



# **University of Wales Trinity Saint David**

**“The Effect of The Office Environment on Employee Productivity: The  
Case Study of Pobl Housing ”**

**MSc Property & Facilities Management**

**M7X01263**

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## ABSTRACT

Housing Associations are an amalgamation of professional services housed under one roof to achieve a common goal. Staffing structures are assembled from professionals with expertise various industries and that have differing office requirements. As a result, the findings of this research could be applied across many organisations and with the world of work being so competitive it essential that the right environment is provided so that quality staff can be attracted and retained whilst achieving maximum productivity.

The research has sought to investigate the effect of the office environment on employee's productivity, using the Swansea office of Pobl Housing as a case study. The main objectives were: to identify which elements of the office environment have the greatest impact on employee productivity, to assess the effect the office environment has on employee productivity and to propose measures to improve the office environment for better performance.

The findings of the research have highlighted that there is an association between office environment and employee productivity. Whilst there are links between each element of the office environment such as layout, aesthetics, furniture, lighting, temperature, ventilation, noise and productivity, the research findings show that the environmental elements (lighting, temperature, noise) were identified as being the area that requires most improvement. The recommendations from the study can be applied to the environments housing similar organisations or organisations with similar functions.

A well-considered office environment will assist organisations in attracting and retaining high calibre and dedicated employees. In order to do this, organisations need to be considered and innovative. Providing safe, comfortable, and thought-provoking environments will always be a priority, however implementing and adapting to alternative working principles should be given serious consideration as many of these principles do not only improve employee productivity but also have other economic advantages.

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## LIST OF ACRONYMS

|     |                       |
|-----|-----------------------|
| Co2 | Carbon Dioxide        |
| EEG | Electroencephalograph |
| FT  | Feet                  |
| HF  | High Frequency        |
| HRV | Heart Rate Variation  |
| LED | Light Emitting Diodes |
| LF  | Low Frequency         |
| VDU | Visual Display Unit   |
| IP  | Internet Protocol     |

## CHAPTER ONE: OVERVIEW

### 1.1 Introduction

With the world of work being so competitive there is a greater emphasis on organisations being innovative and discovering innovative ways to improve its employee's productivity.

Clements-Croome et al (2010) suggest that many employers are under the impression that the level of employee productivity is proportional to the remuneration of the post. It is suggested that although the compensation package is a front runner for motivating employees it has a limited short-term effect on productivity. In fact, the effect of the office environment has been noted in many studies as being the key element affecting employee's motivation and productivity. (Al-Anzi, 2009)

Over the last decade, businesses, government organisations and voluntary sectors have reviewed their accommodation and have started to reconfigure their offices in new ways, in order to improve productivity and increase well-being (Leonard, 2010)

Relationships between office environment and productivity focus heavily on design issues. These issues include; layout design, space requirements, suitable furniture, comfort controls for lighting and temperature, and office location. An effective office environment is one that is attractive, comfortable satisfactory and motivating to employees, it promotes a sense of pride and purpose in what they are employed to do (Humphries, 2005)

## **1.2 Context of the research**

Throughout Wales there are currently 37 Registered Social Housing Associations, these regulated organisations own and manage approximately 150,000 homes across Wales.

The primary roles of associations as landlords are; the development of new homes for rent (and in some instances for shared ownership), the repair and improvement of existing homes, and the provision of housing management services.

Some associations have extended their core role to provide:

- Care & Repair services providing information, advice and repair, improvement and adaptation of the homes of older people, to assist them in maintaining independence in the community;
  - Housing related support services to people with a variety of support needs;
  - Care services such as residential and domiciliary care.
- (Welsh Government Social Research, 2012).

To operate such associations, a wide and varied organisational structure is required, expertise from various sectors such as:

