further growth (Schreuder & Coetzee, 2010).

In terms of the way in which office workspaces should ideally be fashioned can be based on a number of different factors, including aesthetics, general culture of the company, needs of the organisation or needs of the employee. The needs of the employees can be derived in various ways. However, some research would encourage a more user-centred approach to developing a space. A user-centred approach refers to a design system that encourages the development of a concept for the specific users' needs (Abras, Maloney-Krichmar, & Preece, 2004). This can either be done through development of concepts "for" users or "by" users (Hi Chun, Harty & Schweber, 2015). The approach to the current study uses a "design

for" approach, whereby the space was developed to cater for the needs of employees, and their reactions to the space were investigated.

According to Vischer (2008), who developed the User-Centred Theory to the Built Environment (UCTBE), the built in environment (i.e. the workspace in this context) needs to be created such that it caters for the needs of its users' activities. In the office environment this refers to the activities of the office workers. Studies have reported the various types of activities within a workspace and the functional elements required for the operationalisation of the business. This research report discusses the needs of users in relation to the functionality of the office space. It further describes the functional needs in the context of the sample being investigated.

1.2. Aim of Study

Regarding the current study, a South African health insurance company approached an international, UK-based research consulting company. They asked the research consulting company to assist in the redesign of their office workspace as part of an innovative workspace initiative being implemented to improve the health, wellbeing and performance of their employees. The research consulting company, in partnership with an international furniture company, agreed to take part in the study. The design was then piloted and tested prior to full intervention in the new office buildings. The pilot study was agreed to be conducted on one of their subsidiary branches. Using the subsidiary branch was particularly advantageous to the pilot as it had all the organisational departments located in one building. The health insurance subsidiary branch had previously planned to relocate offices, therefore it was agreed that prior to the relocation to the new offices, the currently occupied offices would be refurbished according to the research consultancy's planned workspace design and data on occupants' experiences with that environment would be collected. The role of this study was to take additional measures of the participants' experiences and to use the results to augment the research being conducted by the UK research consulting company.

The current study attempts to measure the participants' experiences with their immediate office environment after the redesign of their workspace in order to use these results to assess if the new design is effective and consequently useable in their new office building. This study planned to use both a quantitative (post-intervention assessments) and qualitative (focus groups) approach. The following variables were assessed in the quantitative

component: job satisfaction, physical wellbeing, psychological wellbeing, work engagement, productivity and satisfaction with the workplace layout. The qualitative component used both a theoretical and exploratory approach during the thematic analysis. Themes that were of particular interest to explore during the focus groups were: communication and interaction between colleagues, satisfaction with the space and performance.

Overall, this study aimed to gain a better understanding of the functional needs of employees, as well as factors that may affect employees' ability to carry out team work and their general work tasks.

CHAPTER TWO

2. Literature Review Part I – The Functional Office

2.1.Defining the Office Workspace

In order to understand the effects that an office workspace can have on its occupants, it is important to understand what an office workspace is. The office workspace has had numerous definitions described throughout literature, such as:

(a) "[An] office is a place for transacting business where clerical and administrative functions are carried out to coordinate and control the activities of the organisation" (Sumathy, Malini, Vaijayanthi, & Zehrajbeen, 2011, p. 1).

(b) Betts (as cited in Rao, 2000) defines an office as "a term which is used to provide and maintain an effective information service through an established communication" (p. 3).

(c) "An office is an example of a heterogeneous good. Its value is dependent upon a great many characteristics associated with that property such as size, age, a range of quality attributes and lease terms" (Dunse & Jones, 1998, p. 297). In other words an office is an asset to the organisation that adds value depending on a number of property factors.

Essentially, an office is a property of the organisation that adds asset value and is meant to act as a transactional business place that coordinates organisational activities and communication processes.

A more modern outlook of an office refers to it as a function instead of a specific place (Chopra & Gauri, 2015). By this definition an office would be regarded as the function of coordinating activities and work regardless of place or whom controls it (Chopra & Gauri, 2015). The changes in conceptualisation of office spaces may be linked to the consistent evolutions of the office space. Through the ages organisations have altered their office workspaces according to the new and revolutionary trends of that era; often these shifts in trends are attributed to the development and advancements of the external social environment (Ouye, 2011). In addition, research into office workspace design began to climb as more interest was placed on both organisational development and employee wellbeing.

It is thanks to this development in research that the evolution of the office has made giant leaps forward, moving away from desks at taverns to coffee shops in office buildings.

2.2.The History of Office Workspace Design

2.2.1. From Benches to the Bullpen

The average workspace of organisations has drastically evolved through the ages due to industrial and technological developments (Khanna & New, 2008). Prior to and during industrialisation, the typical office workspace would be as simple as a bench, table, and/or desk found in a tavern, the room of a house, or the corner of a shop (Sundstrom & Sundstrom, 1986). However, in the mid- to the late-1800's, office buildings began to emerge in Europe and the United States of America (Sundstrom & Sundstrom, 1986; Bluyssen, 2014; Ford, 2003). The office building space had grown larger horizontally and, soon after, vertically due to enterprise growth steadily increasing the demand for more office workspace (Bluyssen, 2014). According to Harris, Engen, and Fitch (1991, as cited in Zhu, 1997), the design of these original office spaces were classically arranged in a "bullpen office plan"; which is a space characterised by rigid desk grids in open-plan type areas surrounded by private offices. The private offices were occupied by executives as they were next to the windows of the building, while the inner open office space was occupied by employees and typically had no windows due to the perimeter of private offices (Zhu, 1997).

2.2.2. Scientific Management and the Production Line

It was around this time, in the early-1900s, that "Scientific Management" became a popular management system developed by Frederick Taylor (1911/1919). Scientific management was a management system infamous for its mechanistic design that reduces the employee's responsibilities and tasks to the most basic roles and further encouraged an extremely strict hierarchical structure (Taylor, 1911/1919; Morgan, 1998). Thus it can be seen that these very dehumanising, mechanistic, and hierarchically controlled principles had greatly influenced the average office workspace to suit scientific management needs (Walters, 2008). Office workspaces imitated a factory production line arrangement in order to create a more effective workflow between desks (Parker, 2016). This however, led to very cluttered workspaces (Walters, 2008), which was considered to be less ideal environments for employees to work in (Danielsson, 2005).

2.2.3. The Bürolandschaft Office Space

In the late 1950s and 1960s a German consultancy, the Quickborner Team, had gone on to create the Bürolandschaft office space; which literally translated to "office landscape" (Walsh, 2015; Stuart, 2016; Laing, 2006; Sundstrom & Sundstrom, 1986). The Bürolandschaft office became a type of socialist space whereby the office space was characterised by very large open spaces that were subtly arranged into different landscapes that were no longer rectilinear and had less formality in order to encourage more communication (Stuart, 2016; Sundstrom & Sundstrom, 1986; Laing, 2006). The emergence of these offices fostered the initial concept that the office space can be designed for the employees' needs and their activities (Duffy & Hutton, 1998). However, Duffy and Hutton (1998) had criticised the Bürolandschaft design for not being adaptable and practical in all types of organisational environments that each require different structures and needs. Furthermore, they argued that the building shells it requires were expensive, inflexible, and too deep to be useful (Duffy & Hutton, 1998)

2.2.4. The Open-Plan Office

At the same time of the development of the Bürolandschaft, in the 1950's open-plan offices were designed and gained immense popularity in the 1970s as it increased interaction in the workspace (Oldham & Brass, 1979). An open-plan office is an office without floor-to-ceiling walls and/or partitions separating the desks/working spaces (Maher & von Hippel, 2005). The disputed advantages of an open-plan office were: (1) they have more flexible space; (2) they reduce setup and renovation time, (3) they reduce maintenance and air conditioning costs, (4) and (as previously mentioned) increase interaction to improve employee support, motivation and satisfaction (Maher & von Hippel, 2005; Oldham & Brass, 1979). Large numbers of studies have been conducted on the reactions to open-plan offices; however an analysis of the results combined reveal that there have been a mix of responses. For example, three studies conducted by Oldham and Brass (1979), Brennan, Chugh and Kline (2002), and Maher and von Hippel (2005) had all indicated employee dissatisfaction with the open-plan environment. In the Oldham and Brass (1979) study, employees had reported decreases in work satisfaction, interpersonal satisfaction, internal motivation, task significance, concentration, perceptions of autonomy, task identity, friendship opportunities, co-worker feedback, supervisor feedback, and communication due to lack of privacy. The Brennan, et al (2002) study had received feedback of employee dissatisfaction due to the increase in distractions. They had further reported increases in

stress and decreases in team member relationships. The Maher and von Hippel (2005) study had reported lower satisfaction levels due to a lack of perceived privacy when employees were given complex tasks, and had low selective attention or stress control. While another study conducted by Birnholtz, Gutwin and Hawkey (2007) revealed that participants had adapted well to the open-plan environment over time.

2.2.5. The Cubicle and Cube Farm

Another addition to the office plan developments during this era was the cubicle which made its debut in approximately 1968 (Lamprecht & Ricci, 2010) when an international furniture company, Herman Miller Inc, had developed the concept and named it "Action office II", which was initially designed by Robert Propst (Liu, 2012; Price, 2013). This design became the model for our modern day cubicles (Liu, 2012). Cubicle offices (also known as partitioned offices) refers to desks/workspaces separated by a small dividing wall that does not reach the ceiling; for example, a partition that is approximately just over 1.5m in height is considered a high partition (Lee, 2010). After the influence of the Action office on cubicle design, the term used for these offices had changed to Cube Farms which is a concept that still continues to be in use today (Altman, 2012). The intention of the cubicle office/Cube Farm was to create a sense of privacy within an open environment, however, employees have complained of feeling watched, self-conscious, and could be overheard by other employees having conversations (Walsh, 2015).

2.2.6. The Virtual Office

It was in 1951 when computers began making appearances in businesses after Joe Lyons along with Cambridge University had developed the LEO-1, which was a first-generation computer (Whiteley, 2013). Over time technology had grown exponentially and reached new lengths and mobility. It was due to these substantial technological advancements that not only would the office space be redefined but also the way in which work could be approached and achieved (Davenport & Pearlson, 1998). It was, therefore, approximately in the 1990's that virtual office made its debut. A virtual office essentially is a work design that does not require the employee to be in a specific place or office space to complete their work and duties, as all work can be accomplished virtually/remotely on a mobile device, such as a laptop (Hill, Ferris, & Martinson, 2003). Thus the employee can work anywhere he/she feels conducive. The aim of this mode of work was to enhance both mobility and flexibility for the employee (Davenport & Pearlson, 1998). Research into the effectiveness of the virtual offices on employee and organisational performance reported positive results

such as an increase in productivity, performance and job satisfaction (Hill, Miller, Weiner, & Colihan, 1998). Conversely, other research had found that virtual offices decreased communication between employees and teams (Hill, et al, 1998). However, as technology has developed, contacting colleagues and teams has become easier and more accessible. Collaboration has become as simple as video calling (e.g. Skype) and Instant messaging (e.g. texts, Whatsapp, Meebo, Pidgin, and AIM) (Engard, 2010). Employees who work virtually/remotely generally use Voice Over IP's (VOIP), an example of this is, as previously mentioned, Skype (Engard, 2010). Thus collaboration between teams is no longer as difficult, as long as individuals have access to the internet.

2.2.7. The Collaborative Space

Contemporary research in office space design had gained more attention from organisations; this was due to the fact that the office space was the second largest expense that an organisation has after staffing (Voss, 2000) Furthermore, after the technological evolution of computer-based and virtual business operations, organisations had been undergoing large transitions in business functioning and standards (Voss, 2000; Herman Miller Inc, 2012). These transitions led to the reconsideration of the office space. The most recent office revolution has been the collaborative space (Voss, 2000), whereby more collaboration and team-based work is encouraged. This is due to the fact that the growing competitiveness of industries has given rise to the need for innovation maximisation, which can be amplified through team-based work/structures (Harvey, Millett, & Smith, 1998). Team structures can be encouraged with more collaborative spaces such as through more meeting rooms or break/coffee areas; such as that implemented by the international Research and Furniture Company on the health insurance company (explained in more detail in the "Procedure" subdivision, section number 4.4.). Research into the trends of office space design revealed that from 1985 to 2010 the percentage to which individual output depended on group work increased from 30% to 80% (Herman Miller Inc, 2012). Additionally, modern day operational demands have pushed many organisations in the direction of the team-based work for the following reasons: (1) knowledge for tasks has become more complex and specialised, thus it has become more difficult to find someone with all the expertise for those tasks, (2) technology has increased deadline expectations, thus more people would be needed to complete a task faster, (3) research has suggested that group decision making is more effective compared to one individual making decisions or working alone, and (4) the increase in mobility and flexibility has facilitated less people needing to come into the office unless to collaborate, thus offices may only need to cater mainly for these instances

(Herman Miller Inc, 2012). For effective team performance, teams need to have a strong system and communication in order to collaborate (Wheelan, 2005; Nordin, Sivapalan, Bhattacharyya, Ahmad & Abdullah, 2014), thus the space they occupy needs to foster this. Studies have indicated that even though these spaces are intended to be ideal for the new method of working within organisations, employees have also complained of distractions and noise in collaborative spaces (Brager, Heerwagen, Buaman, Huizenga, Powell, Ruland, & Ring, 2000).

2.3.Effects of the Physical Space

The history of the office space is a germane theme to the office ergonomics literature, which is a discipline that focuses on the interactions between the physical, office environment and people (Kroemer & Kroemer, 2001; Kingsley, 2012). Office ergonomics literature in office space research has often focused on both the physical space (e.g. space design, layout and size) and physical elements (e.g. comfort, furniture arrangement and Indoor Environmental Quality) that have a large impact on employees both directly and indirectly (Kroemer & Kroemer, 2001). Other variables that are taken into consideration in a full analysis of the environment include: job characteristics (e.g. job demands), organisational context (e.g. shift types, career trajectories, and job security), technology (e.g. correct user interface design for computers), and psychosocial factors (e.g. autonomy and participation) (Robertson & Courtney, 2001). Studies in this area of research have indicated that the office space can have an effect on individual, team and organisational performance (Robertson & Courtney, 2001); employee behaviour (Davis, 1984); and productivity, health and safety, comfort, and morale (Sarode & Shirsath, 2014). Some examples of such studies include:

2.3.1. Studies on effects of Indoor Environment Quality (IEQ) (physical elements)

"There is no clear definition for Indoor Environmental Quality (IEQ). Basically, IEQ was expressed in term of occupants' health determined by environmental aspects like Indoor Air Quality (IAQ), thermal comfort, acoustical quality and visual or lighting quality" (Yee, 2014; p. 1). IEQs have been reported to affect physical health, such as worsen asthmatic symptoms or allergens with bad air quality, increase depression and stress when temperature and humidity is too much, and affect productivity (Singh, Syal, Grady, & Korkmaz, 2010; Fisk, 2002). The study conducted by Singh, et al (2010) had focused on moving employees from their traditional offices to a Leadership in Energy and Environmental Design (LEED) office. A LEED office is a type of green office design that optimises the IEQs within that

space. The experiment was split into two studies. According to the researchers, 56 employees were moved to the LEED office in study 1, and 207 employees were moved in study 2. Both studies used pre- and post-testing. The responses after post-testing were as follows: study 1, n=32 and study 2, n=113. The results of the study showed that there was (1) a noticeable decrease in absenteeism due to asthmatic symptoms and respiratory problems, (2) a decrease in absenteeism caused from depression and stress-related conditions, (3) a decrease in affected work hours caused by asthma and respiratory problems, (4) a decrease in affected work hours caused by depression and stress-related conditions, and (5) an increase in productivity.

2.3.2. Study on effects of office design (physical space)

A study was conducted by Saha (2016), which focused on whether there was a relationship between the various elements of ergonomic design of an office and employee productivity. Altogether, 150 surveys were sent to I.T. companies. The overall number of surveys consisted of fifty business line employees of small scale companies, fifty business line employees of mid-size companies, and fifty business line employees of large scale companies. The results of the study showed that comfortable furniture, noise, lighting, temperature and spatial arrangement were all correlated with productivity. Essentially the results indicate that having more comfortable furniture, better IEQ factors such as less noise, better temperatures and better lighting, and specific spatial arrangements could enhance productivity (Saha, 2016). Other factors tested also showed that there was a relationship with productivity and aroma, privacy and the ability to control the workplace design. All of the aforementioned factors fall part of a larger workspace design system (Saha, 2016).

2.3.3. Study on effects of control over the office space (psychosocial factors)

Lee and Brand (2005) had focused on employee's control over their environments as an influence on job satisfaction, group cohesiveness, and satisfaction with the work environment; as well as the relationship between all these work elements. Questionnaires were sent out to five different companies. The results of the study showed that personal control and perceptions of control over the environment influenced job satisfaction and group cohesiveness. Moreover, perceptions of control and flexibility (whereby the employee was able to adapt certain elements within the environment) within the space further had a positive influence on group cohesiveness. Thus environments that encourage control and flexibility may enable better interpersonal relationships and job satisfaction.

2.3.4. Study on effects of office quality

The study by Leblebici (2012) had similar findings to the Saha (2016) study and focused on the IEQ and office layout of the office as variables affecting employee productivity. The office layout included informal meeting areas, formal meeting areas, quiet areas, privacy, personal storage, general storage, work area, and desk and circulation space. They further studied the behavioural components of the environment which observed the levels of interaction (e.g. social, work) and distraction; both of which were based on the atmosphere and overall layout in relation to colleagues and equipment. Surveys were handed out and 50 employees responded. The results of the study revealed that the physical aspects of the workplace do have an influence on performance. In order from highest influence on performance, the results of the physical aspects components are as follows: (1) Furniture and furnishings was considered the largest influence on performance in their study. Furniture and the furnishings in this study were related to comfort levels, therefore this study indicates that comfort levels are very pertinent to employee performance. (2) The second biggest environmental factor was the arrangement of the office space. Employees commented on how a poorly arranged office space inhibits effective working habits thereby wasting energy and time. (3) The next factor was interior surface, which is both a practical and aesthetic element conducive to the performance of employees. (4) Storage of materials was ranked fourth; thus having adequate storage facilities for employees' materials was perceived to be important to employee performance. The study further established that the employees had suggested that perceived communication and relations with superiors was very important to their performance. The other variables tested, such as satisfaction, were based on their personal impressions of their environment and whether the company was providing them with the appropriate environment needs (Leblebici, 2012).

2.3.5. Studies on office workspace in South Africa

What can be established from the above mentioned studies is the fact there is sufficient evidence to indicate a significant relationship between the physical environment and employee affected outcomes. Yet, despite these indisputable relationships between the work environment and employees, as discussed previously, it is however, quite concerning that South African research still lags in this area. South African research has been criticised for its inadequate amount of research into particular industrial/organisational psychology (IOP) subdivision research, such as ergonomics (Schreuder & Coetzee, 2010). Schreuder and Coetzee (2010) had reported the various areas of research that South African researchers

had undertaken between 1980 and 2008. In all the IOP research reported not a single area of research focused on office workspace effects, the closest to office workspace research was the studies on IEQs from the 1980's to 1999. South African ergonomic research from then on focused on safety. In addition to this, in a table that Schreuder and Coetzee (2010) developed that depicted the frequency of dominant trends between 1950 and 2008, Ergonomic studies had remained extremely low in the IOP literature throughout the years.

A search for scholarly articles was done through Google scholar on office workspace design effects on South African employees; however, results reported links to articles on Nervous Systems, downsizing, domestic violence, chronic poverty, globalisation of furniture companies, and minimum wage laws — to name a few. A similar search was conducted on the general Google search engine which resulted in online articles on South African labour laws on acceptable office sizes within office buildings

Another relevant article that emerged was an online business article by My Broadband (2016) which discussed what features South Africans hate within an office and what they want most within an office based on a study conducted by a South African office space and furniture consulting company that also conducts its own research, Inspiration Offices. The survey was conducted by Richard Andrews, the director of Inspiration office, on 12 000 employees around South Africa (Andrews, 2016). The results of the study revealed that what South Africans want from an office space are as follows: Access to good tea and coffee (95%), security (91%), a healthy environment (87%), natural light (85%), greenery (71%), canteens (65%), and comfortable chairs (52%) (Andrews, 2016). The study also reported the largest displeasures South Africans faced in the workplace: noisy colleagues (88%), people who eat lunch at their desks and make the area smell (76%) (which links closely to the Saha 2016 study which saw a relationship between productivity and aroma), unbearable bosses (66%), lack of privacy (50%), and other dislikes included dreary spaces, long meetings, dress codes and working hours. Finally, the study also looked at what employees found favourable within the workplace, they reported the following: socialising and interacting with colleagues (80%), learning and personal development (61%), and earning money (49%) (Andrews, 2016). The results of the study are interesting as they reveal the needs of South African workers, whereby employees place green building components third and fourth, while functional comfort sits sixth on the list of employee desires. Yet, when there are undesirable or poor office conditions, employees find it noticeable and irksome, for example noisiness, undesirable aromas, and lack of privacy; the former two relating to IEQ factors and the latter relating to office design. It can be assumed

therefore that although physical environment needs are not the presiding elements that employees desire most, it is nonetheless one important factor to their satisfaction when it is present and/or absent. Not much more from this study can be inferred as it is not an academic article that used conventional research methods; it only uses frequencies to point out a phenomena, thus more research into this area needs to be conducted for reliable evidence.

Another online article that was found in this search was from another furniture business that writes about the top three latest office trends in South Africa: collaborative workspaces, workspaces with more indoor nature (green buildings), and virtual offices (Quantum Office Furniture, 2016). However, where this information comes from was not stipulated. Little can be inferred from the articles found online as these are not based on empirical research.