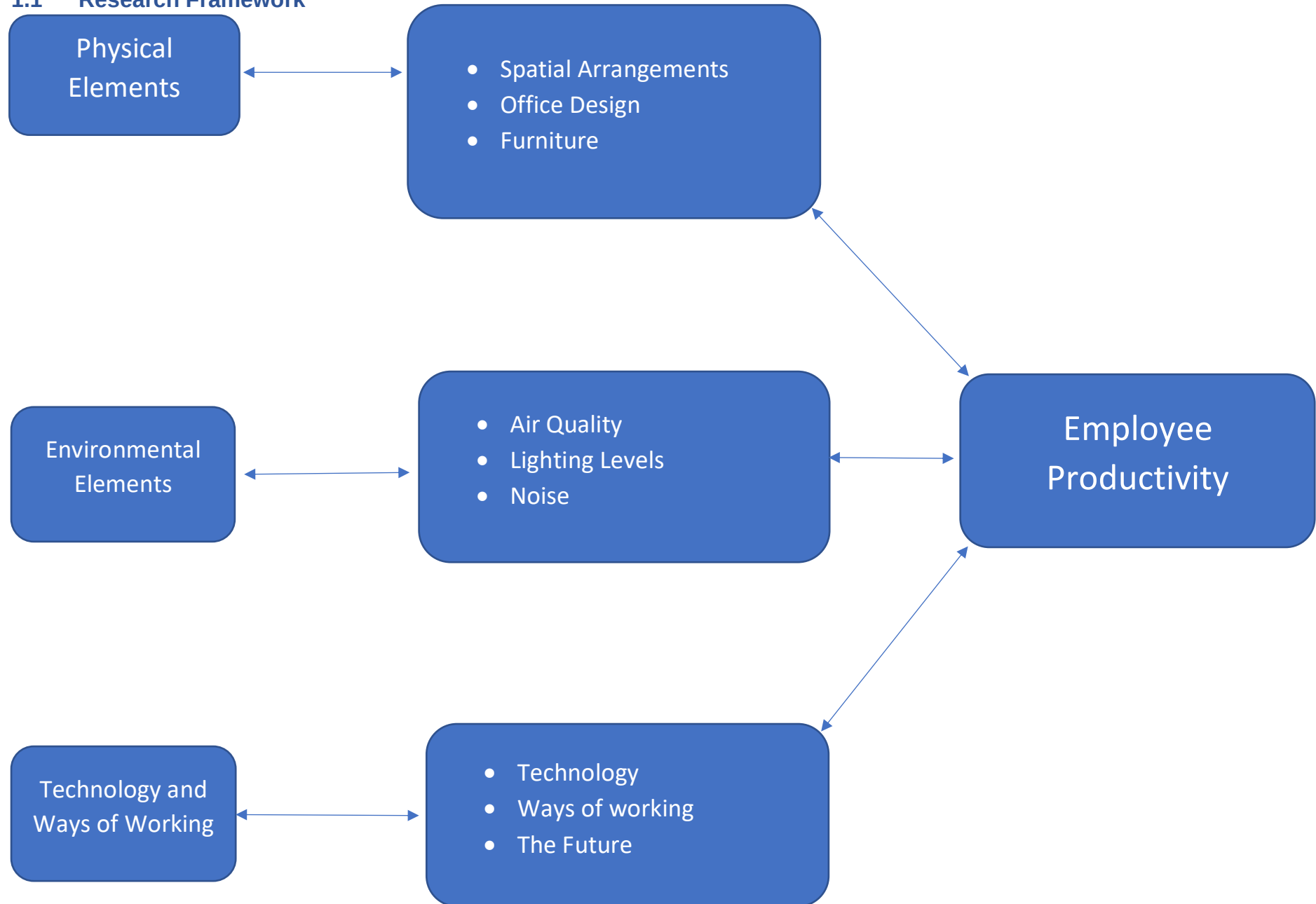
- Finance
- Legal
- Human Resource
- Property Development & Building Maintenance
- Social Care
- Housing Management

The sector is growing and as indicated by Al-Anzi (2009: 356) the number of job opportunities are increasing. The need for the business to re-adjust not only to recruit new staff but to retain experienced staff requires careful consideration, whilst competitive salary packages will attract quality candidates, the workplace environment will have a strong influence on not only recruiting but also retaining talented, knowledgeable employees.

Many staff operate from “head office” environments, some of which have remained unchanged in recent years. These “head office” environments will have both a positive and negative effect on employee productivity, how staff engage, levels of moral and the comfort of an environment can all be affected by the environment and will have some sort of effect on end productivity.

There is ample literature to support the theory that an office environment effects employee productivity, however this study researches the key areas and highlights where to target improvements

## 1.1 Research Framework



#### **1.4 Aims of the study**

The Aim of the study is to investigate the effect of the office environment on employees' productivity when considering a large Welsh Housing Association.