Another search on Google scholar and EBSCO Host was made on the work environment office design effects on South African employees. The results were still minimal and links to some relevant South African articles were inaccessible to the University's students at the time of research. After thorough searches through different search engines a study on the influence of open-plan offices on productivity in Cape Town engineering firms was discovered. The study was conducted by Kok, Meyer, Titus, Hollis-Turner and Bruwer (2015). For the study, 50 employees from Cape Town engineering firms were given questionnaires; 32 responded. Demographics of the participants reported 65.63% of respondents were occupying open-plan offices, 18.75% occupied semi-open plans, and 15.63% occupied private offices. The some notable results of the study revealed that participants believed that (note–all percentages are a combination of the strongly agree and agree responses) (1) the office space needs to be arranged based on functionality (100%), (2) ergonomics was perceived as an important consideration for office space development (100%), (3) employees should be involved in the planning process of new office spaces (96.88%), (4) closed offices created a greater sense of privacy and security (100%), (5) employees felt they had more health issues in open-plan offices (90.63%), (6) employees believed that open-plan offices encouraged communication and team work (84.38%), (7) open-plan offices could support learning and encourage mentoring (81.26%), yet ironically (8) respondents also felt employees are more productive in closed offices and less productive in open-plan offices (65.63%) (Kok, et al, 2015). Justification was given for the preference in closed offices: many of the employees commented on the fact that certain behaviours or habits of colleagues around them can eventually annoy each other or create conflict. Other respondents also commented on the lack of ability to concentrate in an open-

plan environment due to the lessened distractions or interruptions. However, another employee commented, stating that open-plan offices can work if managed appropriately as colleagues also need an adequate amount of communication to help find solutions (Kok, et al, 2015).

It is clear that South African literature on office space outcomes in SA companies is either lacking or extremely inaccessible. It is with this lack research in mind that the aim of the current study is to fill in some of the gaps in South African research while establishing an inference from international research to the South African context. As was indicated in the Inspiration Office study (2016), it is evident that South African employees have specific needs. This makes the inference of workplace needs from one set of employees from international literature to South Africans more complex. Therefore, one of the objectives of this paper is to establish a relationship between the office space and South African employees.

2.4.The Functional Purpose of an Office Space

Another theme that emerges throughout office discussions in this research report is the notion of a functional office. The idea of the functional office will be discussed in two ways: (1) the literal discussion of the function of an office, and (2) the office as a functional space (i.e. a space created to be functional to its occupants).

2.4.1. The Function of an Office

The more specific purposes of an office workspace may depend on the type of business however, every business has similar underlying general purposes expected of the office space. The following quote summarises these general purposes:

> *"The main purposes of an office are:*
>
> *(i) To direct and coordinate the activities of the various departments; (ii) To plan the policies of the business and ensure their implementation; (iii) To preserve all the records of the business; (iv) To handle inward correspondence; and (v) To maintain accounts, statutory and non-statutory books, etc., of the business."*
>
> —Chopra & Gauri (2015; p.14)

The above quote illustrates the idea that the general purpose of an office is to coordinate and process various organisational activities pertinent to the functioning of the organisation. There are a number of organisational activities that need to be facilitated, thus the office workspace has to be multifunctional. Sumathy et al (2011) described the following functions of an office:

(i) Receiving and collecting information. This can include internal (e.g. intra-organisational communication) and external (e.g. customers or inter-organisational sources) organisational sources.
(ii) Maintaining tangible records of the information.
(iii) Functional systematic arrangement and analysis of information.
(iv) Information dissemination.
(v) Activity coordination.

These five functions focus primarily on information processing, which emphasises the importance of an office that facilitates information exchange. In other words, it is implied that offices need to foster a highly communicative environment. Extensive research has focused on the significance of appropriate communication systems within organisations; this will be discussed in further detail in section 2.5. Conversely, these functions, although important, do not cover the full range of functions found within organisations. Chopra and Gauri (2015) had also described the functions of an office. They stated that functions of the modern office can be categorised into the following two classifications: (i) Basic functions, and (ii) administrative management functions.

(i) Basic functions. This refers to receiving, recording, arranging and giving information; similar to the first four of the abovementioned functions described by Sumathy et al (2011).
(ii) Administrative management functions (Chopra & Gauri, 2015). This category consists of a compilation of functions: The first function is the management function whereby proper planning and execution of office work needs to be performed. This entails planning, organising, staffing, directing, communicating, controlling, coordinating, and motivating (Chopra & Gauri, 2015). The second function is the public relations function, which focuses on the public relations with external stakeholders (Chopra & Gauri, 2015). The third function is the institution of planned office systems and routines in order to attain goals and objectives. The procedure of operations are therefore established. The fourth

function is to retain records of all information and service activities of the business such as invoices and transactions. The fifth function is to safeguard assets such as fixed assets and records (Chopra & Gauri, 2015). The sixth function is to design and control the forms utilised by the organisation. The seventh function is to supply and control the supplies and stationery. The eighth function mainly focuses on the manager's expectation to select and upkeep of office appliances and equipment as these are pivotal for full functioning and performance within the office. The ninth function is the personnel function, which focuses on the coordination of personnel and the evaluation or upkeep of their performance. And the tenth and final function is to control office costs (Chopra & Gauri, 2015).

In summation of the aforementioned functions it is evident that the main functions of an office is to facilitate pertinent organisational activities and systems such as communication processes, information management, staff management, and equipment/supply management. All of which are key building blocks to a successful organisation.

2.4.2. The Functional Office

There are many functions of an office space. However, more than the function of an office space being important, having a functional office space is just as imperative to the performance of employees and the organisation. By this we mean offices that consist of functional equipment and space; i.e. the functionality of the office. According to the Oxford Advanced Learner's Dictionary, the term "functionality" is defined as "The quality in something of being very suitable for purpose it was designed for" or "the purpose that something is designed for" (Hornby, 2001, p. 482). Thus based on this definition one can assume that office functionality would refer to the quality of the office space that makes it suitable for the purpose of facilitating office-work processes — such as the ones described in the functions of an office. When discussing the requirements of a good office, it has been contended that the most important characteristic of an office is its functionality feature (Samuel, 2006; Kintler & Adams, 1998). There are different functional arrangements that organisations can focus on that depend on the needs of the organisation. According to literature, the ways in which a functional space can be arranged is to firstly, create an office design that fosters noise reduction through careful placement of loud machines such as photocopy machines, away from the desks where employees are working (Kintler & Adams, 1998). Secondly, it is important to create movement within the space through clearing

pathways (Samuel, 2006; Kintler & Adams, 1998). Thirdly, the desks each team must occupy must be placed such that the teams or employees working together are always near each other (Kintler & Adams, 1998). Fourthly, desks need to always be cleared and neat, thus a means to do this needs to be arranged (Samuel, 2006). Five, always keep all equipment up to date so as to not slow down work processes (Samuel, 2006). Six, have an adequate amount of storage units nearby (Samuel, 2006). And lastly, it is useful to set up a recycling centre to ensure people reduce clutter by throwing away unnecessary items while still being good for the environment (Samuel, 2006).

It is once again notable that there is lack of South African research into this area. The only two South African articles that touched on this were Kok et al (2015), whereby participants had stated that it was important to organise the office space based on functional needs, and the Inspiration Office (2016) study where participants had placed functional comfort sixth on the list of things they wanted in an office workspace. Although, there is little research into functionality of offices it is also scarce on international plains as well.

2.5.Communication

A common recurring theme that office function literature reiterates is the belief that the office needs to facilitate a space for information dissemination and communication. The growing office space trend — as was mentioned previously — was the collaborative space (Voss, 2000). This may be due to the fact that organisations have opted for a more team-based approach as they are more reliable in and capable of meeting the rising competitive demands of the industries (Harvey, Millett, & Smith, 1998). This of course would require not only more team-building exercises but also more collaborative spaces that enables rather than inhibits more interaction between working teams.

2.5.1. What is Communication?

The definition of communication can be more complex than we realise (Fortner, 2007). Questions surrounding what communication is has led to a number of debates (Fortner, 2007) and also to the academic discipline of Communication Studies. Communication studies theorists follow two main schools of thought: the first being that communication is considered the transmission of messages, and it focuses mainly on the encoding and decoding processes of messages (Fiske, 2004). The second school asserts that communication is the process of production and exchange of meanings which focuses on the

meaning within a message that is being disseminated (Fiske, 2004). However, within the discipline of IOP, communication theories do not need to be so complex; communication within the office space can be simply considered as the process of exchange of information, ideas, and news (Hornby, 2001).

Communication within the office and organisation is often used to (1) spread task and policy related information between colleagues and the various management levels, (2) to enhance a sense a community spirit and support, (3) and to build and maintain organisational culture and the social order structures within the organisation (Barker & Angelopulo, 2006; Elving, 2005; Wheelan, 2005). The office space needs to create an environment whereby these communicative activities can occur. Communication within the office can occur on either a formal (which is a process that follows specified procedures or protocol to get the information to the intended target) or informal level (the natural interactions between employees to create interpersonal relations) (Barker & Angelopulo, 2006).

2.5.2. Communication in the Office

Communication in the office is a vital process as it enables both understanding of needs in the organisation and an opportunity to view the activities of employees (Culnan & Bair, 1983). There are various types of communication structures used within an organisation that are also used for different reasons or outcomes. The flow of communication goes through specific channels in order to ensure accurate dissemination of information through the various levels; these are called communication networks. Communication networks can either be Centralised (where there is a common communication point that all information goes through) or Decentralised (there is no particular order or process to which the information has to flow through) (Wheelan, 2005). The Centralised type of communication network is more structured and based on protocols determined possibly by a hierarchy, versus the Decentralised, which does not.

Research into the effects of communication on employees and the organisation have revealed that communication can be an important variable in improving employee performance, motivation, satisfaction, interpersonal relations with other colleagues, perceived support, and commitment, as well as organisational success and change (Rajhans, 2012; Husain, 2013; Neves & Eisenberger, 2012; Snyder & Morris, 1984; Elving, 2005; Allen, 1992). A local, South African article on methods to building a creative and innovative culture had further asserted that a creative and innovative culture can be established through —among other things— appropriate open communication (Martins &

Terblanche, 2003). It is therefore evident that it is important for organisations to encourage more communication amongst their employees at all levels of the organisation. One of the functions of an office — as was stated previously — was to receive, collect and disseminate all business related information that enables the organisation to perform its functional roles and activities (Sumathy, et al, 2011). The means to which this is possible is through different forms of communication. Information can be communicated through any means, including weekly letters, policies, emails, meetings, or conversations.

There have been many attempts from organisations to create an environment that enables more communication between employees. It has been suggested from research that timely notices of vital information through proper channels is one of the means of enhancing communication and information dissemination in the office (Rajhans, 2012). Some organisations also use open-communication between all levels of the organisation so as to include the employees in the organisation's decision-making process which is a motivating factor that also increases their sense of belongingness to the organisation and job satisfaction (Rajhans, 2012; Husain, 2013).

Traditionally organisations simply use an open-plan office in the hopes it will encourage communication. However, a study by Kim and de Dear (2013) had reported that open-plan offices yielded so much dissatisfaction with other factors such as noisiness that it did not make up for the amount of interaction that the space would undergo. Essentially, as Kim and de Dear termed it, the trade-off between the opportunity for communication and the negatives of open-plan office do not balance out, thus the opportunity for a little more interaction was not worth the bad effects that an open-plan would yield.

Another method is the use of the modern collaborative space. A study was conducted on whether the more collaborative office actually did increase communication (Blok, De Korte, Groenesteijn, Formanoy, & Vink, 2009). The results showed that between the traditional open-plan and the new collaborative space, employees felt their performance was better in the collaborative space. They also found that they communicated and cooperated better with each other. The collaborative space used by Blok, et al (2009) consisted of a flexible work environment, shared workspaces, lounge workspaces, small meeting spaces, concentration areas, and standing tables. The traditional open-plan space, however, had a space where employees had their own workstations in the open area.

2.6. Summary

To summarise the first part of the literature review, the aim of the Part I was to establish an argument that the office workspace is an important factor that has an effect on employee outcomes such as productivity and satisfaction. It is evident from the discussion that a lot of research has been placed into the office workspace, internationally. However, not much research has been carried out in South Africa. It is also evident that the office workspace has had a large impact on employees throughout history. Additionally, it became apparent that when observing the impact of the office workspace a number of other features or themes were also central to the exploration of the office-related needs of employees. More specifically, employees' needs are contingent on the following factors: the physical space's design and quality, the functionality or functional comfort of the office space, the communication processes within the space to enable these functions, and the opportunity to have some form of control over the employee's space (as discussed in sections 2.3.2 and 2.3.3.).

The current study therefore aims to establish a relationship between these factors and particular outcomes of the employees of the Health Insurance subsidiary branch. The main objective for the UK research company heading the environmental change was to firstly, create a more aesthetically-pleasing and comfortable physical office design. Secondly, to create a space that also has more functional features and a better overall functionality. Thirdly, create a collaborative space that encourages more communication between colleagues and teams. And lastly, to create an opportunity for the employees to have some control over the final office design, through encouraging feedback on the new space in order to finalise a space that the employees will be happy in when they move to their new office building. Often processes that allow user (i.e. the employee) participation in the design or planning is called a user-centred approach.

There are not many user-centred approach models to office design that have been developed, however an attempt to create a model for the built environment (such as offices or any building space) that involves user consideration was done by Vischer (2008). Exploration of this model and its relation to the current study will be discussed in more detail in the second part of the literature review.

CHAPTER THREE

3. Literature Review Part II – The User-Centred Approach in the Workspace

3.1.User-Centred Design

It is assumed that the occupant of a workspace would be an expert in knowing his/her needs for an environment. Thus, knowing their viewpoint on the spaces they occupy would be valuable when modelling a built environment (Canter, 2008). In design terms this would be considered a user-centred design. 'User-centred design' (UCD) is a general term used to describe design processes that focus on users who influence how a design is developed (Abras, Maloney-Krichmar, & Preece, 2004, p. 445). It is a design approach that concentrates on the user's wants and needs (Hi Chun, Harty & Schweber, 2015). Thus, the user's involvement with the design's development becomes imperative (Gulliksen, Göransson, Boivie, Blomkvist, Persson & Cajander, 2003). The term is generally used in the context of software or graphic design (i.e. Human-Computer Interaction); however it can also be used in designing the built environment (Sanders & Stappers, 2008; Hi Chun, Harty & Schweber, 2015).

According to Eason (1995, as cited in Hi Chun, Harty & Schweber, 2015), the meaning behind user-centred approaches can be seen as twofold: (1) creating a design for a user through gathering information about the users and creating the product (i.e. a design *for* approach), or (2) a product that is created by the users themselves, who become part of the design process. The latter approach can be divided into two possibilities: (a) the user can participate with the design team whereby the designers can learn with the user and decipher their needs, thus the user is a member of the team (i.e. a design *with* approach) or (b) the user can get fully involved and play a leading role in designing the product, whereas the design team should assist or cooperate with the user's wishes (i.e. a design *by* approach) (Acosta, Morales, Lagos & Ortiz, 2011).

The approach used in the current study is a design *for* approach whereby the space is designed for the employees based on observations of the environment, their needs, and their feedback of the environment. In the "design for" approach, there are various methodologies that researchers can use to obtain user input pertaining to what their design needs are. One such methodology is using a sequence of work interviews and questionnaires/surveys (Abras, Maloney-Krichmar, & Preece, 2004). The data gathered using one of these approaches is then analysed and processed to create the product (Acosta, et al., 2011). The designer (or researcher) therefore becomes the representative of the user (Sanders, 2002).

3.2.The History of UCD

UCD was developed by the computer-science field of Human Computer Interaction (HCI) and is to this day still considered an integral concept in HCI, interaction design, usability engineering, interaction programming and other interactive system designs (Thimbleby, 2008). Yet, prior to the development of UCD, designers would develop software or systems that ignored the human factors component, where user roles and satisfaction were not taken into account (Carroll, 1997). Psychologists had then encouraged designers to consider the human component to usability and design given that a system's purpose is to serve the user (Carroll, 1997; Gulliksen, et al., 2003). Thus the conceptual framework known as user-centred design theory began in the late 1970's (Sanders & Stappers, 2008; Monk, 2000). During the 1980's, Donald Norman and Stephen Draper had further established and solidified the foundations for user-centred design after introducing the term in their book titled, *User-Centered System Design: New Perspectives on Human-Computer Interaction* (Keinonen, 2010). This framework was later applied to systems design (Abras, Maloney-Krichmar, & Preece, 2004). In subsequent years it increasingly gained more attention until the 1990's where it become further widespread as it became a useful method to create products for consumers (Sanders & Stappers, 2008).

The relationships between systems and people were considered dynamic and interdependent, thus a user-centred approach became appropriate as it emphasised the importance of user involvement (Yetim, 2010). In a study conducted by Vredenburg, Mao, Smith, and Carey (2002) on UCD methods and practices, questionnaires were sent to UCD practitioners to measure the impact of UCD methods in practice. Their results found that overall, approximately 80% of respondents had reported UCD methods as improving the usability of their products (Vredenburg, Mao, Smith, & Carey, 2002), therefore indicating its usefulness in application. However, UCD can become very costly and may seem less practical as the products or systems created are more specific rather than usable in the general environment and it requires more time to develop (Abras, et al, 2004). Yet, despite these disadvantages, it is still considered to be a more effective and safe method that may enhance users' sense of ownership and satisfaction (Abras, et al, 2004).

3.3.The User-Centred Theory Applied in the Built Environment

Like most design principles, UCD can be adapted to other design purposes such as interior space design (Sanders & Stappers, 2008). For instance, Vischer (2008) has adapted UCD to interior space design, with particular emphasis on its usefulness in and applicability to office workspace design. "The user-centred theory to the built environment" (UCTBE), as it was termed by Vischer (2008), focuses on how the "built environment exists to support the activities of its users" (p. 234). There are three main assumptions to the UCTBE (Vischer, 2008):

Firstly, the built environment is created to support the activities of its users. In order to ensure the activities of the users are supported it is important to define who the users are and how they are using the space.

Secondly, it states that users have different experiences with the environment. These experiences can be related to sensory perceptions of elements of that environment. Users rate their experiences within a particular environment by looking at three environmental support levels including: physical comfort, functional comfort, and psychological comfort. These levels create a framework whereby UCTBE can be applied to three divisions of users: individuals, groups and the organisation (Vischer, 2008).

Thirdly, defining the built environment itself is important; for example defining what the workspace is (Vischer, 2008).

A conceptual model was created from this literature review to illustrate in visual form, the relationship between these assumptions (see Figure 1 on next page).

The UCTBE essentially is a user-centred design method as its main objective is to focus on the user's experiences within the environment. Vischer (2008) argues that their experiences should be central in the development of a space.

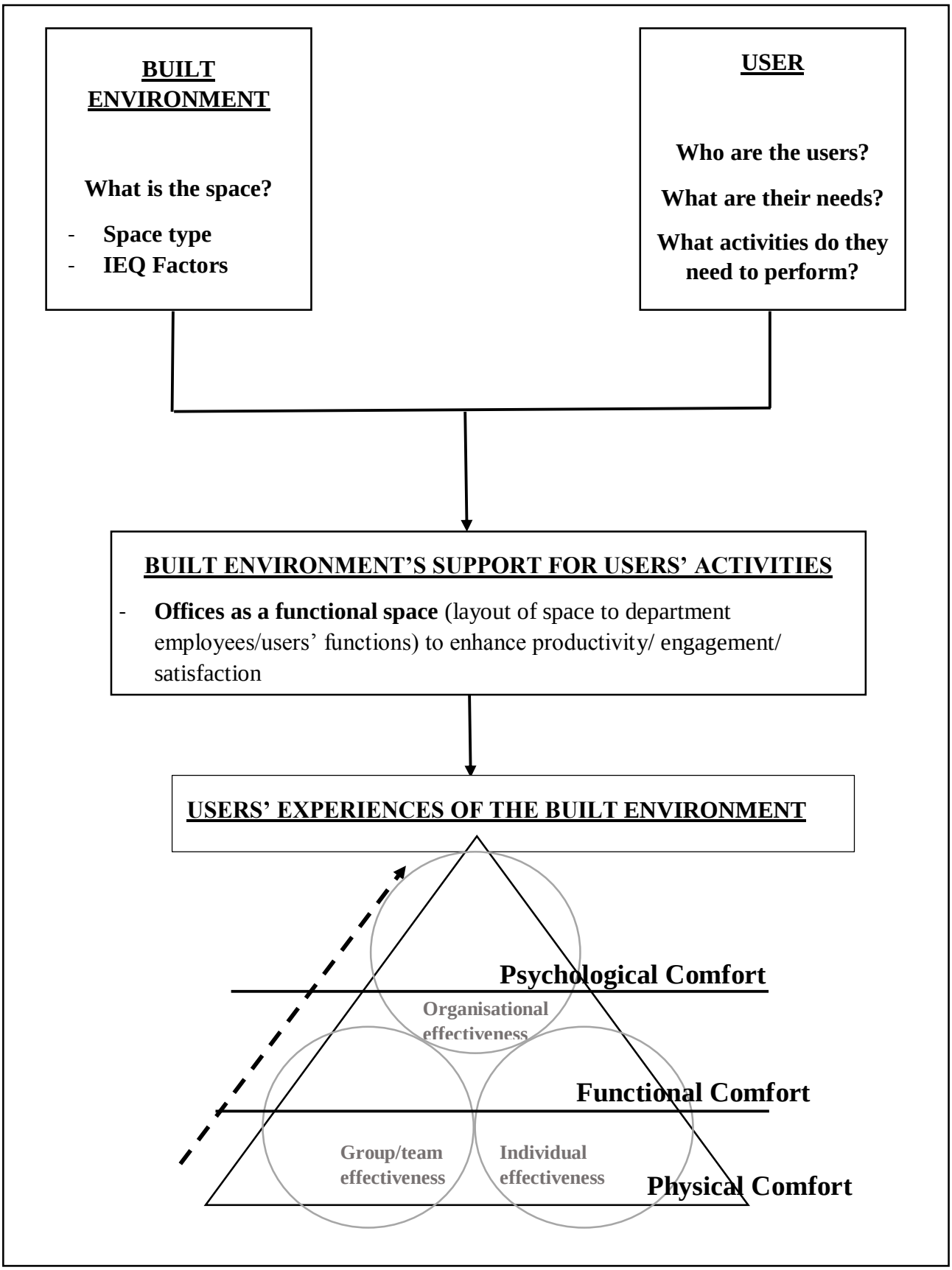


Figure 1: An adapted conceptual model of Vischer's (2008) UCTBE

3.4.The Conceptual Model and its Application

The conceptual model was created to make the theoretical model of Vischer's UCTBE visually comprehensible. It makes the links between each of the concepts more clear. The model can essentially be divided into two main components: the design component and the outcomes component. The Design component — which comprises the "built environment", the "user", and the "built environment's support for users' activities" — illustrates how the integration of both the type of user and the type of built environment can define how a built environment can support the user's activities (Vischer, 2008). The Outcome component — the "users' experiences of the built environment" section — measures the physical, functional and psychological support of that environment for the user; thus their experience with it. The outcomes component also further portrays interaction between the user divisions (individual, group, and organisation) and the above-mentioned support levels (physical comfort, functional comfort, and psychological comfort) (Vischer, 2008).