#### **1.5 Objectives of the study**

The Specific objectives are:

- To identify which physical and environmental elements of the office environment effect employee productivity
- To assess the effect of the office environment has on housing association employees' performance and productivity
- To propose measures to improve the working environment for better performance.

#### **1.6 Research Questions**

The following research question have been set:

- Does the office environment have an effect on employee productivity?
- What elements of the office environment have the greatest effect on employee productivity?
- Can employee productivity be improved by allowing employees to work in a more agile environment?

#### **1.7 Summary**

This chapter has given a brief background to the research topic, and case study organisation, the framework has outlined the research elements and aims, and objectives have been set.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction

By reviewing relevant literature, I intend to research the relationships between office environments and occupier's productivity, this will look at the following key area's; office layouts, space planning, aesthetics, welfare facilities, furniture/ergonomics, the ability to control temperature, ventilation and lighting levels, noise, office technologies and different ways of working.

### 2.2 Productivity

Productivity itself is considered a controversial subject, Krugman stated that *"Productivity isn't everything but in the long run it is almost everything!"*

Productivity growth is considered as the single most important long run economic factor that underpins everything else. (Stoddardt Review, 2016:5) Dorgan (1994:461) defines productivity as *"the increased functional and organisational performance, including quality"*. However, how the increase is made better defines productivity. It is more considered to be a ratio that measures how well an individual, organisation, or industry converts resources in to services.

Another definition of productivity is; a measurement or calculation between inputs and outputs. Inputs in this scenario are the work force; outputs are the services produced. If the outputs are equivalent to the inputs, the employee is considered productive. If the same number of workers starts to produce more/better service than in a prior period, then productivity has increased. This could be as a result in a change in working conditions or environment. (Sheeran, K. 2017)

Productivity, in many industries it alienates organisations that exist to innovate, collaborate or serve customers. In some industries it is far easier to measure productivity than in others, in a factory where a process line is operated this could highlighted by the number of units produced over a period, however, in the office setting, results such as reduction in absenteeism, fewer employee's leaving early and less breaks being taken could all lead to productivity being increased. Hayes (2008 2.) suggest it is widely acknowledged productivity is difficult to measure and quantify, as there appears to be no scientific means of doing so other than self-assessment, whilst this is not ideal, it is better than no measure at all.

However, self-assessment is subjective, Wang and Gianakis (1999) define subjective performance measure as an indicator used to assess an individual aggregated perceptions, attitudes or assessments toward a product or service. The idea that there are potential links between a considered quality office environment and the productivity of its end users seems to be the general consensus. (Leaman, 1990; Oseland, 1999; Clements-Croome, 2000; Hayes, 2007).

Results published by the Leesman index has identified that only 53% of respondents agree that their work place allows them to work productively. The Leesman index uses a quantitative survey to measure workplace effectiveness, it can be used to provide an insight into how well workplace environments support the productive work activities of the employees they accommodate. (Stoddardt Review, 2016)

The Index survey captures employee's views on how well the office environment supports the productivity of the people actually using it. The questions cover areas such as meeting places, temperature controls and desk arrangements to sound and air quality in the work environment. By analysing results, businesses can critically analyse how their buildings are performing. (Oldman, 2012).

Leonard (2010), presents the view that organisations senior management apply the principle of good office environment design means happier and more productive workers.

## 2.3 Office design & productivity

An office is generally considered as space where employees perform tasks, however, how well these tasks are performed can be influenced by having a well-planned, integrated and comfortable space.

To put into perspective the effect of the influence of design, a report produced by Gensler (2005), quantified how office design effects job satisfaction and productivity. The report found that poorly designed offices cost UK businesses £135bn a year. Further research into turnover and productivity compiled by government body the Commission for Architecture and the Built Environment found that while 76% of staff satisfaction is linked to salary, technology, management and work-life balance, 24% is influenced by comfort, air quality, temperature, noise, lighting and office layout. (O'Reilly, 2007)

For many years' organisations have tried various designs and techniques to help increase productivity and attract and retain employees. Although there is a lot of research supporting the idea, measuring of the impact of the office environment has been found to be challenging, trying to correlate between the productivity of an office where employees engaged in tasks like planning and problem solving and their environment is far more difficult to measure compared to that of the manufacturing industry for example.

HR professionals are aware of the importance of this issue. About 60% of HR managers responding to a Sheffield Hallam University survey felt that the office environment had an impact on the effectiveness of staff. They believed that collaboration, knowledge sharing, and the development of ideas were affected by workplace design.

A review of research undertaken by Centre for Building Performance found that a number of different ways of evaluating the impact of the office environment on its occupants had been used (Sullivan et al., 2013).

These included the following:

- Rating perceived productivity;
- Cognitive performance tests (e.g. working memory, processing speed and concentration);
- Monitoring computer activity (e.g. key strokes and mouse clicks);

- Absenteeism;
- Presenteeism;
- Reported frequency of health issues;
- Time lost to issues affecting productivity;
- Mood;
- Sleepiness;
- Job satisfaction;
- Job engagement;
- Intention to quit
- Turnover.

Oseland, (2004) presents the concept of “downtime” as a measure of productivity, the downtime concept is evidenced by time wasted because of poor design and management of the office environment. Oseland (2004), has identified issues such as having to wait for lifts, having to walk between buildings, interruptions from other building users, and having to walk to and wait for copier machines. However, Hayes (2008 <sup>(3)</sup>) indicates that some of these issues could be used opportunities to improve productivity by promoting ad-hoc conversations and in turn knowledge transfer opportunities, as well as allowing the employees to have a break away from their work stations to refresh.

Research carried out by Gensler (2006) on the US working Environment looked at workplace design, work satisfaction and productivity. The results suggest that businesses can enhance their productivity by improving workplace design. Hansika et al (2016) suggest that good office design has a direct influence on employee morale, engagement and productivity. It is evidenced that office design directly affects employee health, well-being and productivity within the workforce.

Office design is defined by Beautyman (2006:12-13) as the “*the arrangement of workspace so that work can be performed in the most efficient way*”. However, others believe that the design should consider more than just the arrangement and ergonomics of the office.

I-Anzi (2009:12-13) identify; furniture, noise, flexibility, comfort, communication, lighting, temperature and air quality as the main constituents of an office design and productivity. It is estimated by Brill *et al* (1984), that by improving the physical design of the office environment increases of around 5-10% in employee productivity can be achieved. Stallworth and Kleiner (1996) presents the argument that by designing the office around the individual employee's needs, it is possible to maximises satisfaction and productivity.

The design of a workplace environment has the ability to influence behaviours of its occupants as well as creating the correct image for the business.

## **2.4 Office layout**

### **2.4.1 Environment design / planning**

Office design is increasingly being looked at by organisations to help meet the needs of different work styles and environmental preferences expressed across generations. Organisations are moving towards more versatile spaces, comprising of functional environments that accommodate a variety of work styles while enhancing productivity. (Anonymous, 2018)

A traditional approach to office environment management has promoted the removal of features other than those required to perform the tasks associated to the area, it was thought that a lean office would result in an efficient and productive workforce, this is mainly as a result of the organisation being left with a large, uncluttered space that can accommodate more people and so lends itself to economies of scale.

(Durmusoglu & Kulak, 2008; Kelliher & Anderson, 2008, Public Health England, 2015)

Research carried out by Roelofsen (2002), indicated the improving a workplace environment has reduced absenteeism, increased productivity, and reduced complaints. By improving the office environment, job satisfaction is improved and employee stress levels are reduced. Knight *et al*, (2010), explain research carried out has found that office space that has design features, rather than lean areas, produce superior productivity outcomes. Taking the process one step further the results improve when staff are empowered to assist in the design process.

### 2.4.2 Layout

Hughes (2007) conducted research that found that 90% workers believe that work space quality does impact on employee's productivity.

layouts need to address two main themes:

- i. The advantages of open plan offices v's cellular office
- ii. The advantage of having a designed layout is sufficient for the task at hand.

#### **Open plan versus cellular offices**

Common themes in the literature identifies the links between employee productivity and office layout centres around the open-plan office versus cellular office argument. (Haynes et al, 2000).

There are various reasons for this argument. They range from personal preferences, to flexibility and economic costs. Many Organisations prefer open plan offices as they tend to be smaller and result in lower cost a per employee. They are thought to be more flexible, though this is questionable, especially if some form of "universal" plan offices are employed that reduces the costs of "churn." (Becker et al, 2001)

Research carried out by Haynes et al (2017) found that workplace productivity can be influenced equally in both a positive and negative way in open plan and enclosed offices. The results were so varied that they concluded that there is insufficient evidence to suggest that productivity is increased in the open plan setting. The research showed that the greatest impact on perceived workplace productivity was the availability of a range of physical layout types. Many big organisations have decided that cellular offices are not fit for their business needs, companies are investing in changing the form of the office to smaller work stations within an open plan environment. By doing this the companies are being more space efficient, therefore saving money, and promoting interaction and knowledge sharing between staff. (Chen, 2011)

There are obvious financial advantages to open plan offices, due to the fact it allows more people in less space, both themes need to consider how the space works for the people and the work pattern.