3.4.1. The User

The *"user"* refers to the people who are occupying the space (Vischer, 2008). As mentioned before, who the user is and what they need from the environment is vital to know in the UCTBE as these aspects are at the centre of the theory. According to Vischer (2008) in order to understand what needs to exist in an environment to support its users, it is important to clarify who the users are. However, many issues can arise when deciding who the users are (Vischer, 2008):

Firstly, what are the parameters that distinguish who are the users and who are not (Vischer, 2008)? In other words, who are the users? Is it only the people who use a specific allocated architectural space frequently or does it also include people outside of that architecture who use the space occasionally? Additionally, is it a heterogeneous group of users, and if so how or who do you cater for everyone, when these differences exist? It is pertinent for there to be an agreement of who the users are in order to decipher their needs (Vischer, 2008).

Secondly, there are moral issues that can arise from deciding who the users of a space are (Vischer, 2008). For example, in spaces where there are more than one type of user, choosing which user has more priority over the development of space may become an ethical dilemma.

Thirdly, users of a space may change over time (Vischer, 2008), especially in office environments where employees are always changing. A flexible space needs to be incorporated. This may change the level or nature of a user-centred approach as the space is no longer developed for the specific user but rather for general users at a specific time that can still be used in the future. This brings into question whether this is a more superficial form of a user-centred approach (Vischer, 2008). However, one could argue this could be a type of "design for" approach.

Resolution of these issues is an important first step to creating a practical user-centred office space. Of course this will not come without some difficulties.

In many ways the users themselves can be considered predictor variables because of their importance and influence in both past research and in the model. For example, the Danielson et al (2014) study that was previously mentioned found differences in satisfaction with types of office designs based on the gender of the user. However, further literature has revealed results that contradict the previous study; for instance, a longitudinal study by Brennan, Chugh, and Kline (2002) on employee satisfaction with open-plan workspaces had found that the subjects had become used to the open-plan workspace and were no longer affected by the environment. As a result, this study tends to contradict the results of the Danielson et al (2014) study. It is plausible that the Brennan, Chugh, and Kline (2002) results may be related to differences in individual perceptions or organisational culture. Can we therefore assume that differences between users can impact on their experiences with that environment? Maher and von Hippel (2005) carried out a study on employees' individual differences in their reactions to open-plan offices. Their research found that individual differences in their reactions, such as their performance or their satisfaction with the environment, was a result of their stimulus screening abilities and inhibitory abilities. Thus it can be assumed that there are characteristic differences between users that can affect their experiences with an environment, as demonstrated by comparing the Danielson, et al (2014) study and the Maher and von Hippel (2005) study.

Research has further indicated differences in environmental experiences according to not only individual differences but also group differences. In a study by Sundstrom, Town, Brown, Forman and Mcgee (1982) on job group experiences with office enclosures, they reported that each job group — secretaries, bookkeepers and accountants, and office managers and administrators (ranked in ascending order of job complexity) — had different perceptions of privacy and their satisfaction with the environment depended on their

respective perceptions. These perceptions of what was constituted as 'private' workspaces were dependent on what each job group prioritised as important factors for their jobs; for secretaries — who were found to have the least physical enclosure— privacy depended on the number of people in the room, thus their job satisfaction levels depended on the level of crowding (Sundstrom et al., 1982). For the bookkeepers and accountants — who were found to have more physical enclosures — their perceptions of privacy were based on the number of co-workers within 25 feet and the number of visible co-workers (Sundstrom, et al., 1982). Thus their job satisfaction depended on level of distraction and noise. Lastly, for office managers and administrators — who had the most physical enclosure of the groups — their perceptions of privacy depended on their visibility to the supervisor, floor-space, and number of co-workers within 25 feet, which influenced their job satisfaction (Sundstrom et al., 1982). It can therefore be assumed that job groups (i.e. the departments to which employees belong) have specific perceptions of privacy, which in turn relates to their level of job satisfaction depending on whether or not the environment fits their perceptions of privacy. This assumption in many ways relates to the design of an office, with the core focus being on functionality. It is possible that certain departments (job groups) require certain types of activities, interactions, and certain levels of privacy based on their task demands or complexity. Thus the office should be designed to fit those activity needs. In the current study the different departments of the Health Insurance Company are placed in different types of design spaces or different types of flexible space arrangements such as the use of fixed desks or hot desking (thus the quality of the space is different). Inferring the results of the Sundstrom, et al (1982) study, it can be assumed that the different departments may have different experiences of the environment. Therefore it can be hypothesised that the departments that employees belong to will have an impact on employees' experiences of job satisfaction and satisfaction with the workplace (Hypotheses 1a and b):

> ***H1a:*** *The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of job satisfaction (DV).*

> ***H1b:*** *The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of satisfaction with workspace layout (DV).*

Employees at the Health Insurance Company were informed of the redesign of the workspace prior to the change. It was communicated to the employees that they should have expected a certain number of changes to their workspace whereby a number of additional facilities would be afforded to each floor with the new design. This would have influenced the employees' expectations of the space. Therefore, taking the previous assumptions a step further, it was additionally inferred that the experiences of the work environment will also differ according to the floor that the employees occupied, as each floor at the Health Insurance Company was changed to varying extents (explained in section 4.4), that may or may not have aligned with different employees' expectations. Alignment with these expectations may additionally have an impact on the employees' satisfaction with the workplace and their job satisfaction. Each floor represents a different group of users; therefore we can hypothesise that the floor which employees occupy (or each floor group) will have an impact on employees' experiences of satisfaction with the workspace and job satisfaction (Hypothesis 2a and b):

> ***H2a:*** *The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of satisfaction with the workspace layout (DV).*
>
> ***H2b:*** *The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of job satisfaction (DV).*

Vischer (2008) makes no mention of how to attain information from users; however, it can be assumed that information about the users can be attained through the following means: interviews, questionnaires, focus groups and/or on-site observations (Abras, et al., 2004).

3.4.2. The Built Environment

The next step to creating a user-centred space is to explain what is meant by the built environment. The *"Built environment"* refers to the office workspace that users are occupying (Vischer, 2008). For example, it could refer to the design of the space: (1) Open-plan, (2) Private — an office separated by floor-to ceiling walls (Maher & von Hippel, 2005), (3) shared — a private office shared by multiple people, generally characterised by two or three people sharing the space (Danielsson, Chungkham, Wulff, & Westerlund, 2014), or a (4) Partitioned (cubicle). It can refer to the physical aspects of the office space, for instance office arrangement, IEQ's, or layout — as was discussed in the physical space

section. It looks at the quality of the environment as a factor that needs to be considered as it can have an impact on employees and their wellbeing (Vischer, 2008).

As was discussed previously, office space design has been an extensively researched area for many years, whereby researchers have consistently measured the effects that offices have on employee behaviour (Brookes & Kaplan, 1972). As was indicated in previous sections, research in this field has generally focused on a number of different outcomes including external variables (i.e. more manifest or observable variables) such as, productivity, performance and absenteeism (Singh, et al., 2010; Saha, 2016; Leblebici, 2012), or more internal variables (i.e. less observable or latent variables) such as, employee morale, satisfaction and comfort (De Croon, Sluiter, Kuijer, & Frings-Dresen, 2005; Leblebici, 2012; Lee & Brand, 2005; Sarode & Shirsath, 2014). Additionally, research has also explored the influences of the physical office workspace on physical and psychological health; as was discussed in the Singh, et al (2010) study that showed offices affected participants' asthma or respiration and depression.

Another example is a recent study conducted by Danielsson, Chungkham, Wulff, and Westerlund (2014) which focused on the impact of office design on sick leave rates. The study used seven office types that had unique architectural (physical features) and functional (how it is organised for functional use) characteristics: (1) cell office, (2) shared-room office, (3) small open-plan office, (4) medium-sized open-plan office, (5) large open-plan office, (6) flexi office and (7) combi-office. The results showed that there was a significant relationship between short sick spells and office types (Danielsson, Chungkham, Wulff, & Westerlund, 2014). The overall higher risks of sick leave were found within all three of the traditional open-plan offices compared to cell offices. The highest risks of short term sick leave were found to be in small open-plan, large open-plan, and medium open-plan office spaces, respectively. They also reported a relationship between long or certified sick leave spells/days and large open-plan offices amongst women. For men, a higher risk of high sick leave spells/days in flexi offices were reported (Danielsson, et al., 2014). Thus, these results indicate that traditional open-plan offices may not be beneficial for general employee health. The possible explanation for the results is that noise levels are higher in open-plan workspaces, which is linked to both dissatisfaction, and decreases in cognitive performance and physiological health (Oldham & Brass, 1979; Jahncke, Hygge, Halin, Green, & Dimberg, 2011). More importantly, the research by Danielsson, et al (2014) identifies a link between office workspace and job satisfaction, physical health and psychological health.

Therefore, it can be hypothesised that the office workspace design has an effect on job satisfaction, and physical and psychological health (Hypotheses 3a–c):

> ***H3a:*** *The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on job satisfaction (DV).*
>
> ***H3b:*** *The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on physical health (DV).*
>
> ***H3c:*** *The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on psychological health (DV).*

In the business context, these outcomes are important concerns as job satisfaction, physical, and psychological health have been linked to productivity (Roelofsen, 2002; Lowe, 2003). For example, a study on stress, burnout, satisfaction and health of nurses found that negative influences, such as burnout, and low mental health have been found to impact on productivity and performance (Khamisa, Oldenburg, Peltzer, & Ilic, 2015).

Research has further found a relationship between the work environment and engagement. Previous research has asserted that the work environment can either be a resource or a demand depending on whether the environment is suitable for the employee's needs or not (Hakanen, Bakker, & Schaufeli, 2006; Hakanen, Schaufeli, & Ahola, 2008; Bakker & Demerouti, 2008). As a demand, an unfavourable work environment can contribute to burnout (Hakanen, Schaufeli, & Ahola, 2008), yet a resourceful environment can promote an employee's willingness to dedicate themselves to a work task (i.e. encourage work engagement) (Bakker & Demerouti, 2008). Engagement is also directly, positively related to comfort levels (physical comfort, functional comfort, and psychological comfort) (Feige, Wallbaum, Janser, & Windlinger, 2013). This is important to businesses as researchers have proclaimed that engagement is also a strong predictor of employee performance (Gruman & Saks, 2011; Markos & Sridevi, 2010).

Bearing in mind the affects the physical space has on employees it is clear that when considering an environment that is best suited for its occupants, considerable thought needs to go into the type and quality of the office space. Vischer (2008) states that feedback about the space from the users can be useful to ensure the experiences of the user are optimal as it informs the designers of their needs. This feedback can be obtained by the same means mentioned previously – interviews, questionnaires, etc. Feedback in our study will be received from questionnaires and focus groups.

3.4.3. The Built Environment's Support for Users' Activities

The next step is to combine the users and their needs with the environmental design developed to meet their needs. It is at this point when evaluations of the environment can be made to determine if the environment supports the user's activities in order for them to perform their tasks (Vischer, 2008). This step therefore focuses on the workspace having a functional layout and physical design that enhances their activities such as having the appropriate facilities and resources to enable task performance; every workspace provides some form of support for its users and their activities, the more support for the task, the more comfortable a space is perceived (Vischer, 2007b).

In order to support the activities of users the environment needs have the appropriate functionality for the space. As was discussed in section 2.4.2., the way in which functionality can be created is through arrangement of the space based on noise reduction, clear pathways, updated equipment, neat spaces, sufficient storage, and teams/employees are arranged based on groups who work together on interdepartmental projects (Samuel, 2006; Kintler & Adams, 1998).

The workspace is also expected to have a physical layout that can support interaction and therefore create a greater sense of social support. Social support from colleagues has been reported as being an important work motivator for employees (Van Yperen & Hagedoorn, 2003). Moreover, the environment should facilitate user's physical and psychological needs, along with their functional needs (Vischer, 2008). A study on ideal workspace layouts that encourage interaction, reported that offices can increase their interaction through well-connected spatial networks and more open, easily accessible public spaces (Rashid, Kampschroer, Wineman, & Zimring, 2006). These help increase visible co-presence and face-to-face interaction which then increases communication between employees and teams, thus improving coordination, organisational agility, and organisational efficiency (Rashid et al., 2006). The current study does this through utilisation of more public spaces and better spatial networks, discussed in more detail in the procedure section 4.4. Furthermore the effects of the interaction will be explored during the focus group phase. The focus group will explore a range of research questions guided by the representatives of the furniture research company, this includes the following question:

***RQ1**: Will the new spatial layout improve social interaction with co-workers?*

3.4.4. The Users' Experiences of the Built Environment

This segment marks the outcomes stage where the users' experiences and perceptions of that environment are observed and evaluated in order to test whether the development was successful in meeting the needs of its users (Vischer, 2008). Vischer (2008) stated that at this stage it is important to identify how one can measure experiences. There needs to be some agreement on what is meant by user experience. Experiences can be measured in a number of ways. Some studies measure the experiences of users through sensory perception, while other studies measure behavioural and psychological phenomena (Vischer, 2008). Experiences of the workspace can be influenced and experienced at three comfort levels:

(1) A physical comfort level. The quality of the indoor environment affects discomfort within the indoor environment as it is related to lower productivity levels in relation to increases in job stress and job dissatisfaction (Roelofsen, 2002; Vischer, 2007). Even factors such as, Indoor Environmental Quality (IEQ) factors, can cause discomfort which can lead to high dissatisfaction rates (Kim & de Dear, 2013), more reports of higher distraction levels (Lee & Brand, 2005), and lower productivity (Öz & Ergönül, 2015). Discomfort may also lead to physical health issues such as asthma exacerbation and respiratory allergies, and psychological health issues such as anxiety, depression, stress, feelings of lack of confidence, and low energy (Ghodrati, Samari, & Mohd Shafiei, 2012). According to Vischer (2007) physical comfort can also include even the most basic human needs such as safety, hygiene and accessibility. Experiences at this level are generally felt at a biological/physiological level (Feige, et al., 2013).

(2) A functional comfort level. "Functional comfort is defined in terms of ergonomic support for users' performance of work-related tasks and activities" (Vischer, 2007; p. 179). It focuses on the suitability of the space in facilitating work-related tasks (Feige, et al., 2013). Functional comfort is related to the IEQ factors previously mentioned (Vischer, 2007) as there is a relationship between the physical comfort and functional comfort. According to Vischer (2007), functional discomfort can cause depletion in energy that would otherwise be used in their performance. Therefore it can be assumed that functional comfort and performance are related.

(3) A psychological comfort level refers to a number of variables that can affect psychological wellbeing. Often this can be through spatial, individual, social and interpersonal needs (Feige, et al., 2013). One possible means of attaining

psychological comfort can be as a result of one's feelings of belonging (which can be linked to interaction), ownership, and control over workspace (autonomy) (Vischer, 2007). A sense of belonging has been considered a factor that influences health (Hagerty, Williams, Coyne, & Early, 1996). It is believed to be related to social functioning (social involvement) and psychological functioning (depression, anxiety, and loneliness). More specifically, higher scores in belongingness had higher scores in social functioning wherein participants were more involved with their community (Hagerty, Williams, Coyne, & Early, 1996). Higher scores in belongingness had lower scores in depression, anxiety and other psychological functions (Hagerty, Williams, Coyne, & Early, 1996). Interaction will be explored in the focus group phase of this study.

Additionally, the outcome variables are not only split into comfort levels but also into the users' experience of the environment from an individual, group, and organisational level (Vischer, 2008). The individual and group categories were explained extensively in the "users" section; the variables that were consequently discussed as a result will be used in this study which aims to look at the experience of the user at an individual level and at a group level (distinguished by department), which aligns with the Sundstrom, Town, Brown, Forman and Mcgee's (1982) research study that stipulates that different work types (departments) will have different experiences with the change in workspace. The organisational level of experience was mentioned briefly in the Brennan, Chugh, and Kline (2002) study, which mentioned organisational culture as an influence; however, it will not be under investigation in the current study.

Vischer's UCTBE model has not been used or tested in many studies except for one where researchers Feige, Wallbaum, Janser and Windlinger (2013) did a study on the relationship between Vischer's comfort levels and productivity in a sustainable building design. The study was conducted under the premise that the quality of a sustainable building will have an impact on comfort, performance and work engagement. The study received approximately 1500 usable responses from 18 building areas. The results showed that firstly, there was a relationship between the building and comfort level (the building features included operable windows or air conditioning). Secondly, work engagement was correlated to comfort levels, but productivity was not. This also indicated that higher levels of comfort will help reduce turnover rates. Lastly, results also revealed that offices that showed a higher interest in user needs had more positive ratings. It is important to bear in mind that the results were preliminary as the study was planned to continue (Feige, et al., 2013). Based on

these results it can be assumed that satisfaction with the workspace (higher comfort levels) will relate to levels of productivity and work engagement (Hypotheses 4a and b):

> ***H4a:*** *Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of productivity (performance) (DV).*
>
> ***H4b:*** *Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of work engagement (DV).*

Satisfaction with the workspace layout and employee performance can also be explored qualitatively by means of focus groups. The way in which the space has been experienced and how it has affected their performance are topics that can only be explored holistically using a mixed method approach. Thus these two topics will further be explored during the focus groups. The research questions to be explored are as follows:

> ***RQ2:*** *Will the new spatial layout improve the employee performance?*
>
> ***RQ3:*** *Will employees be satisfied with the new workspace layout?*

Reflecting on the results of this study and that of the Danielsson, et al (2014), what is notable was the fact that the office design layout would have an effect on employee outcomes. Thus satisfaction with the environment would have an impact. Combining the premises of the Danielsson, et al (2014) (of the design having an impact on job satisfaction and psychological health) study and the Feige et al (2013) study (of satisfaction with the layout having an impact on employee outcomes), a question of whether satisfaction with the layout of the workspace layout would also lead to job satisfaction and psychological health arises. Therefore the following hypotheses will be explored:

> ***H4c:*** *Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of job satisfaction (DV).*
>
> ***H4d:*** *Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of psychological health (DV).*

The feedback required to ensure the needs of the users are met, can be attained through the exploration of their experiences with the environment. Future improvements of the space can thereby be made based on the feedback received. For the health insurance company this

becomes the opportunity to change the elements of the new space that does not quite meet the needs before their move to the new office building.

3.5. Summary

The aim of Part II in the literature review was to establish a theoretical model that could underpin the way in which the study can be conceptualised. Vischer's (2008) UCTBE model integrates the themes of physical space quality, functionality, communication and user orientation. It also aimed to establish a set of hypotheses and research questions in relation to the themes raised in office workspace literature.

Exploration of the UCTBE model yielded eleven hypotheses that focus on (1) the relationships between group variables, such as department groups and floor groups, and job satisfaction and satisfaction with the workspace layout. (2) The relationship between the design of the space and job satisfaction, physical health, and psychological health. And (3) the relationship between satisfaction with the workspace layout and work engagement, productivity, job satisfaction and psychological health. The exploration also alluded to the importance.

3.6. Summary of Hypotheses/Research Questions

3.6.1. Quantitative Research Hypotheses

H1a: The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of job satisfaction (DV).

H1b: The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of satisfaction with workspace layout (DV).

H2a: The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of satisfaction with the workspace layout (DV).

H2b: The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of job satisfaction (DV).

H3a: The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on job satisfaction (DV).

H3b: The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on physical health (DV).

H3c: The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on psychological health (DV).

H4a: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of productivity (performance) (DV).

H4b: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of work engagement (DV).

H4c: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of job satisfaction (DV).

H4d: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of psychological health (DV).

3.6.2. Qualitative Research Questions

RQ1: Will the new spatial layout improve social interaction with co-workers?

RQ2: Will the new spatial layout improve the employee performance?

RQ3: Will employees be satisfied with the new workspace layout?

CHAPTER FOUR

4. Methods

4.1. Research Design

The study consisted of two components: a quantitative component, whereby employees were administered questionnaires, and a qualitative component wherein employees were given the opportunity to participate in several planned focus groups headed by representatives of the research/furniture company; thus this study was a mixed methods design. Using a mixed method design, the aim was to gain a better understanding of the experiences felt by employees in their workspace environment depending on both group differences and individual differences. Mixed method has been considered to be particularly advantageous as it is a more holistic approach that compensates for the shortcomings of either a quantitative or qualitative approach on its own (Creswell, & Plano Clark, 2011). It is able to remove the biases found in qualitative research and the lack of in depth understanding of personal experiences found in quantitative research (Creswell & Plano Clark, 2011).

The quantitative component of the study aimed to explore the relationship between the workspace environment and differences in employee experiences depending on the groups they belong to (H1, H2, and H3), as well as individual perspectives of comfort levels (H4). These relate back to Vischer's (2008) individual versus group level experiences, which describes the differences in users' experiences based on these levels. The quantitative component focused on the relationships between department groups, and job satisfaction and satisfaction with the workspace layout; floor groups, and job satisfaction and satisfaction with the workspace layout; the design of the space and job satisfaction, physical health, and psychological health; and the relationship between satisfaction with the workspace layout and work engagement, productivity, job satisfaction and psychological health. The qualitative component then aimed to gather qualitative information on individual employees' overall personal experiences with the environment and whether the actual change in the work environment has had an effect. In other words the quantitative component aimed to test the relationship between workspaces and specific variables, and the qualitative component aimed to explore these relationships with a more extensive, personal perspective of the effects of the new workspace and whether employees felt it had a significant impact on them. As a user-centred design, a mixed methods approach would be

suitable as it focuses on user experiences and gets both a quantifiable and qualitative depth to the analyses.

The design of the quantitative study is a one-group, posttest-only, non-experimental design. This is due to the fact that the measure is administered after the manipulation (workspace refurbishment), to a single group with no control or baseline group. However, there will be inter-group comparisons. Furthermore, there cannot be random assignment as participants were measured within their pre-established groups which cannot be changed as these groups are based on their occupations at the organisation. Moreover, it is a cross-sectional, between-subjects design. The design of the study can limit what can be inferred from the research such as whether the change improved employee wellbeing, satisfaction and productivity.

4.2.Sample

The study used a non-probability, convenience sample consisting of the South African health insurance subsidiary branch employees. The intended target group occupied three floors of the health insurance building: second, third, and fourth floors. All employees on each floor of the subsidiary branch were invited to voluntarily take part in the study.

4.2.1. Quantitative Sample

Employees were approached at the offices on all three floors and those who volunteered were handed a questionnaire. Approximately 304 questionnaires were handed out and 160 were completed, thus the response rate was 52.63%.

4.1.1.1. Missing Values

Scales that were missing too many item answers were removed from the study. Due to the small sample size, it was set that the number of missing values cannot exceed 30%. For each scale this means that:

(a) Psychological wellbeing - participants who have not responded to more than 2 items will be problematic (30% of 7 items = 2.1)
(b) Physical wellbeing - participants who have not responded to more than 4 items will be problematic (30% of 15 items = 4.5)
(c) Reversed work engagement - participants who have not responded to more than 1 item will be problematic (30% of 6 items = 1.8)

(d) Satisfaction with work layout - participants who have not responded to more than 5 item will be problematic (30% of 19 items = 5.7)

Participants were removed from the sample if too many items were missing from all of the above.

Two participants were removed from the study as they had too many missing items, thus the final sample consisted of 158 participants. One participant, however did not respond to many items in the final scale but did answer every question in the rest of the survey, thus the participant was kept in as overall he/she answered more than 70% of the items.

4.1.1.2. Demographics

The demographics were as follows:

Table 1

Demographics Table

		Sample (n = 158)							
		n	**$\bar{x}$**	**SD**	**Mode**	**Range**	**Min.**	**Max.**	***Missing**
Gender	**M**	81 (51.27%)	-	-	-	-	-	-	1
	F	76 (48.10%)	-	-	-	-	-	-	
Age		149	31.62	7.637	27 years old	40	20	60	9
When they started working at the company		153	3.59 years ago	4.143 years ago	Year 2016	22 years	0	22	5
Number of hours they work per day		156	7.58	1.5587	8 hours	8	3	11	2
Number of Days they work per week		158	4.91	0.601	5 days	6	1	7	0

Certain demographic details, such as race, could not be asked for in the questionnaires as employees were concerned about anonymity as too many details would identify them in their work teams. The sample of participants consisted of 158 participants; of this sample there were 81 identified males (51.27%) and 76 identified females (48.10%), and 1 respondent who did not include their gender. Of the participants who responded the average age reported was 31.65 (SD = 7.637). On average employees work 7.577 (SD = 1.5587, s^2 = 2.430) hours a day, 4.91 (SD = 0.601, s^2 = 0.632) days a week. Employees began working at the health insurance subsidiary branch between 0 and 22 years ago ($\overline{x}$ = 3.59, SD = 4.143, s^2 =17.164).

Table 2

Crosstabulation Depicting the Number of Participants per Floor and Neighbourhood

			Block				
			Multiple blocks	**West block**	**Centre block**	**East block**	**Total**
Floor	**Second floor**	**Count**	1	33	25	32	91
		% of Total	0.7%	22.0%	16.7%	21.3%	60.7%
	Third floor	**Count**	0	1	1	15	17
		% of Total	0.0%	0.7%	0.7%	10.0%	11.3%
	Fourth floor	**Count**	0	6	0	36	42
		% of Total	0.0%	4.0%	0.0%	24.0%	28.0%
Total		**Count**	1	40	26	83	150*
		% of Total	0.7%	26.7%	17.3%	55.3%	100.0%

**There were 8 missing responses that were not included in the crosstabulation totals.*

4.2.2. Qualitative Sample

The qualitative sample was invited by the furniture research company to participate in focus groups that were run over the course of a week. The focus groups did not have a set limit as it was contingent on the number employees who could join. We were allowed to join and take note of the concerns raised during the focus groups. The researcher attended five focus

groups, in which each focus group had a varying number of employees participating (see Table 3 below for information on the number of participants).

Table 3

Depicting the Intended Targets of Each Focus Group and Number of Attendees per Group

Group	**Intended targets**	**Number of Attendees**
Focus group 1	Second floor occupants	9
Focus group 2	Third floor occupants	14
Focus group 3	Second floor occupants	7
Focus group 4	Fourth floor occupants	10
Focus group 5	Second floor occupants (however, fourth floor occupants had also joined)	6

4.3.Instruments

4.3.1. Quantitative Instruments

Surveys consisted of the following sections (see questionnaire in Appendix I):

Demographic information: Gender (Male/Female), Date of birth, Work duration at health insurance company, organisational role, Department, Office workspace type (private, shared, private cubicle, and open-plan), number of hours spent in workspace, and number of working days per week they go to work in office (see section 4.2.).

Psychological Wellbeing: The Short Warwick-Edinburgh Mental wellbeing Scale (SWEMWBS) (2009). The original WEMMBS was initially 14-items. The instrument was then reduced down to 7 relevant items, and was measured on a 5 point likert-type scale ranging from "None of the time" to "All of the time". It uses statements such as, "I've been thinking clearly" and "I've been feeling optimistic about the future". The scale has positive scoring thus higher scores represent higher wellbeing. The original scale had reported a Cronbach alpha of .85. In the current study we tested for reliability on this scale, the scale reported a Cronbach alpha of .87.

Job satisfaction: A single item on job satisfaction scale using a 5 point likert-type scale ranging from "Very dissatisfied" to "Very Satisfied" that asks, "Taking everything into consideration, how do you feel about your job in the last month?" was used. Higher scores represent higher job satisfaction.

Physical wellbeing: The Hedge et al (1996) sick building syndrome scale (SBS) uses a 4 point scale with the following response headings: "Never", "1-3 times a month", "1-3 times a week", and "every day"; however reliability of the scale was not reported. Participants were asked how often they experience various symptoms such as, "excessive mental fatigue" and "headache in your forehead". This scale had a negative scoring thus higher scores in this scale represent worse physical wellbeing. The aim of this variable in the current study was to test whether there were any occurrences of physical ailments amongst the sample, thus larger scores will highlight this more intensely. Therefore the score was kept as negative scoring. In the current study we tested for reliability on this scale. The scale reported a Cronbach alpha of .88.

Work Engagement: The Nieuwenhuis et al.'s (2014) Work Engagement Scale is a 6 item scale that uses a 5 point likert-type scale ranging from "Not at all" to "very often". Participants were expected to respond to when they last experienced symptoms that include "feeling apathetic", "feeling bored", and "being easily distracted". The reported Cronbach alphas of .83 and .84. The initial scale was used to represent scores of higher disengagement, however in order to create a scale whereby higher scores represent higher perceptions of work engagement the scores were reversed. In the current study we tested for reliability on this scale. The scale reported a Cronbach alpha of .86.

Perceived satisfaction with the workspace layout: Thatcher and Chunilal's (2015) Workplace Layout Scale uses a 5 point likert-type scale ranging from "Very dissatisfied" to "Very Satisfied". It is a 19 item scale that includes statements such as, "I am able to use my relevant furniture/appliances in my "work" area without physical space problems" and "My "work" area meets my work needs in terms of its physical layout". The reported Cronbach alphas were .88 and .90. Higher scores mean a higher level of satisfaction with the workspace layout. In the current study we tested for reliability on this scale. The scale reported a Cronbach alpha of .92.

Perception of productivity: A scale that ranged from negative 40 to positive 40 was used to record the amount of perceived productivity felt by employees. It consisted of a single item that stated: "On a scale of -40 to +40 (where negative represents a decrease in productivity,

0 represents no change, and positive represents an increase), rate how you have been working over the last month in relation to your full capacity? Please indicate using a vertical line or circle".

The final question of the survey was a brief qualitative question which asks employees to describe what factors had impacted on their productivity.

4.3.2. Qualitative Instruments

Over the course of a week focus groups were conducted by the research company, notes on themes brought up by the attendees were made. The focus group was guided by questions of satisfaction with the space, the amount of communication/interaction created through the space, and which elements were being used. The focus groups participants were allowed to speak and mention any concerns or contentment with the space. Employees were also asked about their preference between the old space and new space. Notes on the relevant topics were taken.

4.4.Procedure

From the beginning of 2016 the health insurance subsidiary branch and the furniture research company had coordinated designs and setup of the pilot for the new office space. The pilot had been intended to go live on the 8th August 2016 where the space was completely refurbished and all employees occupied the new spaces.

The workspace layout was recreated to one that has the following agile spaces to improve functionality and interactions: 'walk-n-talk' spaces (passages where walk-and-talk interaction is encouraged), intersection spaces (a community space with areas to sit and interact, as well as lockers for employees to place belongings), pause areas (places to eat), pit-stop spaces (informal meeting spaces to increase interaction), huddle rooms (for formal meetings which are cellular office spaces), quiet areas (reflective and regenerative space), team tables, phone booths (for employees to have privacy when on personal calls), and private offices for higher management, however lower management were moved to the open-plan space. The spaces were integrated in such a way that the physical comfort of the space and functionality of the space merge to create a diverse interactive and comfortable space for employees to work. In other words the workspace had well-connected spatial networks and more open, easily accessible public spaces. More scribe walls were provided in various sections for both projects and for quick brainstorm sessions.

The spaces were carefully planned for functionality: informal meeting spaces were surrounded by lockers or space partitions to create noise barriers, photocopy machines were placed away from working spaces to reduce noise, and department groups were arranged closer to other departments that coordinate more often.

In terms of physical design, prior to the change, the desks were fixed open-plan desks that were clustered together and more desks were left unoccupied (thus there was a surplus of desks than was needed). After the change, the surplus of desks were removed and space was arranged for functional purposes. For most of the space the desk arrangements were changed to hot-desking (flexi-desks), however employees were expected to sit in particular "neighbourhoods". Neighbourhoods were specific planned out areas of the floor for specific groups of people. For example, a certain department would be expected to sit anywhere in central block. However, particular departments were given fixed desks as their work required highly sensitive information and certain types of equipment to use such as the fourth floor call centre agents or financial admin. The fourth floor received the least amount of change due to the nature of the work, thus many needed to retain their fixed desk structure. However, certain spaces and arrangements were changed in order to accommodate certain agile space features such as the phone booth and quiet spaces. Little could be changed in this space due to the very small and already limited space on fourth floor. The second floor, on the other hand, is a very large space that takes the entire floor space from East to Central to West block. This of course created better opportunities for the most change. Most of second floor was agile space thus meaning more employees were expected to hot desk in their neighbourhoods. The third floor was smaller than the second floor but slightly larger than the fourth, thus more features were added than in fourth but less than second (See Appendix II for an extract of one of the floor plans).

The survey was administered from 17 October 2016 until 31 October 2016 after which the focus groups commenced. This gave participants approximately 2.5 months to settle into the new space. During the first week of the survey administration, all employees were approached personally throughout the office and asked to complete the survey. Surveys were then collected by hand or alternatively participants were asked to place the completed surveys in survey collection boxes placed at each pause area if they completed the surveys beforehand collection. Collection boxes were collected on the 31st October 2016.

The focus groups were scheduled to begin from the 3rd of October through to the 4th November 2016. Employees were contacted via email and asked to volunteer in

participating in specific focus groups allocated to their floor areas and neighbourhoods so as to receive feedback on their experiences with the space. According to the research company heading the focus groups, the focus groups were designated by the floors and neighbourhoods the employees occupied, as each floor and neighbourhood had a different set of resources and facilities placed in that space; this enabled them to keep track of which facilities which were being most used and it further enabled them to see the difference in their reactions to the space. Times and meeting areas were described in the email. Employees who wanted to participate could join any time within the allocated meeting times. The focus groups were facilitated by two of the research company's representatives from the UK. The focus groups could not be recorded, however thorough hand-written notes were taken.

4.5.Analyses

4.5.1. Quantitative Analysis

Hypotheses 1–3:

H1 to H3 all used a One-way ANOVA. One-way ANOVA's were used as the IVs for each respective hypotheses had more than 3 levels (as indicated in the hypotheses) and the aim was to find a relationship between each of the IV levels and the respective DVs and compare the relationships, which can be done using an ANOVA as it focuses on group level comparisons.

Hypotheses 4a-d:

Correlation and Simple Linear Regressions. These hypotheses were tested using simple regressions, however, before we could conduct the simple regressions a correlation was done in order to ensure there was a relationship between the variables. Simple regressions were suitable because there was only a single IV tested against the DVs:

- Satisfaction with the Workspace Layout on Perceptions of Productivity (Performance)
- Satisfaction with the Workspace Layout on Work Engagement
- Satisfaction with the Workspace Layout on Perceptions of Job Satisfaction
- Satisfaction with the Workspace Layout on Perceptions of Psychological Wellbeing.

4.5.2. Qualitative Analysis

Thematic Content Analyses. Thematic content analysis was used in order to identify and report recurring themes brought up during the focus groups. We then interpreted the themes and the subsequent effects on employees' experiences with the environment.

The type of thematic approach used to analyse the focus group data and qualitative questions was both theoretical and inductive. Theoretical refers to an already guided by theory analysis (Braun & Clarke, 2006). There were specific research questions that guided this research report based mainly on conceptual theories discussed in the literature review. Yet at the same time, during the coding process the themes were open to change and expand on as analysis continued. This takes on a more explorative, inductive approach (Braun & Clarke, 2006). Furthermore, the analysis focused on semantic themes (explicit/surface themes) (Braun & Clarke, 2006) as the main focus and aim of the research report was to explicitly examine the experiences of employees within a space through direct explanation of these experiences from the employees.

A structured guide to Thematic Analysis was developed by Braun and Clarke (2006). This guide states that there are six phases to analysis:

i. Familiarisation with the data

ii. Generation of initial codes

iii. Search for themes that arise using the codes created

iv. Review of themes

v. Definition and naming of themes

vi. Production of the report

This process of analysis was therefore used to develop the themes of the study. The aim of the qualitative component of the study was to explore the experiences of employees within the new functional, collaborative space. In order to gain qualitative information on this, a qualitative question was asked in the surveys handed out (n = 119 out of 160 filled in responses; thus 74.38% response rate) and focus groups were conducted by the research company heading the project. Information was gathered from 5 focus groups (focus group 1, n = 9; focus group 2, n = 14; focus group 3, n = 7; focus group 4, n = 10; focus group 5, n = 6). In total there were 46 participants in the focus groups. Focus groups were conducted in

available meeting areas on each respective floor. Analysis was conducted on all the possible themes that had arisen in both the focus groups and the qualitative questions.

The themes described are discussed such that they explain the thematic exploration of employee's reactions and concerns, while at the same time answering the research questions proposed in this research paper.

4.6.Ethical Considerations

According to the Belmont Report, there are three main ethical principles that need to be taken into consideration: respect for persons, beneficence, and justice (Beauchamp, 2008).

The first principle, respect for persons, relates to issues surrounding privacy, informed consent and confidentiality (Beauchamp, 2008; Lo, 2010). Communications between the researcher and the health insurance company had indicated a concern from employees with respect to anonymity and confidentiality. Employees were concerned with anonymity as they felt that too much identifying information on the survey would enable the company to identify them; especially people from smaller teams. Racial categorisation may have tipped the scales in terms of identification, thus it was left out. The employees taking part in the quantitative study were given participant information sheets that gave them the relevant information about the surveys (see Appendix III). However, the employees had no choice in being part of the intervention as this was a compulsory transition implemented by their organisation. Confidentiality and anonymity were maintained as access to completed questionnaires was strictly limited to the researchers (student and supervisor) conducting the study. Any information requested by the company was given via a summary report with no information that could be traced back to any individual employee.

The second principle, beneficence, links to risk/benefit assessment wherein the benefits of a study should outweigh the risks of a study (Beauchamp, 2008; Lo, 2010). The risk of the current study is the strenuous effect of moving and changing office workspaces. However, as there were initial plans to move office workspaces prior to the study, employees therefore were made aware of the potential transition and were given time to prepare for the changes; this reduced the risk of excessive strain on the employees. Additionally the benefits of a positive outcome of this study will have greater health, performance, and interactive effects for the employees. The benefits of participation in this study granted participants the opportunity to express their satisfaction or concerns with their new work environment.

Moreover, it contributed to the broader area of research on the various effects of the physical environment on employees from a South African context.

The third principle, justice, involves all participants being given the same amount of burdens and benefits of the research (Beauchamp, 2008). Thus selection of participants was equitable (Lo, 2010). The entire subsidiary branch was affected by the intervention however different levels of change on each floor were evident. This was due to constraints if the space on each floor level. Participants had equal opportunity to choose to volunteer to participate in questionnaires and/or focus groups, as well as the opportunity to withdraw from the focus groups without any drawbacks.

CHAPTER FIVE

5. Results

5.1.Quantitative Results

As was stated previously, 160 surveys were completed out of 304 that were handed out; of this number 2 were removed from the data set during the cleaning process as they had completed less than 70% of the items; therefore the final sample count was 158. In order to explore the results, this section will be explained based on Hypotheses exploration.

5.1.1. One way ANOVAs

5.1.1.1. Assumptions of all DVs that need to be met:

(a) Random sampling was assumed as groups of participants were defined and tested based on their roles that were already set at the company.
(b) Dependent Variable is at least Interval scale for all of the DVs
(c) Normal distribution was tested as follows:
    i. Skewness and Kurtosis coefficients

Table 4

Table Depicting the Skewness and Kurtosis Coefficients

		Psychological Wellbeing	Job Satisfaction	Physical Wellbeing	Work Engagement	Work Layout	Productivity
N	**Valid**	158	157	158	158	158	154
	Missing	0	1	0	0	0	4
Skewness		-.097	-.473	.729	-.277	-.529	-.236
Kurtosis		-.142	-.298	-.143	-.462	.863	-.867

In order to indicate for normality using Skewness and Kurtosis coefficients, the value has to be between -1 and 1. As can be observed in Table 4 all the coefficient values of all the DV variables were within this range, indicating to normal distribution.

    ii. Kolmogorov-Smirnov and Shapiro-Wilk tests

Table 5

Table Depicting the Kolmogorov-Smirnov and Shapiro-Wilk tests for Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Job Satisfaction	.237	153	.000	.888	153	.000
Psychological Wellbeing	.088	153	.006	.977	153	.012
Physical Wellbeing	.144	153	.000	.942	153	.000
Work Engagement	.080	153	.019	.977	153	.011
Workspace Layout Satisfaction	.061	153	.200*	.978	153	.013
Productivity Scale	.155	153	.000	.955	153	.000

The Kolmogorov-Smirnov (K-S) and Shapiro-Wilk tests, however seem to mostly contradict the skewness and kurtosis results. On the Kolmogorov-Smirnov test, job satisfaction, psychological wellbeing, physical wellbeing, work engagement and productivity all show significant results, meaning that they were not normally distributed. However, workplace layout satisfaction is not significant on K-S which indicates a normal distribution. The Shapiro-Wilk test reports all significant results which firstly contradicts the K-S report for workplace layout satisfaction and secondly indicates that the distribution may not be normal. More information was needed to verify this, thus more tests were observed.

iii. Histograms and Q-Q plots

The histograms (below) portray a close to normally distributed bell curve for workplace layout satisfaction and psychological wellbeing, however, physical wellbeing seems to have very slight skewness. Work engagement and job satisfaction both seem to border normal and skew as the shapes are close to normal distribution yet the right tails do not stretch as

much as the left tail. Productivity on the other hand is not skew but has a bimodal shape due to the large mode.