## **Designing office layout and work processes**

Mawson (2002) found that negative effects on productivity could be attributed to the office environment not meeting the needs of the work tasks to be undertaken, other industries highlight this, Mawson gives the example of a manufacturing plant, where detailed consideration is given to the process and the work space is designed backward from there in order to get the best fit, which in turn allows the process to be most productive.

There are of course issues with designing an office to solely meet the needs of its occupants and they're working processes, it limits the flexibility of the space, research carried out by the Building Research Establishment and DEGW posed the question

*"Most office buildings and they're environments are designed for typical 9 to 5 office activities, but how do they perform when this pattern for use changes"*

The research focused on three main design elements:

- The work processes
- The building designs
- The HVAC systems

The results included an assessment of the three elements, to identify any correlations between the working environment and the work patterns.

Laing et al. (1998, p. 21–24). Categorised the work patterns as:

*"Hive: The hive office organization is characterized by individual routine process work with low levels of interaction and individual autonomy. The office worker sits at simple workstations for continuous periods of time on a regular 9 to 5 schedule (variants of this type include 24-hour shift working).*

*Cell: The cell office organization is for individual concentrated work with little interaction. Highly autonomous individuals occupy the office in an intermittent irregular pattern with extended working days, working elsewhere some of the time (possibly at home, at clients, or on the road).*

*Den: The den office organization is associated with group process work, interactive but not necessarily highly autonomous. The space is designed for group working with a range of several simple settings, typically arranged in the open-plan or group room.*

*Club: The club office organization is for knowledge work: both highly autonomous and highly interactive. The pattern of occupancy is intermittent and over an extended working day. A variety of shared task-*

*based settings serve both concentrated individual and group interactive work.”*

These work patterns were used to suggest four different office environments, this study inferred that an optimal match between process and environment can be made. There were limitations to the study as the results were only formulated from a small-scale experiment, i.e. eight case studies. Also, while the research addressed the issue of the working environment and the work processes, it did not directly address the working environment and workplace productivity. (Laing et al, 1998)

Haynes et al (2017) also found that there was a difference in how different genders and age groups perceived how the office layout affected their productivity whilst at work.

### **2.4.3 Spatial arrangements**

Under the Workplace, (Health Safety and Welfare) Regulations 1992, the guidance every employee shall have sufficient floor area, height and unoccupied space for purposes of health, safety and welfare. With regards to office accommodation, the total volume of the room, when empty, divided by the number of people normally occupying it should be at least 11 cubic metres. In a typical office environment, where the ceiling is 2.4m high, a floor area of 4.6m<sup>2</sup> will be required to meet the 11 cubic metres.

(Health and Safety Executive, 2013)

This sets the minimum standard however the British Council for Offices state in their guidance 8-10m<sup>2</sup> should be allowed per workspace. (Gardiner et al, 2014)

Also, the number of work stations required does not necessarily have to meet the exact numbers of staff, a standard adopted by many government organisations looks only to provide 8 desks for every 10 full time employed staff. By allowing for leave, sickness, site visits, meetings and other legitimate reasons we can safely reduce desk occupancy levels. (Flexibility.co.uk, 2015)

By using space creatively and using work simplifying techniques organisations are able to make better use of space.

#### **2.4.4 Aesthetics – Look and feel of an office**

The visual appeal of an office design is considered as key element to employees work satisfaction, research shows that the aesthetics of a workplace can help with both retention and recruitment. However, it is suggested by Osmond, that aesthetics and other key elements of the office environment such as ergonomics are not always compatible, designers and architects are often clear on how they want an office to look visually. Compromise is rarely an option, the brief to the designers should be that aesthetics and, ergonomics should be considered in a holistic approach. (O'Reilly, 2007)