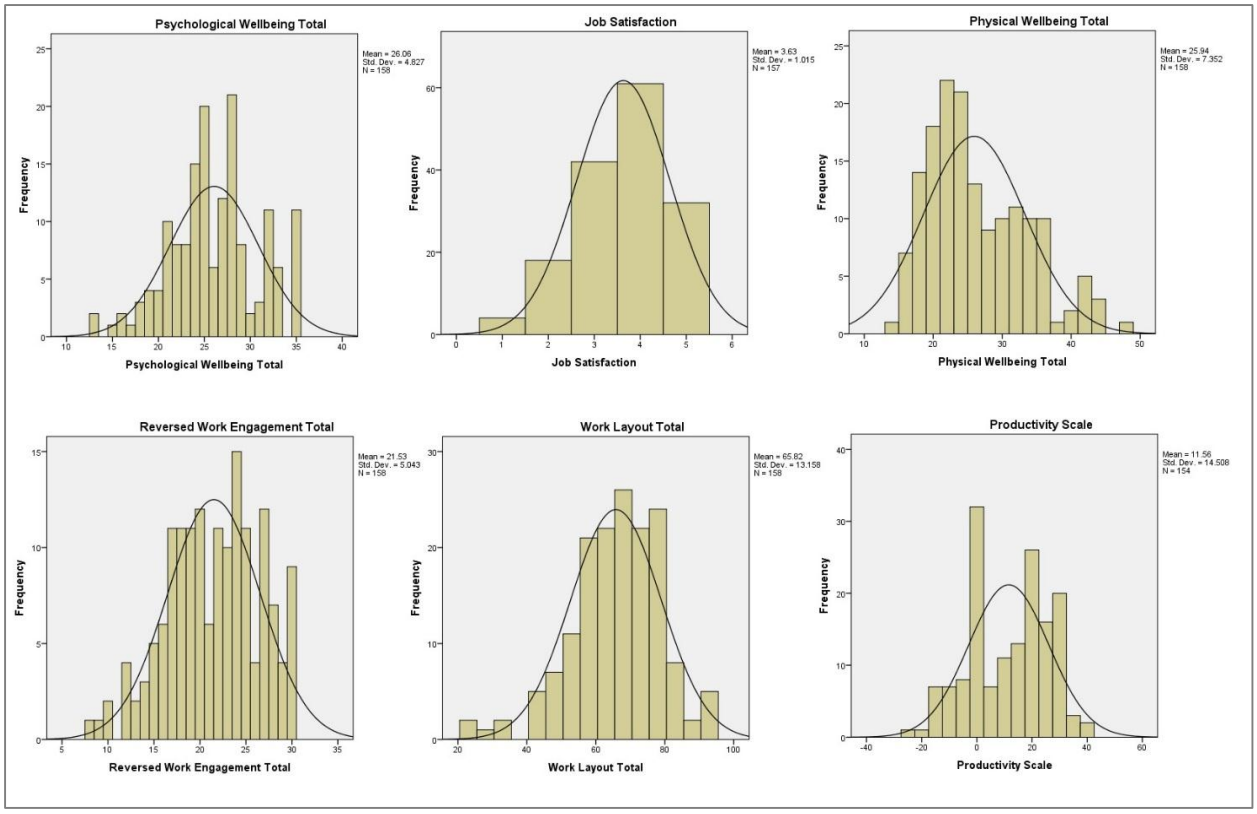


Figure 2: Frequency Histograms of Psychological Wellbeing, Job Satisfaction, Physical Wellbeing, Work Engagement, Satisfaction with the Workspace Layout, and Productivity.

iv. Descriptive Statistics of All the Scales

Based on the mean, median and mode scores (see Table 6 below), it can be concluded from all of the above that workplace layout and psychological wellbeing are very close to normal distribution such that they did not need to be fixed. Work engagement and job satisfaction were also taken as normally distributed as more information points to the variable being normally distributed. Physical wellbeing and productivity however, were slightly skewed or abnormal based on observations of the histograms, box plots, the mean/median/mode table, the Q-Q plots, and Kolmogorov-Smirnov and Shapiro-Wilk tests. In order to fix majority of these variables, the following were transformed (see section 5.1.1.2.):

- Physical wellbeing – a Log transformation as the data was positively skewed (Field, 2013).
- Productivity – a reverse Square Root transformation as the data had a negative shape. A transformation was used to fixed the kurtosis coefficient in

order normalise the distribution and try align the mean, median and mode (Field, 2013).

Table 6

Table of the Descriptive Statistics of the Scales

		Psychological Wellbeing	Job Satis-faction	Physical Wellbeing	Work Engagement	Work space Layout Satisfaction	Produc-tivity
N	**Valid**	158	157	158	158	158	154
	Missing	0	1	0	0	0	4
Mean		26.06	3.63	25.94	21.53	65.82	11.56
Median		26.00	4.00	24.00	22.00	66.00	14.50
Mode		28	4	21	24	66[a]	0
Std. Deviation		4.827	1.015	7.352	5.043	13.158	14.508
Range		22	4	34	22	72	65
Minimum		13	1	14	8	23	-25
Maximum		35	5	48	30	95	40

a. Multiple modes exist. The smallest value is shown

(d) Homogeneity of Variance of ANOVA scales (Job Satisfaction, Satisfaction with the Workspace Layout, Physical Wellbeing and Psychological Wellbeing)

A one-way ANOVA makes the assumption that the variances between groups are equal. Unequal variances can be problematic as they can cause Type I errors. Homogeneity of variance can therefore be tested using the Levene's test of Equality of Variances. This was checked during the One-way ANOVA analyses (see the results of the ANOVAs for the Levene's test results).

5.1.1.2. Transformations

(a) Physical wellbeing

Physical wellbeing was positively skewed therefore a log 10 transformation was used to normalise distribution. The results of the transformation had normalised the histogram and

Q-Q Plot. The table below (table 7) further indicated that the mean, median and mode were close to normal distribution. Additionally, the skewness and kurtosis coefficients also indicated a normal distribution. Thus the transformation had an impact despite the Kolmogorov-Smirnov and Shapiro-Wilk scores (Table 8).

Table 7

Table of Descriptives for Physical Wellbeing after Log Transformation

Physical Wellbeing LOG10

N	**Valid**	158
	Missing	0
Mean		1.40
Median		1.38
Mode		1.32
Std. Deviation		0.12
Variance		0.01
Skewness		.22
Kurtosis		-0.72
Range		0.54
Minimum		1.15
Maximum		1.68

Table 8

Table Depicting the Kolmogorov-Smirnov and Shapiro-Wilk Tests for Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Physical wellbeing LOG10	.090	158	.003	.978	158	.014

a. Lilliefors Significance Correction

(b) Productivity

The productivity scale had a negative shape thus a reverse score transformation was needed. A Square Root transformation was used, and it was then reversed during the transformation;

as indicated by Field (2013). After the transformation the transformed results scores were reverted back from the negative to positive scale. The transformation results had not made a large difference, thus the scores remained slightly skewed. Therefore the research report continued to use the untransformed variable.

5.1.1.3. Exploration of Hypotheses 1a and 1b

The following ANOVAs are testing for:

H1a: *The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of job satisfaction (DV).*

H1b: *The type of department group (Training and Quality, Services and Queries, Ops and Maintenance, New Product Development, Sales and Retention, and Reporting) (IV) will have an influence on employees' experiences of satisfaction with workspace layout (DV)*.

In order to test for homogeneity of variance (i.e. the assumption that variance between groups are equal), the Levene's test was used (see Table 9 below). The result of the Levene's test on job satisfaction reported $p = 0.437$ (thus $p > 0.05$) which indicates that there was homogeneity of variance. This was good for the study as this suggested that all the ANOVA assumptions were met and therefore parametric testing could be used. The result of the Levene's test for Workspace layout satisfaction reported $p = 0.896$ (thus $p > 0.05$) which suggested that there was also homogeneity of variance with workspace layout satisfaction.

Table 9

Test of Homogeneity of Variances

	Levene Statistic	**df1**	**df2**	**Sig.**
Job Satisfaction	0.986	6	144	0.437
Workspace Layout Satisfaction	0.372	6	145	0.896

In the overall sample there were 31 teams/departments that were identified. There were too many groups with very small group sample numbers, thus to ensure there were enough participants in each group to run the ANOVA, we defined them by their respective broader

department groups (see Table 10 below for more detail). An ANOVA was conducted in order to test if there was a relationship between departments and job satisfaction

Table 10

Table of Descriptives of Department Group on Job Satisfaction and Workspace Layout Satisfaction

	Job Satisfaction			Workspace Layout Satisfaction		
Team/Department	**N**	**Mean**	**Std. Deviation**	**N**	**Mean**	**Std. Deviation**
Multiple departments	6	3.83	1.169	6	64.50	12.880
Training and Quality	10	4.30	.675	10	70.30	11.889
Services and Queries	54	3.83	.986	54	67.96	13.904
Operations and Maintenance	25	3.72	.737	25	66.00	12.852
New Product Development	31	3.61	1.054	31	67.61	12.107
Sales and Retention	16	2.88	1.025	16	57.00	14.161
Reporting	9	3.11	1.054	9	60.56	11.370

ANOVA statistic results (see Table 11, on the next page) for team/department on job satisfaction was $F(6,144) = 3.349$, $p = 0.004$ (thus $p < 0.05$).

Table 11

ANOVA Table for Department Group on Job Satisfaction and Workspace Layout

		Sum of Squares	df	Mean Square	F	Sig.
Job Satisfaction	**Between Groups**	18.626	6	3.104	3.349	.004
	Within Groups	133.467	144	.927		
	Total	152.093	150			
Workspace Layout Satisfaction	**Between Groups**	2049.960	6	341.660	2.001	.069
	Within Groups	24752.013	145	170.704		
	Total	26801.974	151			

A conservative post hoc test was used, the Tukey HSD (see Table 12 on the next page). The results of the post hoc revealed that there were mean differences between 'sales and retention' (i) and 'training and quality' (j) ($\overline{x}_i - \overline{x}_j = -1.425$, $p = 0.006$) as well as a difference between 'sales and retention' (i) and 'services and queries' (j) ($\overline{x}_i - \overline{x}_j = -9.58$, $p = 0.011$). Both training and quality, and services and queries were higher than sales and retention. Therefore, Hypothesis 1a has been accepted as there is a mean difference between at least one group pair.

Table 12

Tukey HSD Post Hoc Test for Department Group on Job Satisfaction

Tukey HSD

	(I) Departments	(J) Departments	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Job Satisfaction	Multiple Departments	Training and Quality	-.467	.497	.966	-1.95	1.02
		Services and Queries	.000	.414	1.000	-1.24	1.24
		Operations and Maintenance	.113	.438	1.000	-1.20	1.42
		New Product Development	.220	.429	.999	-1.06	1.50
		Sales and Retention	.958	.461	.371	-.42	2.34
		Reporting	.722	.507	.788	-.80	2.24
	Training and Quality	Services and Queries	.467	.331	.797	-.52	1.46
		Operations and Maintenance	.580	.360	.676	-.50	1.66
		New Product Development	.687	.350	.443	-.36	1.73
		Sales and Retention	1.425*	.388	.006	.26	2.59
		Reporting	1.189	.442	.109	-.13	2.51
	Services and Queries	Operations and Maintenance	.113	.233	.999	-.58	.81
		New Product Development	.220	.217	.950	-.43	.87
		Sales and Retention	.958*	.274	.011	.14	1.78

	Reporting	.722	.347	.368	-.31	1.76
Operations and Maintenance	New Product Development	.107	.259	1.000	-.67	.88
	Sales and Retention	.845	.308	.096	-.08	1.77
	Reporting	.609	.374	.665	-.51	1.73
New Product Development	Sales and Retention	.738	.296	.171	-.15	1.62
	Reporting	.502	.365	.813	-.59	1.59
Sales and Retention	Reporting	-.236	.401	.997	-1.44	.96

In order to test for the overall effect size on the main effect (which is possible as there was at least a main effect), the formula is: Eta Squared = $\frac{SS\ between\ groups}{SS\ total} = \frac{18.626}{152.093} =$ 0.1225. Therefore the overall effect size is 12.25%. Therefore the influence of department group on job satisfaction can be considered to have a moderate effect.

The ANOVA test for the relationship between teams/departments and their experiences of satisfaction with the workspace layout had an output of $F(6,145) = 2.001$, $p = 0.069$ ($p > \alpha$), thus the effect is considered to be non-significant. Therefore Hypothesis 1b has been rejected.

5.1.1.4. Exploration of Hypotheses 2a-b

The following one way ANOVA tested for:

H2a: *The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of satisfaction with the workspace layout (DV)*
H2b: The floor (second, third or fourth) on which employees occupy (IV) will have an impact on employees' experiences of job satisfaction (DV).

The result of the Levene's test reported $p = 0.844$ (thus $p > 0.05$) the relationship between floor occupation and workspace layout satisfaction and the result of the Levene's test reported on the relationship between floor occupation and job satisfaction is $p = 0.813$ (thus

p > 0.05) which signifies that there is homogeneity of variance and meets the final assumption for parametric testing.

Table 13

Test of Homogeneity of Variances for Floor Levels

	Levene Statistic	df1	df2	Sig.
Workspace Layout Satisfaction	.170	2	153	.844
Job Satisfaction	.207	2	152	.813

As indicated previously, there were three floors that were affected by the change in design, these floors were the second, third and fourth floors of the building (see Table 14 below for more information on the descriptives).

Table 14

Table of Descriptives of Floor Levels on Job Satisfaction and Workspace Layout Satisfaction

		N	Mean	Std. Deviation	Min.	Max.
Work-space Layout	**Second floor**	94	66.02	13.093	24	95
	Third floor	17	61.88	13.788	23	84
	Fourth floor	45	66.93	12.990	34	93
Job Satisfaction	**Second floor**	94	3.67	.988	1	5
	Third floor	17	3.29	1.160	1	5
	Fourth floor	44	3.70	1.002	2	5

The ANOVA (see Table 15) revealed that the relationship between the floor that employees occupy and satisfaction with the workspace layout was not significant $F(2, 153) = 0.936$, $p = 0.394$. Therefore, there is insufficient evidence to indicate that there is a difference in means between the different floor groups. Hypothesis 2a was therefore rejected. The non-

significant result makes us unable to run a post hoc test. The ANOVA analysis also revealed that the relationship between the floor that employees occupy and job satisfaction was not significant $F(2, 152) = 1.126$, $p = 0.327$. Therefore, there is insufficient evidence to indicate that there is a difference in means between the different floor groups. Hypothesis 2b was therefore rejected.

Table 15

ANOVA Table for Floor Level on Job Satisfaction and Satisfaction with the Workspace Layout

		Sum of Squares	df	F	Sig.
Workspace Layout Satisfaction	**Between Groups**	323.145	2	.936	.394
	Within Groups	26408.522	153		
	Total	26731.667	155		
Job Satisfaction	**Between Groups**	2.303	2	1.126	.327
	Within Groups	155.465	152		
	Total	157.768	154		

5.1.1.5. Exploration of Hypotheses H3a-c

The following one way ANOVA tests for:

H3a The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on job satisfaction (DV).

H3b: The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on physical health (DV).

H3c: The type of office participants (Private Office and Cubicle, shared office, and open-plan) occupy (IV) will have an impact on psychological health (DV).

The Levene's tests for all of the following variables all indicated homogeneity of variance (see Table 16 on the next page).

Table 16

Test of Homogeneity of Variances for Office Types

	Levene Statistic	df1	df2	Sig.
Physical Wellbeing	2.948	2	153	.055
Psychological Wellbeing	1.045	2	154	.354
Job Satisfaction	1.217	2	154	.299

Based on the descriptives of the sample (see Table 17 on the next page) group sample sizes are extraordinarily different as the setup of office space had changed to more open spaces with no cubicle partitions so as to enhance interaction/communication within the space.

Table 17

Table of Descriptives of Office Type on Physical Wellbeing, Psychological Wellbeing, and Job Satisfaction

						95% Confidence Interval for Mean			
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min.	Max.
Physical Wellbeing	**Private office or cubicle**	5	21.40	2.074	.927	18.83	23.97	19	24
	Shared office	25	26.40	7.974	1.595	23.11	29.69	18	48
	Open with no cubicle	127	26.10	7.309	.649	24.82	27.39	14	44
Psychological Wellbeing Total	**Private office or cubicle**	5	25.00	2.449	1.095	21.96	28.04	22	28
	Shared office	25	25.84	4.705	.941	23.90	27.78	16	33
	Open with no cubicle	127	26.18	4.942	.438	25.31	27.05	13	35
Job Satisfaction	**Private office or cubicle**	5	3.60	.548	.245	2.92	4.28	3	4
	Shared office	24	3.58	1.139	.232	3.10	4.06	1	5
	Open with no cubicle	127	3.62	1.006	.089	3.45	3.81	1	5

The results from the ANOVA (see Table 18) testing the effect of office type occupation on physical wellbeing, psychological wellbeing and job satisfaction all revealed non-significant results. Physical wellbeing $F(2, 154) = 1.034$, $p = 0.358$, psychological wellbeing $F(2, 154) = 0.181$, $p = 0.834$, and job satisfaction reported $F(2, 153) = 0.022$, $p = 0.978$. Therefore there was insufficient evidence to suggest that there was a meaningful relationship between office type (physical design) and physical wellbeing, psychological health, and job satisfaction. Hypotheses 3a, 3b, and 3c were therefore, all rejected.

Table 18

ANOVA Table for Floor Level on Physical Wellbeing, Psychological Wellbeing, and Job Satisfaction

		Sum of Squares	df	F	Sig.
Physical Wellbeing	**Between Groups**	111.131	2	1.034	.358
	Within Groups	8274.869	154		
	Total	8386.000	156		
Psychological Wellbeing	**Between Groups**	8.557	2	.181	.834
	Within Groups	3632.195	154		
	Total	3640.752	156		
Job Satisfaction	**Between Groups**	.046	2	.022	.978
	Within Groups	158.640	153		
	Total	158.686	155		

5.1.2. Correlations and Regressions

The correlations and regression analyses are testing for:

H4a: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of productivity (performance) (DV).

H4b: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of work engagement (DV).

H4c: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of job satisfaction (DV).

H4d: Satisfaction with the workspace layout (physical, functional, and psychological) (IV) will be a predictor of perception of psychological health (DV).

In order to test for the relationship between satisfaction with the workspace layout and productivity, work engagement, job satisfaction and psychological health using simple regression, one must first test to see if there is a relationship between the variables, thus a correlation was conducted. A Pearson's correlation was conducted.

5.1.2.1.Pearson's Correlations

The following assumptions were met in order to conduct a Pearson's correlation

(a) Assumptions

i. Variables must either be interval or ratio – both the IV and various DVs are at least interval scale.

ii. Variables were approximately normally distributed (addressed during the one-way ANOVA section), except for Perceptions of Productivity (Performance). However, with correlation as long as the variable is closer to normal, it can be used. Thus we assumed normality.

iii. Linearity – Linearity was tested using the scatterplots. Based on the scatterplots in Appendix IV, we assumed linearity despite the weak relationship (see more detail in Appendix IV).

iv. Outliers are kept to a minimum.

Boxplots were created previously to test for normal distribution in the one-way ANOVA. Based on those plots, job satisfaction had four problematic outliers, these same outliers are creating issues of linearity. In the scatterplot the same outliers occurred, however the pattern of the outliers did not seem to be based on any type error but rather on a pattern of responses (i.e. many of the employees who responded with a 1 in job satisfaction). Therefore, it would not be advisable to remove the outliers.

The work engagement and psychological wellbeing scatterplots had the same strong outlier that was identified and it was therefore removed. Lastly, two strong outliers were identified

in the productivity scatterplot, and were also removed. After removal the final sample was n = 155.

(b) Results of the correlation

After the assumptions for Pearson's correlation were met, the analysis was conducted. The result of the Pearson's correlation were as follows:

Table 19

Correlations Table for Relationship between Job Satisfaction, Psychological Wellbeing, Work Engagement, Satisfaction with the Workspace Layout, and Productivity

		Job Satisfaction	Psychological Wellbeing	Work Engagement	Work Layout Total	Productivity
Job Satisfaction	**Pearson Correlation**	1				
	Sig. (2-tailed)					
	N	155				
Psychological Wellbeing	**Pearson Correlation**	.655	1			
	Sig. (2-tailed)	.000				
	N	155	155			
Work Engagement	**Pearson Correlation**	.692	.633	1		
	Sig. (2-tailed)	.000	.000			
	N	155	155	155		
Satisfaction with the Workspace Layout	**Pearson Correlation**	.444	.445	.393	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	155	155	155	155	
Productivity	**Pearson Correlation**	.365	.326	.257	.318	1
	Sig. (2-tailed)	.000	.000	.001	.000	
	N	151	151	151	151	151

Table 20

Table of Descriptive Statistics for the Correlated Variables

	Mean	Std. Deviation	N
Job Satisfaction	3.63	1.007	155
Psychological Wellbeing	26.09	4.850	155
Work Engagement	21.49	5.080	155
Satisfaction with Workspace Layout	65.90	13.231	155
Productivity	11.91	14.414	151

The results reported a significant, moderately positive correlation between satisfaction with the workspace and job satisfaction, $r(153) = 0.444$, $p = 0.000$. A significant, moderately positive relationship between satisfaction with the workspace and psychological wellbeing, $r(153) = 0.445$, $p = 0.000$. A significant moderately positive correlation between satisfaction with the workspace and work engagement, $r(153) = 0.393$, $p = 0.00$. And lastly a significant, moderately positive correlation between satisfaction with the workspace and productivity, $r(149) = 0.318$, $p = 0.000$.