An article published in Executive Accountant (1993) stated that pastel coloured environments encourages employees to take pride in their work area. Less time is lost to illness, particularly stress related ailments. Further studies have found that by combining colours can promote the corporate image of a company, define the role or type of work of different employees, separate groups of individuals who work in teams or simply make the area more visually appealing, friendly and less hostile. All these components can lead to employees being considered more productive. There is further literature which suggests that colour should be an issue in the workplace, it highlights that colour impacts on concentration, energy levels, motivation and well-being. (Irish times, 2001)

Artwork is considered another aesthetic approach that is considered to improve employee productivity, research conducted at the University of Exeter by Knight, found that incorporating artwork into an office design helps to improve productivity, reduce stress and increase wellbeing of employees. The research found that employers tend to opt for “sanitised, lean workspaces designed to encourage staff to just get on with their work and avoid distraction”. It conducted experiments where participants were asked to do an hour's work in four different environments:

- Lean (containing only necessary tools)
- Enriched (featuring art and plants in fixed locations)
- Empowered (the same art and plants with the ability to arrange them personally)

- Disempowered (the ability to arrange the objects, which were then put back into their original positions by the team).

The results highlighted that participants who worked in the enriched environment were 15% more productive than those in the lean environment and results improved further in an empowered setting. Productivity results for those in the disempowered room were the same as those in the lean office. Along with measured productivity results fewer health complaints were reported.

(Brewer, 2016)

## **2.5 Physical condition of the environment**

### **2.5.1 Welfare facilities**

Employee welfare is a corporate attitude or commitment reflected in the expressed care for employees at all levels, the facilities they provide underpins their work and the environment in which it is performed (Cowling and Mailer, 1992). Thurman et al (1988) presents the view that work place facilities are an essential element in any work enterprise, welfare facilities are not a luxury that are to be attended to when all other elements are satisfied, at some point during the working day staff are going to need to use a welfare facility of some description. Good Welfare facilities are essential to higher productivity. They improve employee's health, morale, motivation, job satisfaction and attendance.

Wehigaldeniya (2018) carried out research that found that welfare facilities are a fundamental factor in the improvement of human performance, they reflect on how an organisation value their employees' attitudes, health, safety and wellbeing. Welfare facilities can be both statutory and non-statutory, in the United Kingdom the "Health & Safety at Work Act 1974" places a duty on the employer to ensure minimum standards are met. These standards include: canteen facilities, drinking water, proper and sufficient lighting, facilities for sitting, changing rooms, first aid appliances, toilet facilities, wash rooms, and rest rooms.

### **2.5.2 Furniture**

Chairs, Desks, Shelves, Drawers come together to form an office, all of these are believed to play a role in increasing and decreasing employee productivity. The functionality, appearance and general cleanliness of the furniture will influence how effective employees are. Singh, (2018) has found that

workplace furniture helps the organisation greatly in increasing employee productivity, at the same time taking care of the employees' health and promoting a corporate image. One of the main causes of negative productivity is absenteeism as a result of work-related musculoskeletal disorders, Mantooth et al (2017) states that as a result in an increase in work-related musculoskeletal disorders the demand for ergonomic office interventions has increased. If all factors surrounding an employee are ergonomically correct, then the employee will be comfortable and remain motivated to give the best. Ellegast et al (2012) highlighted that ergonomic advancements have focused on predominantly on dynamic office furniture. (Larsson and Gard, 2003)

### **2.5.3 Ergonomics**

Phesant, 2003, states that the word ergonomics is derived from two words “ergo” which is work and “normia” which means law, ergonomics is the science of designing the workplace to fit within the needs and limitations of the user. The main aim of ergonomics in the office environment is to ensure the design of the work station fits the individual and allows for a comfortable working environment for maximum productivity. The modern office environment relies heavily on technology, this in turn has brought huge benefits, but also some associated dangers. Mustafa et al., 2009 explains that purpose of ergonomic design is to aims to improve the occupant's comfort, safety and work efficiency. Disregarding ergonomic principles has a negative effect on office productivity, this is because poor ergonomics can affect the main human body parts. The health risks posed by poor posture and repetitive stress, as a result of poor ergonomics, are too important to ignore. AL-Anzi, (2009) has found that by failing to achieve an effective ergonomics environment, productivity will be affected in a negative manner and standards of work will also suffer. Conversely a well-designed ergonomic environment will allow its occupants perform the faster, and in an efficient manner. Concentration levels are found to improve, absenteeism rates will drop, fatigue will decrease.