Other significant relationships that the correlations table reported that are not under investigation also found weak to strongly positive relationships between job satisfaction, psychological wellbeing, work engagement, and productivity.

5.1.2.2.Simple Regressions

The next step of the study was to establish whether the IV under investigation (Satisfaction with Workspace Layout) is a predictor of the DVs stated in the hypotheses; this required simple linear regressions as there is only one IV. In order to conduct a simple regression the following assumptions had to be met:

(a) Assumptions:

(i) Both variables are continuous variables (i.e. interval scale). This requirement was met.

(ii) Linearity. This was established during the correlation assumptions.

(iii) No or minimal outliers. With regressions there are different procedures to check for outliers as regressions are more pedantic with the influence of outliers. Outliers were

checked for each simple regression and for each regression the sample was reset to the original data set of n = 158 as outliers may have differed for each IV-DV pair:

For psychological wellbeing the Cook's D and leverage average were observed in order to find any outliers and influential points. Three participants were found to be outliers and influential points and were removed for this variable. Studentised residual was also checked, however, there were no violations. Tests were rerun after the outliers were removed.

For job satisfaction in the original set of variables the studentised residual showed that there was an outlier. Upon further investigation of Cook's D and leverage average three more variables were also outliers and influential points. These four outliers were removed.

The work engagement statistics of studentised residual variables suggested a possible outlier. Cook's D and the leverage average had confirmed this by revealing two outliers and two influential points; these were removed.

Lastly, productivity had, according to the Cook's D and leverage average, three outliers/influential points were removed.

(iv) Normally distributed. To test this a histogram of residuals was observed.

After removal of the outliers normality was checked using the residuals histograms (Appendix V). The residuals histograms showed a clearly normally distributed bell curve for psychological wellbeing (n = 152 responses, $\bar{x}$ of residuals = -1.45E-16, SD of residuals = 0.997), job satisfaction (n = 151, $\bar{x}$ = 2.86E-16, SD = 0.997), work engagement (n = 151, $\bar{x}$ = 3.19E-16, SD = 0.997). Productivity (n = 148, $\bar{x}$ = -3.47E-18, SD = 0.997) has a close to normal bell curve.

(v) Homoscedasticity. Homoscedasticity was tested for and showed that for all the variables it could be assumed (Appendix VI).

(vi) Uncorrelated Residuals

The Durbin-Watson test statistic has to be between 0 and 4 in order to confirm the residuals are uncorrelated (independence of residuals). The closer to 2 the better. For psychological wellbeing the statistic was 2.035, job satisfaction was 0.016, work engagement was 0.12, and productivity was 1.667. All of these results indicated uncorrelated residuals, thus fulfilling all the assumptions required for all the regression tests to be carried out.

(b) Results of the simple Regressions of perceptions of workplace layout onto the outcome variables

Table 21

Model Summaries Table of Regression Results (for Satisfaction with Workspace Layout as a Predictor on Psychological Wellbeing, Job Satisfaction, Work Engagement, and Productivity)

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Psychological Wellbeing	.449	.201	.196	4.275
Job Satisfaction	.484	.235	.230	.865
Work Engagement	.429	.184	.179	4.485
Productivity	.341	.116	.110	13.498

Table 22

Coefficients Results Table for all Regression Results (Satisfaction with Workspace Layout as a Predictor)

		Unstandardised Coefficients		Standardised Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
Psychological Wellbeing	**(Constant)**	14.308	1.961		7.295	.000
	Work Layout Total	.178	.029	.449	6.149	.000
Job Satisfaction	**(Constant)**	1.015	.398		2.552	.012
	Work Layout Total	.040	.006	.484	6.759	.000
Work Engagement	**(Constant)**	9.854	2.063		4.776	.000
	Work Layout Total	.177	.030	.429	5.805	.000
Productivity	**(Constant)**	-14.966	6.242		-2.398	.018
	Work Layout Total	.404	.092	.341	4.387	.000

The simple linear regression was calculated to predict perceived productivity based on perceived satisfaction with the workspace layout. The prediction of productivity found that satisfaction with the workspace layout ($\beta = 0.341$, $t(146) = 4.387$, $p = 0.000$) was a significant predictor. The $R^2 = 0.116$ suggested that 11.6% of the variance in productivity can be explained by satisfaction with the workspace environment. Therefore Hypothesis 4a has been accepted.

The simple linear regression was calculated to predict work engagement based on satisfaction with the workspace layout. The prediction of work engagement found that satisfaction with the workspace layout ($\beta = 0.429$, $t(149) = 5.805$, $p = 0.000$) was a significant predictor. Results further report an $R^2 = 0.184$. This indicates that 18.4% of the variance can in job satisfaction can be explained by satisfaction with the workspace environment. Therefore Hypothesis 4b has been accepted.

The simple linear regression was calculated to predict job satisfaction based on satisfaction with perceived workspace layout. The prediction of job satisfaction found that satisfaction with the workspace layout ($\beta = .484$, $t(149) = 6.759$, $p = 0.000$) was a significant predictor. Results further report an $R^2 = 0.235$. This indicates that 23.5% of the variance in job satisfaction can be explained by satisfaction with the workspace environment. Therefore Hypothesis 4c has been accepted.

The simple linear regression was calculated to predict psychological wellbeing based on satisfaction with perceived workspace layout. Psychological wellbeing was found to be significantly predicted by satisfaction with the workspace layout ($\beta = 0.449$, $t(150) = 6.149$, $p = 0.000$), with an $R^2 = 0.201$. This indicates that 20.1% of the variance in psychological wellbeing can be explained by satisfaction with the workspace environment. Therefore Hypothesis 4d has been accepted.

5.2.Qualitative Results

Analysis for:

RQ1: Will the new spatial layout improve social interaction with co-workers?

RQ2: Will the new spatial layout improve the employee performance?

RQ3: Will employees be satisfied with the new workspace layout?

Thematic analysis of employees' reactions to the environment alluded to a number of sub-themes that were interconnected, which were refined down to four emergent, overall themes that encompass these interactions:

- Technology is a pivotal feature for a fully functional and operational office space.
- Functionality has a major impact on various features of an office and ultimate satisfaction with the space. However, it is important to note that functionality is not only based on the description in the literature review but also based the needs of the company under investigation and their relative needs.
- There is a trade-off between opportunities for more collaboration or communication and noise/distractions in a space.
- Physical design (such as, open-plan, collaborative space) of the office and practice (such as, hot-desking) also has a large influence on major factors that influence employee wellbeing and satisfaction.

The rest of the results section will explore these themes more thoroughly and the interactions between the subthemes that surfaced.

(i) Technology is a pivotal feature for a fully functional and operational office space.

A major theme that was emphasised in each focus group and many survey answers was that of the inadequacy of the technological and technical equipment and/or services. The main comments were based on I.T. issues such as broken docking stations or ports that burn out laptops, and I.T. hardware and general equipment used that was broken. Other issues also involved insufficient technology quality such as, laptops that were given which had specs and processors that were too low to use certain types of necessary software. Employees stated that they wasted a lot of time and had felt a lot of irritation due to these technical issues which were vital to everyday office practices and performance. A survey response stated the following: "Technical issues when docking laptop at a space I have not used before. It takes about 15 to 30 minutes to resolve. I therefore only sit in spots I have used before".

It was evident that there was a lot frustration towards the technological/technical features of the space. These challenges associated with technology and technical features seemed to have had an impact on other themes that included the satisfaction employees felt with the

space and this aspect relates to the functionality of the space. Many employees had responded that they would have preferred the new space if all the technological/technical issues were resolved; for example, during the 3rd floor focus group (focus group 2), only 3/10 participants stated they liked the new space despite the issues, however, more participants agreed that they would prefer the new space if all the technological issues were resolved (thus 6/10 employees stated they would stay in the new space if all issues were resolved). Functionality refers to the equipment used in the space and whether it was fully functional, which in many cases within the offices the various technical equipment was not, making working in the space more difficult.

(ii) Functionality had a major impact on various features of an office and ultimate satisfaction with the space.

Functionality (i.e. the functions of an office) had a large impact on the overall experience with the environment. In terms of positive and negative remarks on the functionality of the space, responses were mixed. Positive remarks about the space stated that the collaborative space has made them happy, been useful for collaborative working, or for help. The phone booths were also very useful and the lockers were considered useful to some employees. Comments on lockers were mixed and placement of phone booths were too far for some employees. General positive remarks on the functionality of the space basically states that the space was really good for collaboration and flexibility. The space was also larger for some employees. Quite notably most of the positive remarks were stated by the 2nd floor employees and only one positive point was made by a 4th floor employee.

The negative comments on the functionality of the space differed across the floors as the needs that needed to be met differed. The 2nd floor occupants stated that some utilities and facilities were not being used, such as certain electric, convertible sit-stand desks which were not in useful spaces. They also commented on the fact that meeting rooms may need to be larger for larger teams. Additionally, they commented on the fact that some of the furniture (such as the small, mushroom-shaped stools) were very dangerous as they are not solid. This links to issues of safety for employees when using the company owned equipment and furniture. The final comment from 2nd floor employees was the fact that the agile space system also made it difficult for IT support personnel to find the employees who logged the tickets.

Third floor occupants had negative comments about the usability and size of the space. In other words they found that the space was very small and cluttered, including the working

space and the meeting rooms. They also stated that the lockers added no value as they were not being used (not placed near enough) and they cluster up the space even more. Lastly they complained about the technical and technological aspect of the space where the pods were too small to fit their laptops and one of the ports had blown the laptop.

Fourth floor occupants had commented on the fact that all of the utilities that were provided for the space was not sufficiently placed or developed for their needs. For example, the lockers and phone booths were all placed far away, thus they are not being used. The meeting room was small and there were not enough meeting rooms. They further commented on the fact that the space was very cluttered and small and that the desk space was smaller. Lastly, their floor was not given private space areas such as the quiet areas or pods that the other floors were given. It is due to the lack of these elements that many of them were very disappointed with the outcome of the space as they were not given all of the facilities that were promised to all of the employees. A quote from the notes during the focus group stated that, "Of the 10 people all felt disappointed with the space because they weren't given everything they wanted in the space that was promised. Only given phone booths and handful of private pods that all aren't being used often".

The general negative comments on the functionality of the space detailed in the surveys stated that the spaces were very cluttered which affects their inspiration (psychological wellbeing) and there were also not enough desks and desk space. Lastly, the hot-desking made it difficult for some employees to sit with their teams. This was interesting to note as this contradicts the very intention of the space, which was to encourage more interaction within (and between) working teams.

All these comments could have an impact on the satisfaction with the space. Employees who felt disappointed with the space and the functional design of the space revealed more dissatisfaction with the space. These employees would have rather remained in the old space due to the functionality being better for their teams.

(iii) Trade-off between opportunities for more collaboration or communication and noise/distractions in a space.

The space was intended to create an environment in which more interaction and communication between and within teams could be facilitated more easily than the space prior to the change. However, it is due to this increase in interaction and communication within the space that employees found that there was more noise and distractions. There

were many different reactions to the agile space and the hot-desking which encouraged individuals to change desks where they work. Some comments on communication that were made were as follows:

The physical design of the office seems to be contributing to communication, interaction or collaboration in the spaces. It also seems to be contributing to satisfaction with the space – there were more formal/informal meeting areas. For floors 2 and 3, team meetings were a lot easier to do spontaneously as there were enough meeting spaces to meet their needs. General positive comments state that meetings were easy to initiate, the environment had fostered opportunities to make new relationships and, and lastly had enabled some to locate specific people from other departments to receive direct help from them. However, on the negative side of communication with colleagues, some employees felt that the neighbourhoods were self-defeating as they restricted your movement thereby removing the point of agile space and freedom to move around.

Floor 3 employees stated that their floor did not have large enough meeting rooms for large teams and they had to go downstairs to the 2nd floor to find one. Floor 4 employees claimed that there was not enough meeting rooms on the 4th floor in general as there was only one meeting room on that floor. The meeting room was also extremely small on that floor and the colours were quite dull. Other general negative comments stated that some people were not near enough to their teams or were unable to find the people they needed to collaborate with. Lastly, other comments claimed that sometimes there was too much interaction that it became distracting; hence the trade-off between the opportunity to interact versus the noise and distraction it can cause. There were a large number of employees who stated that they felt distracted by the noise levels due to the increase in interaction within the space. Only one person commented on the fact that noise helped them work better; while the others had stated that it hindered their performance.

(iv) Physical design (such as, open-plan, collaborative space) of the office and practice (such as, hot-desking) also has a large influence on major factors that influence employee wellbeing and satisfaction.

Positive remarks on the agile space and hot-desking in general have suggested that some people enjoyed the flexibility and the freedom to move around to comfortable spaces. Employees stated that the agile space and hot-desking helped improve interaction and communication with other departments. However, some employees commented that they did not like hot-desking and that some people did not rotate which affected the amount of

flexibility. Additionally, employees found that they were unable to find specific places/areas they were searching for, other colleagues and teams, or places to sit in that design. Some had further commented that they lost their places if they left the area for a specific reason, such as a meeting. Floors 3 and 4 both commented on the cluttered space or less space than before. Floor 4 was less flexible due to the fixed desks based on the nature of the work of the employees that occupied that space. There was competition for space, in particular amongst the 3rd and 4th floor occupants. On the 2nd floor, there were many open spaces, however there were not many areas that had available WIFI or functional equipment (as was discussed in the first theme). This competition for space may have impacted on the increased number of sabotage cases, whereby employees would remove or break an item by a specific desk/space so that others cannot use the space except the sabotager who would know how to fix the item they sabotaged. Thus territorialism began to become a problem. Employees had also thought that the neighbourhoods defeated the purpose of flexibility and communication as you were restricted to a specific area.

In relation to satisfaction with the space, there were mixed perspectives of the space. One comment stated that they were satisfied with the flexibility of the space and the ability to find a comfortable space. In addition to this the old space was boring. Second floor occupants had a large number of positive remarks about the space. Second floor employees had stated that the open space, the agile space, and the hot-desking were satisfactory characteristics, as they allowed for more communication, better collaboration, and a greater sense of psychological freedom. They had stated that they would not go back to the old design. Some had commented on the spaciousness of the new office space and how exciting it was to have a new space. Furthermore, an employee stated that he/she felt stimulated by the new space.

Third floor occupants had stated that they preferred the old space as they had fixed desks with their own PC's with a good processor (specs) and a quieter working environment (6/10). In addition, there was a lot of irritation when employees were unable to find working desks

The fourth floor occupants were very dissatisfied with the space as they were very disappointed with the fact that they were promised many facilities that were not provided to them in the end. They felt as if they were left out. And lastly, they felt that the space was very cluttered and cramped.

In relation to the space affecting health, some employees stated that they had been feeling physically ill since the change in environment. Yet, other employees (particularly on 2nd floor) had felt psychologically better and more relaxed with the new space. The space seemed less stressful and that had helped them psychologically and physically. Furthermore, someone from the 3rd floor had gained self-understanding and perspective as her experience with meeting employees from the other department she had wanted to work in had made her realise she was already in the correct career trajectory and she no longer wanted to be in that department. Another employee had commented on the fact that the crowdedness of space makes them lose inspiration.

CHAPTER SIX

6. Discussion

6.1.Quantitative analysis discussion

The aim of this study was firstly, to explore the relationship between a number of environmental factors and employee outcomes that were perceived to be affected by these factors. And secondly, to explore the employees' reactions to the space while still establishing whether the functions of the space accomplished what it intended to.

6.1.1. Differences in Department Groups

In the first hypotheses (H1a and H1b), a one-way analysis of variance was conducted in order to establish whether there was a difference in experiences of job satisfaction and satisfaction with the workspace layout across department groups; as was established by the group experiences study by Sundstrom, Town, Brown, Forman and Mcgee (1982). This was based on the premise that groups have different experiences of a space based on their needs for the space. The department/team groups had been placed in different environments based on their general needs. Departments that were perceived to be more flexible were given hot-desking as a method of space design.

The ANOVA test indicated that the relationship between department/team groups and job satisfaction was significant. A significant main effect suggests that there may be at least one pair of group differences. A post hoc test was then conducted. The post hoc used was a Tukey HSD as there more than five groups, thus a conservative post-hoc test was better suited. The Tukey HSD is a conservative test that controls for Type I errors/familywise error rates at 0.05 (α), this makes it quite strict (Howell, 2011); thus for more groups it is more suitable as it reduces the likelihood of Type I errors. Two group differences were found with the post hoc: (1) there was a group difference between 'sales and retention' and 'training and quality', as well as a difference between 'sales and retention' and 'services and queries'. The results suggested that job satisfaction in the Training and Quality Department was 1.425 higher than Sales and Retention, while job satisfaction in the Services and Queries Department was 0.958 higher than Sales and Retention. It is possible that the satisfaction with the workspace may have had an impact on their job satisfaction (as seen in the regression tests). However, job satisfaction can be contingent on not only the workspace layout but also other factors such as organisational characteristics, role conflict/ambiguity and/or autonomy (Gormley, 2003); therefore more research would need to be conducted to clarify possible factors affecting their job satisfaction. The test result supports the

Sundstrom, et al (1982) study results as it confrims the relationship suggested by Sundstrom,et al that different departments may have different expectations and as such will have different experiences of job satisfaction. Further research would need to be conducted in order to establish an exact cause for differences in job satisfaction between department groups. The effect size was measured for the main effect, significant result of department/team groups on job satisfaction. The result of 12.25% indicates to a moderate effect size. This suggests that 12.25% of the variance in job satisfaction can be explained by the departments/teams they belonged to.

The aim of the second ANOVA on the interaction between department/team groups and satisfaction with the workspace layout was to establish whether there was a relationship between the satisfaction levels of the layout of the new space and different department groups who we hypothesised to have different reactions to the space. However, the results suggested that there were no differences in satisfaction with the layout means which indicates that there was insufficient evidence to suggest a relationship between the department/team group type and satisfaction with the workplace layout. There may be a number of possibilities for this lack of relationship. An issue that may have occurred was the fact that the ANOVA data were unbalanced, whereby the sample group sizes were unequal. This may have affected the results. According to Shaw and Mitchell-Olds (1993) an unequal sample size weakens the power of the test to distinguish the effects of the factors. With this in mind it is possible that there may be a difference that could not be distinguished. The sample sizes were based on the already existing groups within the company, this of course could not be changed as it was related to the nature of their work. It would have therefore been more beneficial had the sample sizes of the various groups were of similar number. In the future, studies in this area would benefit from using samples that have similar group sizes to find more valid results.

6.1.2. Differences in Floor Level Occupant Groups

We tested for hypotheses 2a and 2b, which also used a one-way ANOVA. The aims of these tests were to investigate whether there were mean differences between the occupants of specific floors and their satisfaction with the workplace layout, as well as job satisfaction. This relationship was based on the fact that different levels of change had been implemented. This included differences in the number of facilities placed at each level; for example, 2nd floor consisted of East, Centre and West block neighbourhoods, thus they had

more space for quiet areas, phone booths, and formal and informal meeting rooms/areas. However, the 4th floor space consisted only of one block (East block neighbourhood) and the size of the block was further slightly smaller, thus the number of facilities that were added were limited to a single meeting room and a phone booth. We made the presumption that being given different levels of functional space would have an effect on their job satisfaction and/or satisfaction with the workplace layout. The quantitative results of the study, however, had indicated that there were no differences in either analyses of variances, suggesting there is no relationship as was initially hypothesized. The same issues of imbalanced sample group sizes were also found for these groups. This may be due to the fact (as previously mentioned) that the different floor sizes are different, therefore the number of occupants that could use the space had also differed on each floor. The number of occupants of 2nd floor were 1.5 times larger than the other two floors combined. Thus as stated previously, the imbalance may have impaired the analysis (Shaw & Mitchell-Olds, 1993).

Quite notably, however, the qualitative results seem to indicate to a difference in experiences of the space depending on the floor the groups occupied. More positive comments on the space were made by 2nd floor occupants and more complaints were made by the 4th floor occupants. One theme focused on the satisfaction employees felt within the space, the results of this found that more 2nd floor employees were satisfied with the space compared to the 3rd and fourth floor participants. However, even the 2nd floor employees still had reservations about the new space due to the technological/technical issues. Thus it brings to question whether or not there is a difference in satisfaction, it is possible that (1) there are differences between groups but they could be so slight overall that the statistical analyses revealed no results, (2) there may have been specific types of individuals who had joined the focus groups, i.e. people who had stronger opinions of the space or stronger experiences than the others, (3) the scales used for responses were not sufficient to capture all the differences; i.e. they may have been quite generalised items that did not capture the differences accurately enough. A definite strength that rises from this discussion is the fact that the qualitative level of analysis was quite helpful to delve into a deeper understanding of what quantitative may not be able to capture in the responses.

6.1.3. Differences in Types of Office Space

The aims of these hypotheses were to investigate whether the type of office that employees occupied had an effect on physical wellbeing, psychological wellbeing and job satisfaction.

A one-way ANOVA was used to test these relationships. The results of the study revealed that there were no significant results, therefore failing to establish a relationship between the variables. It is possible that an imbalance of sample size may have occurred during these tests, as majority of employees had been using open-plan offices without cubicles. In our sample 127 employees had used open-plans with no cubicles, 5 used private offices or cubicles, and 24 used shared office spaces. The mean differences were quite small, which may, however, have occurred coincidentally in this sample. The same comments can be made for this test as was made for the previous ANOVAs in which future studies will benefit from balancing their groups to a certain degree that they can be considered close to equal, for more accurate results.

6.1.4. Perceptions of Workplace Layout Satisfaction as a Predictor

In the quantitative analysis component, to test the relationships between satisfaction with the workplace layout and other variables, correlations and simple regressions were used in order to establish whether there firstly, was a relationship between these variables, and secondly, to see if the relationship could be predicted, to establish the type of relationship. The aims of these analyses were to establish whether employees' satisfaction with the workplace layout had an influence on their self-perceptions of productivity, engagement with their work, job satisfaction and their psychological health.

Correlations and regressions were used as the IV and DVs were all at least interval scale. The correlation had favourable results as all the tested results were correlated with each other, indicating a relationship between the tested variables. The results reported significant correlations between satisfaction with the workplace layout and job satisfaction (moderate, positive), psychological wellbeing (moderate, positive), work engagement (moderate, positive), and productivity (moderate, positive). It was important to establish whether there was a significant correlation between the variables as this a prerequisite for parametric testing for simple regression.

Other significant relationships that the correlations table reported that were not under investigation included relationships between job satisfaction and psychological wellbeing, work engagement; a moderately positive relationship between job satisfaction and productivity; a relationship between psychological wellbeing and work engagement, as well as productivity; and a relationship between work engagement and productivity. Although these results were not specifically relevant to the study, they were interesting to note for future research purposes.

After the correlations, simple regressions were conducted on each of the hypothesised relationships. The results of the regressions revealed that all relationships were significant. In other words this suggests that there is a predictive relationship whereby satisfaction with the workplace layout can predict employees' job satisfaction, psychological wellbeing, work engagement and productivity. These are pertinent results as these align with previous studies that focused on how the workplace design can have an impact on performance, work engagement (Feige, Wallbaum, Janser & Windlinger, 2013), job satisfaction and psychological health (Danielsson, et al., 2014). Due to the lack of South African literature in this area of research it is valuable in adding to a much needed South African body of research. The results suggest that psychological wellbeing/health, job satisfaction, work engagement and productivity all increase when satisfaction with the workplace increases. We can therefore submit that the hypothesised relationships have been considered to be true for this sample of individuals. The R^2's of psychological wellbeing, job satisfaction, work engagement and productivity were 20.1%, 23.5%, 18.4%, and 11.6%, respectively. Based on these results we can establish that the effect size of all the relationships are quite moderate.

There are a handful of studies that focus on satisfaction with the workplace layout and its effect on employees. Chandrasekar (2011) states that satisfaction with the work environment can have an effect on employee health motivation, and ultimately their performance. According to the employees of the study, the physical factors that can have an impact on their overall attitudes towards the space and performance are — in rank order— (1) the office space layout which needs to arranged such that the space is functional for their work habits, (2) the furniture and furnishings, whereby the furniture all need to be in good condition, (3) storage facilities for the materials they use, and the final ranking,(4) the interior space which focuses on the aesthetic and practical value of the space (Chandrasekar, 2011). Quite notably, all four of the above ranked factors were mentioned during the focus groups.

Other literature had suggested that although there is no conclusive evidence to suspect a specific preference towards a particular type of workspace design or type of furnishing, it is evident that employees' needs are critical to their satisfaction towards the space (Marquardt, Veitch, & Charles, 2002). In other words, it is important for the specific needs of employees to be met by the organisation and the space itself, thus a more user-centred approach may be more ideal for employees as opposed to more generic designs not specified for their needs. This assertion also ties in well with an aspect of Vischer's (2008) UCTBE model which

stipulates that the environment needs to be created to cater for the employees' specific activities and needs. Linking the results of the study back to the literature, it is apparent that a degree of satisfaction with the workplace can be attained from meeting specialised needs and well-designed functional spaces. Once these needs have been catered for, other areas such as employee job satisfaction, psychological health, work engagement and productivity (performance) can be boosted, as was evident in the regression analyses in this study. This is evidently true for a South African sample; however, more research on more South African samples not confined to one company may be more beneficial when quantifying the results. Additionally, the statement may explain why the ANOVA tests were not successful in finding a relationships established from H1 to H3. It is possible that the results revealed insufficient evidence because the variables under investigation were not being affected by the office type, group differences, or which floor they occupied but rather a different variable which related to whether the specific needs of the employees were catered for that may lead to their satisfaction with the environment. In other words, their satisfaction is not based on work design type but rather on whether their specific functional needs are being met. As was discussed in the literature review, South Africans have particular needs that are unique to the South African social climate/culture (Andrews, 2016), South Africans may want more than specific layouts; they want a space that caters for their specific needs (IT needs being the strongest, based on the qualitative results). The needs of employees were explored more thoroughly during the qualitative analysis of the study.

During the qualitative component, satisfaction with the space was a theme that was discussed during the focus groups. Both specific satisfaction and overall satisfaction were explored. A prominent theme that emerged from employees was that many employees were dissatisfied with specific features of the space such as noise, technological/technical issues, and the placement of certain facilities which were placed in areas that were not functional to the employees. The results of the qualitative component often suggested that employees' satisfaction with the space was contingent on the functionality of the space. The less number of functional features in the office, the less likely the employees would be satisfied with the space. Functional features, according to Samuel (2006), and Kintler and Adams (1998), includes up-to-date equipment, storage facilities that usefully placed, noise reduced space, pathway clearance for movement, and a recycling centre. In relation to these characteristics the current office space at the health insurance company fails to meet the criteria of working, up-to-date equipment as many employees complained about the broken equipment and technical hardware. Moreover, the reactions to the storage facilities were mixed as

many employees had stated that the placement of the lockers were too far away to be used, while other employees had stated that the lockers were helpful and being used. The new space was more open-plan than the previous space, yet there were nonetheless several employees who complained about the crowded space that made them less inspired and other employees who felt the space was small and cluttered. Quite notably the complaints about clutter were described by 3rd and 4th floor occupants rather than 2nd floor who had the most space. Other functional elements that added to the satisfaction of the space were the agile spaces that allowed employees to be free in terms of where they can sit or work — yet there were also other employees who did not like hot-desking. Overall employees felt that although the space was different, if the issues with the space were fixed then they would have been more satisfied.

Studies have claimed that companies have to have a specific level of physical accommodation that enables the employees to feel satisfied and that their needs are being catered for (Marquardt, et al., 2002). Furthermore, functionality is pivotal for employees (as described in the literature review) (Kok, et al., 2015). Based on the themes and concerns raised during the focus groups and survey question, the satisfaction of the employees in the office may have been dependent on a number of functional factors: (1) whether their space had working equipment, (2) if the space was noisy, (3) if they had enjoyed the hot-desking/agile space/flexible offices or not, (4) if the area was spacious, (5) if the facilities that were afforded to each space were usable or placed in the appropriate area and were used, (6) if there were actually facilities placed in the space at all, as was promised, and (7) if the technological specifications were appropriate for working.

A very similar study to the current study was conducted by van der Voordt (2004). The study aimed to investigate productivity and employee satisfaction within flexible office spaces (van der Voordt, 2004). The study was conducted on two different companies who had changed their spaces to become flexible office spaces. The results of the study revealed that the first company building had not met all the initial criteria/expectations. The space had improved communication and employees were satisfied with the facilities provided, however there was also an increase in distractions (van der Voordt, 2004). This study had also indicated that age made a difference. Older employees within the organisation had responded more negatively than the younger employees to the space (even after a recovery period). They also revealed that newer employees were more positive about the space than the employees who had been at the organisation for longer as the latter employees had felt their expectations about the space were not met (van der Voordt, 2004). Another

observation made was the fact that from the baseline time, in the new space employees' perceptions of their own productivity had reduced from 60% to 25% and then up to 28% after the two months recovery period. However, observations of the second company had resulted in opposite results whereby the employees had reported perceptions of productivity in the space increasing, and the number of people who felt negative about the space had reduced (van der Voordt, 2004). Additionally, the employees from the 2nd company were able to use the quiet area facilities which enabled them to perform under more concentrated conditions.

In terms of employee satisfaction, this variable was described as the extent to which employees are satisfied with the environment (van der Voordt, 2004). Employees in that study were found to have mixed results on job satisfaction as some were positive about the space yet others would have preferred to return to the old space. Other issues that had arisen was the lack of privacy, issues with technological and technical equipment, distractions/noise, territorialism, poor match between flexibility of space and company culture, time wastage to organise materials or logging in to systems while still adjusting to the space, not all facilities were accessible/in reach and having to carry a lot of items around (van der Voordt, 2004). The positive remarks on the space stated that the space had allowed for more organisational transparency, choice of workplace setting, cultural change, encouraged employees to be organised and neat, better communication/interaction, more telephonic and physical accessibility, quiet areas, and more efficient use of resources (van der Voordt, 2004). Employees in the current study had very similar experiences as the 1st company in van der Voordt's (2004) study (mostly described in the qualitative segment) for productivity.

6.1.5. Other Factors Affecting Performance

The responses related to the performance of employees during the focus groups had been mixed. However, as the simple regressions investigation had revealed, if the employees were more satisfied with the environment then it is more likely their performance would have improved. The number of reactions to the new space had differed greatly based on a number of factors. Employees had found factors that affected their performance were the noise levels and the technological/technical issues. It is possible that different factors acted as either enhancers or inhibitors. The technological/technical issues were large contributors to performance inhibition as many devices, equipment, hardware, and connectivity-related issues were problematic for employees. Employees had lost work due to faulty docking

stations which blew laptops, as well as many had wasted valuable time when they sat at desks that had faulty equipment such as broken phones, chairs, and keyboards and would have to find new spaces to work at. Performances were also affected by insufficient technology whereby the laptops that were provided had specs that were too low to use needed software. However, the increase in collaborative spaces may have increased the performance of employees as it gave them more opportunities to meet quickly and coordinate for all projects. Some employees had stated during the focus groups that their psychological wellbeing had improved which may relate to performance improvement (although the causal relationship cannot be inferred).

Very little research has been conducted on performance and collaborative office designs. The research that does exist is however, not academic or peer-reviewed, instead they are articles created by organisations. Yet what can assumed is that the initial intention of collaborative offices is to increase communication which will, in turn, increase performance which has been investigated in various studies such as Rajhans (2012), who found that communication systems can increase motivation, performance and loyalty to the organisation. Whether there was a performance increase that was facilitated by the space cannot be stipulated as there were too many mixed responses about performance and this would have required a pre- and post-test design that measures their performance before and after the change in space.

6.1.6. Social Interaction

It was evident that the new space had encouraged social interaction with co-workers. This was clearly described in the third theme (*the trade-off between opportunities for more collaboration or communication and noise/distractions in a space*) by participants who had numerously described their increased capabilities to interact and initiate more formal or informal meetings. It was emphasised by occupants of floors 2 and 3 in particular that teams had found the spaces easier to collaborate in. Other participants had described how they had made new relationships with other co-workers that they do not normally interact with. This is rather promising as this had worked in line with the objectives of the space. A quantitative study initiated by Boutellier, Ullman, Schreiber and Naef (2008) had investigated the difference in communication based on the type of office space design. The study compared cellular offices and multi-space offices whereby cellular offices referred to traditional layouts of private offices while multi-space offices referred to open spaces with functional meeting areas such as meeting

rooms, break areas, quiet rooms, etc. The study found that the frequency of interactions were three times higher in multi-space offices than cellular offices (Boutellier, Ullman, Schreiber & Naef, 2008). The duration of conversations were 9 minutes in cell offices and 3 minutes in multi-space. They also found that employees spent 43% of their time communicating in cell offices compared to employees in multi-space offices who spent 30% of the time, thus freeing more of their time for other activities which is conducive to productivity (Boutellier, et al., 2008). The study concluded that in a multi-space office there are more opportunities for interaction, more frequent feedback and therefore less time needed, as those fast, small exchanges speed up specific processes of verifications (Boutellier, et al., 2008). Bearing these results in mind, it is possible that the increase in communication has increased their productivity as they are able to coordinate faster and easier. Comments from particular participants in focus groups had further stated that the space has enabled them to seek help faster and create new relationships.

However, with the increase in communication came issues of noise and distraction within the space, which counteracts the effects of enhanced communication on productivity. A number of employees had stated that the noise levels were distracting and that the increase in interaction in the office is difficult to filter in terms of work-related communication and casual conversation. Hence the trade-off between the communication and noise. The way in which the space was set up was intended to also lessen the amount of noise flowing through the office from meeting groups, but not the noise travelling from casual communication. This trade-off is therefore difficult to balance. Some employees have further stated that noise can also come from high traffic pathways, especially desks that are near these pathways. In a study by Hameed and Amjad (2009) different factors of office design were tested to see their effect on employees. The results found that noise did have an effect on productivity, however reactions differed from person to person. They reported that women were more able to work in noisy areas than men (Hameed & Amjad, 2009). The implications of this study suggests that the noise levels could be potentially impactful to employees to some degree.

6.2. Limitations and Opportunities for Future Research

One limitation can be criticised at a methodology level: communication with those managing the space redesign project versus execution of the project. Those managing the project had made promises and set specific standards for the aim of the space, however these expectations were not met for every area of the space, which of course became a large disappointment to the employees who had not received all that was expected. This may have added to the levels of dissatisfaction as these were essentially a framework or reference to which employees had set specific expectations for. This is especially notable with employees on the 3rd and 4th floor who had less space in the offices, and so less facilities were afforded to them. Additionally, the equipment given was not up to a standard that employees felt was suitable for their work nor was the furniture acceptable in terms of use as some equipment was unstable which could create safety hazards. Lastly, the technological aspects were not functional. These technological aspects are pivotal to the performance of employees, thus the dysfunctional technology created an inability to perform and also created a lot of frustration. These issues were however not evident in every space, thus only certain employees in certain neighborhoods experienced extreme difficulties in one area or another. There is a possibility that these issues or lack of standardisation may have affected the quantitative results. These issues, however, are challenges that can be fixed and it is possible that the surveys and focus groups were initiated too early in the process. In order to see whether there was change over time at the organisation (whereby all the functional and technological complaints were attended to) it would have been beneficial to have conducted a longitudinal study. This may have assisted in observations as it would enable the researchers to see if there were any changes in attitudes towards the space after all the issues were resolved.

Another limitation was the recording of focus groups. Recording was problematic during focus groups thus notes on commentary had to be made instead, which leaves room for bias, miscommunication/misinterpretation, and less accuracy (Markle, West & Rich, 2011). Additionally, the sizes of sample groups could not be changed or randomised to an equally sized sample in order to fully test the effect of the IVs. Either larger sample groups or more equal sample group sizes may improve the accuracy of the results.

Bearing the limitations of the study in mind we would therefore suggest that any future research in this area should ensure standardisation across the entire sample (in terms of having equal sample sizes and controlling for possible extraneous variables) and further

ensure all facilities have been given equal access to all employees, where possible. Future research may also be beneficial in terms of validating the needs of employees across different populations. In terms of the internal validity of the study, there were concerns of demoralisation that may have impacted the study. Demoralisation refers to a group in a study that feels deprived of the treatment or stimulus may give up during the experiment (Babbie & Mouton, 2001). Employees from the current study who had not received all the facilities promised compared to the other groups had felt disappointed and unimportant within the organisation. This may have confounded the results by changing the way in which the space was viewed thereby affecting their satisfaction and possibly their performance. In other words, the presence of the sense of inequality may have affected the results. Alternatively, there may have been natural confounds that were not being measured. This of course only affects the quantitative segment of the results. The qualitative segment had however helped augment the results and explain some of the issues raised.

The mixed method approach was very advantageous to the current study as it enabled the connection of confirmatory data and exploratory data (Teddlie & Tashakkori, 2009). These results need to be further established and tested in the future in order to validate the information across populations. This leads us to the external validity of the study. This study was conducted only on white-collar, South African employees from various backgrounds and job types of a single company. This study may have limited population and ecological validity. In terms of population validity the sample can only be generalised to the type of sample group that it was conducted on; the intended target group was for general South African workers, which to some extent can be inferred due to the large scope of job types that were tested. Yet at the same time, this sample is limited to only white collar employees, as well as employees from a single firm which may make generalisation to other samples such as blue collar workers less advisable. In terms of ecological validity, the study was conducted in a natural setting; therefore it may be generalised to other similar sample types, as discussed previously, such as white collar businesses.

CHAPTER SEVEN

7. Conclusion

In summation of the overall study, it is evident that the office workspace can have an effect on employees in a number of ways. Organisations who take an interest in the needs and wellbeing of their employees may find quite significant value in taking into consideration the factors that were under investigation in this study, as well as the factors that had emerged during the study. According to literature, employee satisfaction is vital for the success of organisations as it is related to productivity and turnover rates, thus their satisfaction should be on all employers' agendas (Gregory, 2011; Oswald, Proto, & Sgroi, 2015). With this in mind, this study will therefore help employers explore possible factors that will help improve their satisfaction, productivity and wellbeing.

Many organisations try to find means to develop themselves and their workforces; using the appropriate office design seems to be one such mean of achieving this, as the office workspace can have considerable effect on both the employees and the general functioning of the organisation (Turner & Myerson, 1998). However, knowledge of which specific factors within the office space that actually affect the employee and the organisation has very limited scope, as such it makes office redesign a sort of 'fad' for organisations or vendors who could make a number of claims about the ideal space (Davenport, 2005). In addition to this, South African research in office workspace design and the effect it has on employees is meager to say the least (Schreuder & Coetzee, 2010); any investigation in this scope of research can be considerably useful to ameliorate the current South African research scope.

The aim of the current study was to investigate the relationship between the office workspace design and a number of outcome variables such as psychological wellbeing, physical wellbeing, job satisfaction, work engagement, satisfaction with the workspace layout, productivity, and collaboration. Additionally, the study aimed to use this investigation in order to firstly, contribute research to the South African Industrial/Organisational Psychology field, and secondly to help augment the research of the health insurance subsidiary branch and the International research company that will be used as a means to ensure a more user-centred approach is being used. This study operated as the user-centred design, as it was intended to be used to describe employee's reactions to the space so as to create a more ideal space that employees want to use. The new space was intended to improve performance through better collaboration of teams and also to improve

satisfaction and wellbeing within the space through innovative and flexible design of the space. Additionally, the intention of the space was to further ensure that the functionality of the space catered to the requirements of employees' tasks as per the framework raised by Vischer's (2008) UCTBE model, which asserts that the built environment must be created to cater for the user's needs and activities. Bearing this information in mind it is evident that this research report achieved what it aimed to do.

We learnt from this study that different departments can have different experiences and perceptions of job satisfaction. However, to gain traction on this statement, more research in the future would need to be conducted. In the South African research milieu, there is ample opportunity to test this, as it is not well-tested in South Africa at this point in time. Other results of the study had found that satisfaction with the workplace layout had also been related to psychological wellbeing, job satisfaction, work engagement, and productivity. The results suggested that the higher the employees' satisfaction with the workplace layout the higher their psychological wellbeing, job satisfaction, work engagement and productivity. This study supported the Feige et al (2013) study and the Danielsson, et al (2014) study. This result was quite noteworthy, not only to this study in particular, but also for future investigations and developments in the ergonomic research field. It is a development area as many organisations can gain more understanding of the needs of employees and how a workspace environment can have an impact on their employees. This form of research can encourage organisations to create new, innovative spaces that cater to their functional needs of its employees.

The results of the focus groups also brought to light a number of functional needs that can facilitate employee satisfaction and performance; this includes functioning I.T. equipment and general furniture, noise levels and distraction, accessibility to functional equipment or features, collaboration, and office space design. What we can gain from these results is that firstly, the right balance of collaboration and distraction is tricky and would need more research to find the most optimal collaborative space. And secondly, technology, functional and accessible equipment, and safe furniture are functional needs of employees that need to be catered for. Due to the fact that little focus has been placed on this area of research in South Africa, this again leaves room for more research that be conducted in order to validate and quantify these results. Going forward this study can act as a catalyst to further South African research that can help foster dialogue on employees' needs and how they can be catered for by organisations who take particular interest in their wellbeing.

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APPENDIX I

Workspace Survey Administered to the Employees

WORKSPACE SURVEY

To help us provide some insight into your current workspace needs, please complete this survey and return it to Nicolette Zackey or place in one of the survey boxes placed around the office.

Biographical Details				
Gender	**Male**		**Female**	

Date of Birth	
When did you start working at [Name – Removed for Anonymity]?	
Organisation role	

What floor do you occupy? (Please tick in the empty box to the immediate right of your choice)					
Second		**Third**		**Fourth**	

What block are you in? (Please tick in the empty box to the immediate right of your choice)					
West		**Centre**		**East**	

Which Team/Department do you belong to? (Please tick in the empty box to the immediate right of your choice – optional)					
Process Analysis		**Business Change & PMO**		**Finance Reporting**	
Quality Assurance		**Commercial & Legal**		**Risk and Analytics**	
Partner Operations		**Strategic Programmes**		**Quality Assurance & Training**	
L&R Systems		**Wellness**		**Broker Relationship Management**	
BAU Systems		**Systems Architecture**		**Platinum Outbound**	
Call Centre		**Data Operations**		**Other (please specify below)**	
Administration		**Customer Value Management**			

Finance Operations		**Conservation**		
Team [Removed for Anonymity]		**Acquisitions**		
Systems - New Product Development		**Systems MIS**		

How would you best describe your primary workspace? (Please circle your choice)	**Private Office**	**Shared Office**	**Reception Area**	**Private Cubicle**	**Open with no cubicle dividers**

How many hours per day on average do you spend working in your workspace?	

How many days per week on average do you come in to work in this office?	

Psychological Wellbeing

Please answer the following questions in relation to how you have been feeling **at work** in the **past month.**

Statement	**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 feeling relaxed.					
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.					