(Terek Edit et al., 2014)

### **2.5.4 Formal and collaborative meeting space**

In most office environments meetings form part of everyday occurrences. Meetings can be carried out for various reasons, they can be confidential, formal, of a collaborative nature, or purely just an informal touch base. Garrett

(2007) indicates the by providing break-out spaces and small meeting rooms staff are encouraged to interact and in-turn be more productive. For many years' organisations have built large meeting rooms that are great for large group work processes, and decision-making meetings that involve large numbers of people. Large meeting spaces can make smaller groups feel uncomfortable, and smaller groups would be better served by smaller meeting rooms or collaborative meeting spaces. (Evidence Space, 2016)

Collaborative meeting spaces can often be far more productive areas for employees to work, they do need to consider the privacy of the user to ensure they feel comfortable enough to confidently contribute to the meeting. Creating and positioning these collaborative areas needs to be carefully considered as Brager et al., (2000) found that spaces designed for collaborative work, such as informal meeting spaces that are intermingled among the desking areas, are often less successful due to noise distractions and the inability to group materials displayed for future work.

Finding the right balance between formal, informal and collaborative meeting areas/rooms without wasting space and interrupting other employees appears to be a key element in improving employee productivity.

## **2.6 Environmental comfort**

### **2.6.1 Air quality**

Dorgan and Dorgan, (2005) define office air quality as being made up of a combination of the following factors:

- Temperature
- Humidity
- Room air motion
- Contaminants

They found that, if the air quality levels are not right, there are impacts on the user's health and productivity.

This is also highlighted by Clements-Croome and Derek, (2008) in their research they found that a comfortable working environment is a place where workers can perform their work appropriately, this environment should not only have a clean air quality but also have satisfactory level of temperature, humidity

and ventilation. Sarode & Shirsath, (2012) have found that there are numerous adverse impacts of poor air quality on employee's health, poor air quality can cause respiratory issues, headaches and fatigue which can have a negative impact on employee productivity.

An experiment carried out by Wargocki et al. (2009) was carried out in three different studies and included 90 different subjects, *"the quality of the air change was established by interventions, the effect to the occupiers were assessed using a perceived air quality acceptability scale. Productivity measures adopted were measurable i.e. not self-reported, since the activities undertaken in the office were simulated office tasks such as typing, addition and proof reading.* Wargocki et al (2000) concluded from these experiments that a relationship does exist between Indoor office air quality and productivity. There were limitations to the study which means that we may not be able to apply this research to all office tasks. (Haynes, 2008)

An experiment carried out by Lan et al (2010) investigated the effect of temperature levels on office workers productivity, 21 volunteers carried out computerised neurobehavioral tests during exposure in a replicated office environment within a laboratory setting; physiological parameters were monitored and measured including heart rate variation (HRV) and electroencephalograph (EEG). Subjective rating scales were used to measure participant's emotion, well-being, motivation and the workload imposed by tasks. The findings revealed that the warm discomfort negatively affected participants' well-being and increased the ratio of low frequency (LF) to high frequency (HF) of HRV. In the moderately uncomfortable environment, the workload imposed by tasks increased and participants had to exert more effort to maintain their performance and they also had lower motivation to do work.

The results indicate that thermal discomfort caused by high or low air temperature had negative influence on office workers' productivity and the subjective rating scales were useful supplements of neurobehavioral performance measures when evaluating the effects of IEQ on productivity.

Valancius, R and Jurelionis, A., (2012), highlight that heating and cooling plant in the office environment is usually controlled and balanced to external air temperature. Sudden changes to outdoor air temperature may result in the

indoor temperatures not meeting what is considered to be comfortable. This can mean, despite modern facilities, occupants being exposed to a temporary thermal discomfort that affects their performance. The results from their experiment highlight that indoor temperature affects several human responses, these include; thermal comfort, air quality, and sick building syndrome symptoms. All of the above can have a negative effect on performance in the workplace.

### **2.6.2 Lighting levels**

Office lighting levels will differ depending on the type of work being carried out – close, accurate work such as typing or studying documentation will require greater lux levels than walking down a corridor. When considering office lighting, several different factors need to be taken into account, such as colour, contrast, and glare.