Job Satisfaction					
Statement	**Very dis-satisfied**	**Dis-satisfied**	**Neutral**	**Satisfied**	**Very Satisfied**
Taking everything into consideration how do you feel about **your job** in the **last month?**					

Physical Wellbeing

In the **last month** how often have you experienced the following symptoms while **at work**?

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

Engagement with Work

While **at work,** to what extent have you experience the following symptoms during the **last month**?

Statement	Not at all	Rarely	Some of the time	Often	Very often
Feeling apathetic					
Feeling bored					
Being easily distracted					
Not being challenged					
Feeling worried					
Feeling tired					

Workplace Layout

While **at work**, what has been your experience of the following issues during the **last month**?

Statement	Very dis-satisfied	Dis-satisfied	Neutral	Satisfied	Very Satisfied
I am able to use my relevant furniture/appliances in my “work” area without physical space problems					
My "work" area meets my work needs in terms of its physical layout					
The workspace allows me to move throughout the “building’ without being impeded by “work” area obstacles such as furniture and office equipment					
The technical equipment provided for my individual use meets my needs					
The technical equipment provided for meetings and collective use meets my needs					
My furniture (e.g. chairs/desk/screen) is adjustable for my height or size					
I have the necessary personal storage space for my needs					
My workspace enables me to interact with colleagues when necessary					

There are available workspaces that enables we to work on a project together with my colleagues when necessary					
When necessary I have the available workspace to work without interruptions					
I have quiet space that I can go to on my own to re-charge					
There are available informal areas where I can socialise with my colleagues					
I am able to personalise my workspace to my own individual preferences					
I have control over my heating/cooling to find the best ambient temperature for myself					
I have control over my lighting to work in lighting conditions that suite my work needs					
Natural daylight is suffient for my work needs (not too little but also not too much glare)					
I have a view to the exterior of the building from my working area					
Fresh, clean drinking water is easily available close to my working area					
The stairs are easily located from my working area					

Perceived Productivity

On a scale of -40 to +40 (where negative represents a decrease in productivity, 0 represents no change, and positive represents an increase), rate how you have been **working** over the **last month** in relation to your full capacity? Please indicate using a vertical line or circle.



-40 **0** **+40**

What is the single most important factor that may have impacted (increased or decreased) your productivity during this time?	

APPENDIX II

Example Floor Plan: Floor Plan for the Second Floor

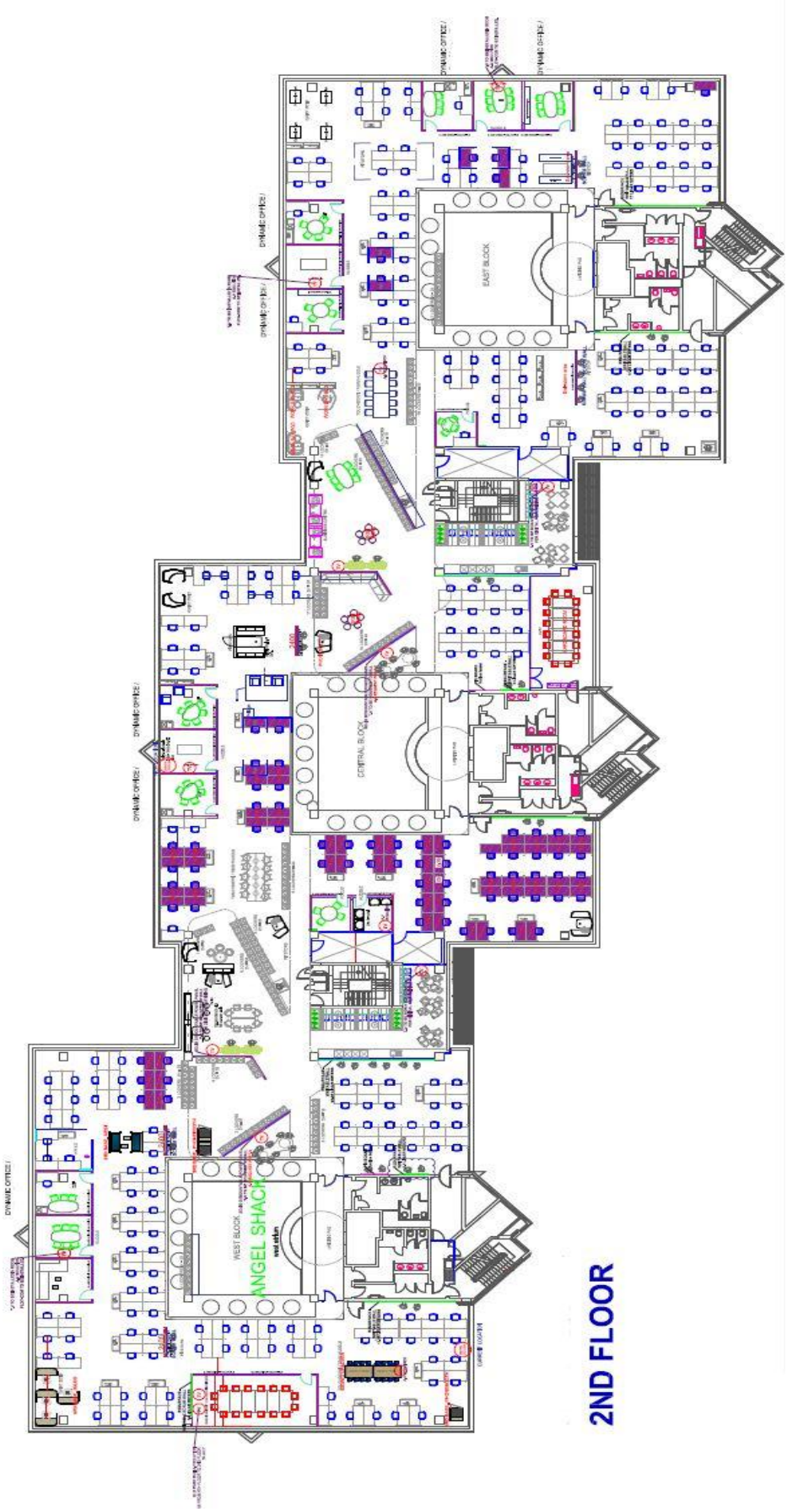


Figure 3: Second Floor Floor Plan

APPENDIX III

Participant Information Sheet (Questionnaire)

PSYCHOLOGY
THE SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT (SHCD)

Private Bag 3, Wits, 2050 • Tel: 011 717 4541 • Fax: 011 717 4559 • E-mail: psych.SHCD@wits.ac.za

Dear Sir/Madam

Good day! My name is Nicolette Zackey and I am currently completing my Master's degree in Organisational Psychology at the University of the Witwatersrand. For the purpose of obtaining my Master's degree I am conducting research on employees' experiences with their workspace environment and the subsequent effects it has on employees' job satisfaction, performance, engagement, and interaction, as well as physical and psychological health and wellbeing. The research study is conducted under the supervision of Professor Andrew Thatcher from the University of the Witwatersrand, who is also a registered Industrial/Organisational Psychologist. I would like to invite you to participate.

Participation in the study would require you to complete a questionnaire pertaining to your experiences within your workspace. It should take no more than approximately 20 minutes to complete. We understand that this is a substantial investment of your time, however, your response is highly valuable and will be of great benefit to everyone involved. Participation in this study will grant you the opportunity to express your satisfaction or concerns with your new work environment. Moreover, it will contribute to the broader area of research on the effects of the physical environment on employees from a South African context.

Participation is completely voluntary and we guarantee complete confidentiality and anonymity. We assure you that your identity will not be displayed on the questionnaire and no persons will have access to the documents submitted other than the researchers conducting the study. Furthermore, you will not be expected to provide your name or any other identifying information.

Please note that submission of the questionnaire will be considered as permission for your responses to be used for the research. Should you choose not to participate, it will not be held against you in any way. Responses are used only for the intended research purposes and data will be protected by the researcher.

For any further queries or anyone interested in the outcomes or require general feedback on the results are welcome to contact us via e-mail.

Thank you for your time and consideration in taking part in our research.

Kind Regards

Nicolette Zackey
nicky_zackey@hotmail.com

Prof. Andrew Thatcher (Supervisor)
andrew.thatcher@wits.ac.za

APPENDIX IV

For Correlation and Regression: Linearity Scatterplot Tests:

The scatterplots below look at the linearity of workspace satisfaction on psychological wellbeing, job satisfaction, work engagement, and productivity respectively. The linearity of psychological wellbeing and work engagement both show a positive linear relationship, however, the strengths seem weak and there may be some outliers creating issues in the plots. The shape of the job satisfaction plot seems strange, however nonetheless still moves in a positive linear direction. The shape may be due to the fact that job satisfaction consisted on 1 item and only have a 5 point response. Productivity at first seems to have the most worrisome plot out of the four plots, yet the responses follow in a linear progression with a very weak strength, yet there are handful of outliers that are making the plot look unrelated. These outliers will be dealt with in the next section. Thus we can assume there is linearity, although the strength of the relationships may be weak.

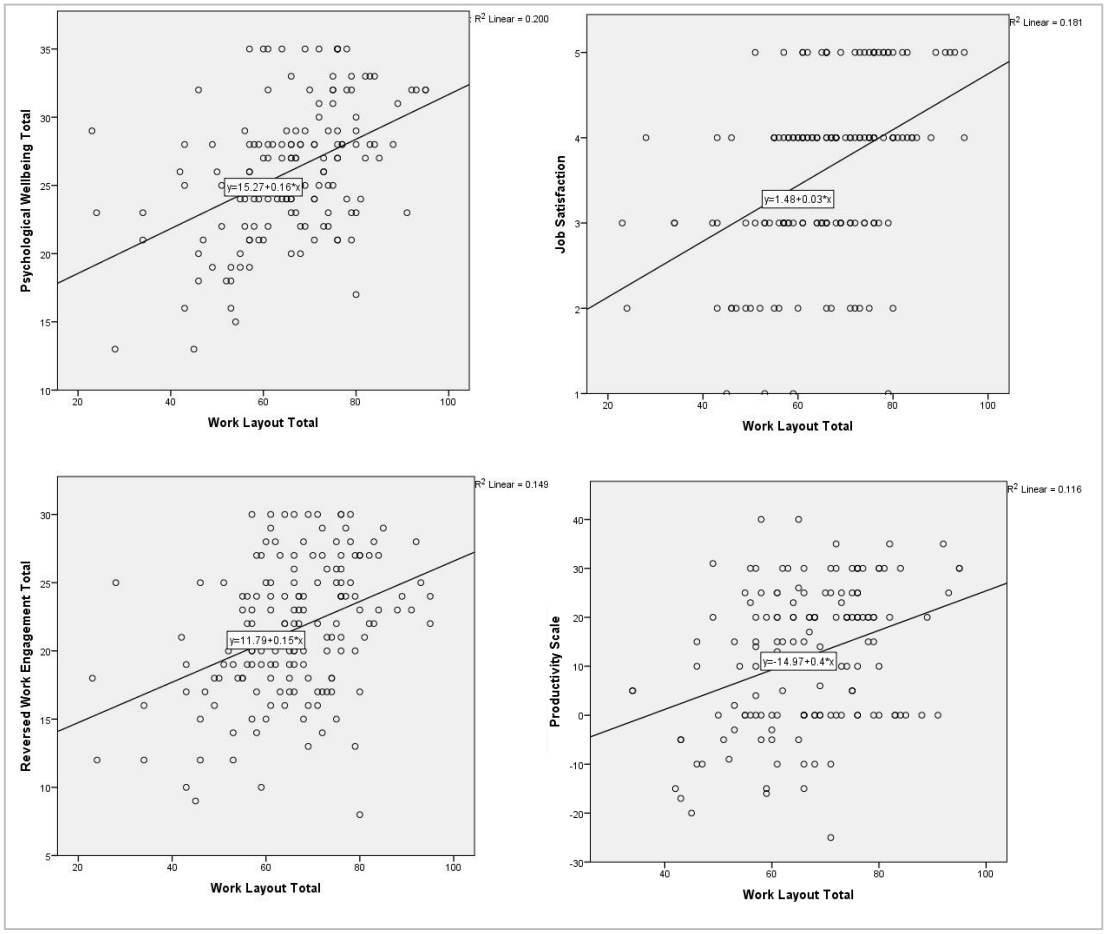


Figure 4: Linearity Scatterplots for Psychological Wellbeing, Job Satisfaction, Work Engagement and Productivity

APPENDIX V

For Regression: Normally distributed - Histogram of Residuals

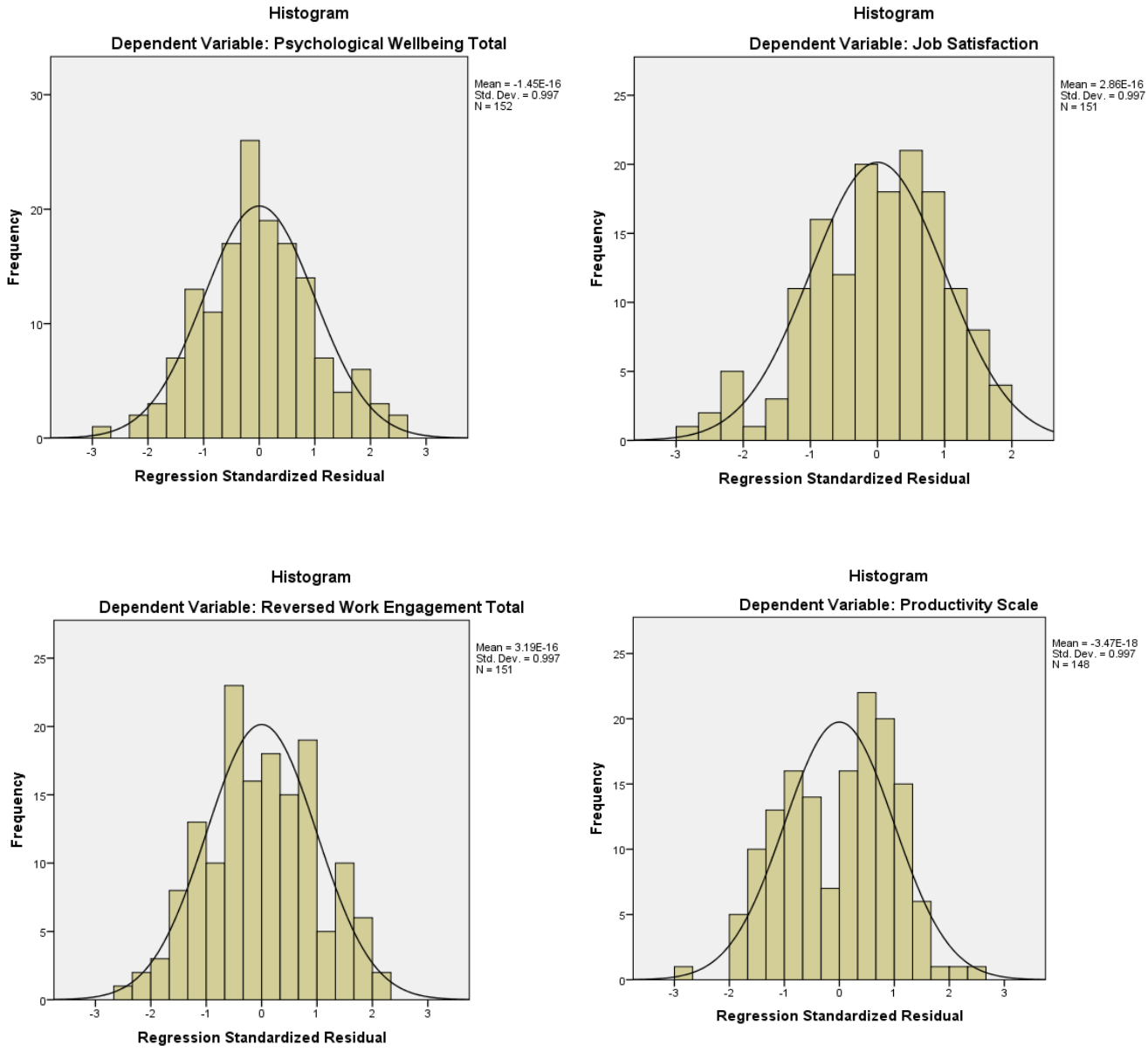


Figure 5: Residual Histograms for Psychological Wellbeing, Job Satisfaction, Work Engagement and Productivity.

APPENDIX VI

For Regression: Test for Homoscedasticity

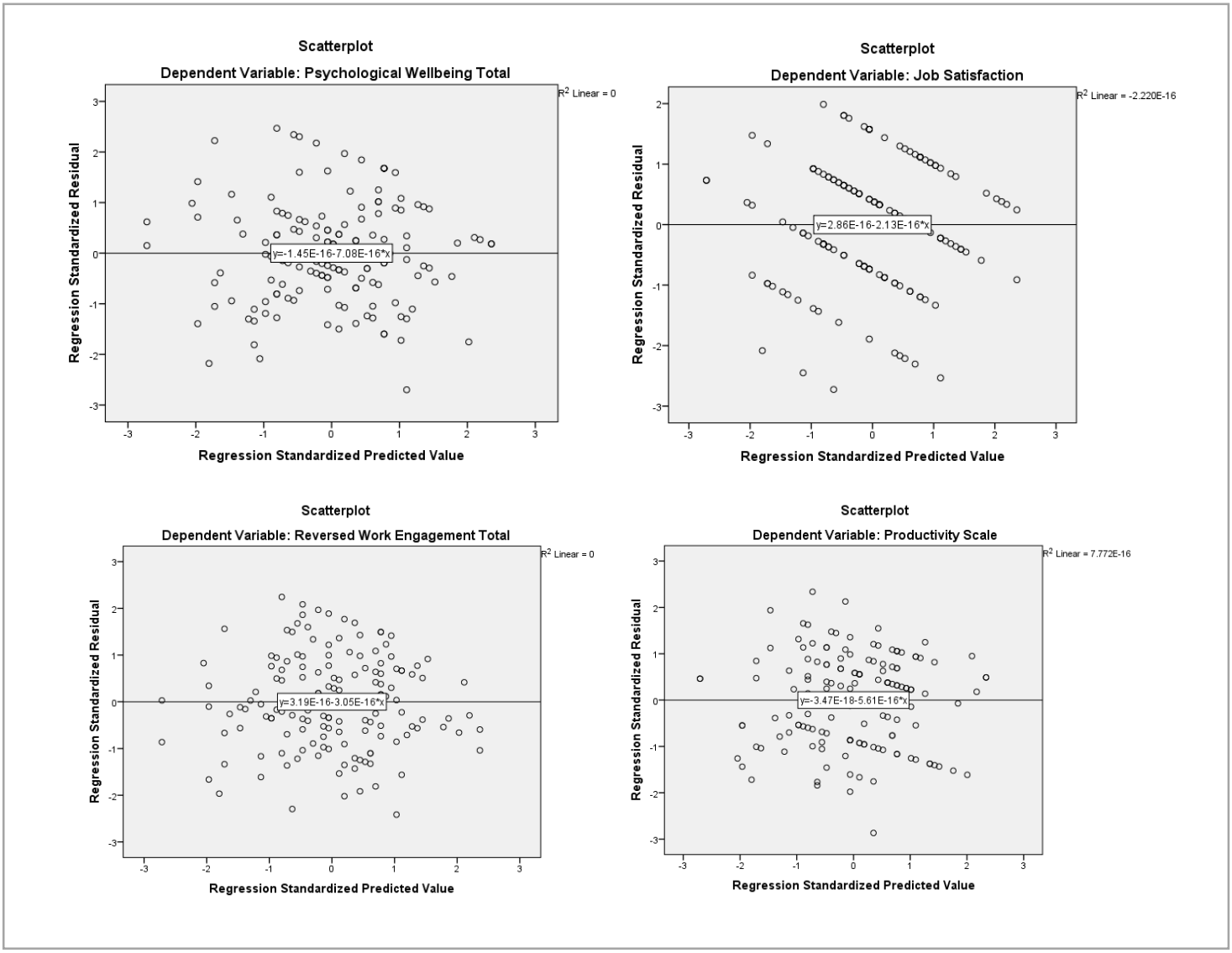


Figure 6: Standardised Residual and Standardised Predicted Value Scatterplots for Psychological Wellbeing, Job Satisfaction, Work Engagement and Productivity.

Homoscedasticity was tested for and showed that for all the variables it could be assumed (see figure 6 above).

To test for homoscedasticity a scatterplot of the standardised residual and standardised predicted value is created. On SPSS one can order the programme to place a line of best fit, if the line that appears is horizontal, it is an indication of homoscedasticity. One also can check the shape of the scatterplots around the line of best fit to check for shape, a more rectangular shape indicates homoscedasticity.

For psychological wellbeing, the line of best fit sits horizontally on the residuals plot, this indicates that there may be homoscedasticity. The shape of the plot also looks closer to a rectangular type of shape.

The shape of the job satisfaction scatterplot is a bit more complicated to determine homoscedasticity. When SPSS was computed to add the line of best fit, a horizontal line was placed, indicating the possibility of homoscedasticity. Thus it will be assumed.

On work engagement the line of best fit sits horizontally on the residuals plot, this indicates that there may be homoscedasticity. The shape of the plot also looks closer to a rectangular type of shape than a deviated shape. We will then assume homoscedasticity.

Productivity's line of best fit sits horizontally on the residuals plot, this indicates that there may be homoscedasticity. The shape of the plot also looks closer to a rectangular type of shape than a deviated shape, however this can be based on fastidiousness of interpretation. We shall assume homoscedasticity as the SPSS output indicates.