Abdou, (1997), suggests that office occupiers consider lighting to be the most important element of the office environment, he highlights the fact that it can be a cost-effective way of increasing productivity. Furthermore, the research highlighted that office occupier's preference for lighting levels were in conditions where daylight was provided. Veitch (2005) proposes that occupiers who have access to natural daylight through a window are more satisfied (and therefore more productive) and given a choice, occupiers would prefer natural light in the workplace.

Boyce et al. (2003) carried out an experiment which looked at “best practice lighting levels” compared with “base case lighting levels”, office occupiers task performance was measured, the results from this experiment highlighted that people's preference for lighting levels are vastly different, and that one set lighting level in a communal environment will not suit all of its occupiers. By installing individual lighting controls, we can address the issue of individual preference, Boyce et al (2003) found that when people were given individual control of the lighting, higher ratings of productivity and environmental satisfaction were achieved.

The historic Hawthorne illumination experiment demonstrated that, irrespective of how the lighting levels were altered, employee's productivity levels increased, Roethlisberger and Dickenson (1939) argued and concluded that

physical environments are relatively unimportant when considering productivity. Veitch (2000) suggests that there is a lack of research in lighting and performance, this is probably because of the Hawthorne experiments. It is suggested that the research that has been carried out evaluates lighting in economic terms rather than from the human perspective. Veitch also highlights that apart from the need for lighting for visibility and task performance, there is also a requirement for lighting to influence social behaviour, communication and mood. Haynes (2008)

### **2.6.3 Noise**

Noise has been identified as an environmental issue that has a more drastic effect than what is thought by occupiers. Many studies have highlighted the effect of noise in offices, and how it relates to an employee's comfort, health and productivity. Research conducted by Folsom, (2003), proved that noise was considered by 71% of respondents as the most distractive environmental condition in the office setting.

A study carried out by Mak et al (2012) examined the effect of sound on office productivity and assessed the relationship between office productivity and office noise sources. The study found that noise was listed as one of the principal factors affecting office productivity. A significant correlation was found between changes in office productivity and noise. The noise sources that the participants rated as most annoying were conversation, ringing phones and machines. The study indicated that they had a significant negative impact on all participants. Non-specified noise sources inside or outside the office and outside the building were rated as the least annoying among all noise sources.

Research carried out by Schwede et al (2008) identified that noise is a problem in the Office environment, even in new and refurbished environments noise is still an issue and not enough consideration is given at design stages.

## **2.7 Office technology & ways of working**

### **2.7.1 Technology**

The office workplace set up is probably one of the environments most affected by technological advancements. Office equipment and tools are becoming more technologically advance at a rate of knots. Historical research carried out by Umbaugh et al (1982), recorded that employers had only just started to

understand the value of technology within the office, by automating the office, organisations are able to speed up the creation and transmission of information, aiding decision making, flow of information, and reducing storage costs. This view was formed almost 35 years ago when electronic mail (e-mail), word processing and electronic storage systems were in their infancies.

More recent research carried out by Econocom, 2018 found that:

- over half (55 percent) of office workers surveyed believed that the availability to have access to the latest workplace technology would make them more productive;
- 43 percent said this would make them feel more valued,
- while 38 percent said it would motivate them to work harder.

These results highlight how important technology can be from a productivity perspective, but it also, the hidden extra of increasing motivation and morale among staff. Staff regularly rely on their own technology, this indicates strongly that workers are becoming increasingly dissatisfied with the state of technology available in the workplace. The research highlights that employees are often not satisfied with the technology being provided by organisations and as a result use their own devices for work purposes. This is thought to be because of the budgetary implications of replacing devices to keeping up with advances in technology.

### **2.7.2 Smart offices**

A smart office is a workplace where technology enables people to work better, faster and, of course, smarter. By using beacons, sensors and mobile apps employees can improve the way they perform menial tasks, enabling them to focus on productive outcomes. A smart office / intelligent workplace environment is one that supports individuals social, psychological and intellectual needs. It will enhance the occupier's performance and empower its users to be more productive. (Shabha, 2006). It incorporates technology that allows people communicate better, simple tasks like meeting scheduling, and booking meeting rooms, is an automated process. Sensors are used to tell if a person is in the building, where exactly they are at any given moment and even if a certain conference room is booked and for how long. (IOTSpace, 2018)

Shabha, (2006) indicates that the use of smart sensors will be of a paramount importance in optimizing the operational efficiency of office buildings, there is the potential to provide a long-term multi- strategic approach for facility and property management. There are benefits to stakeholders including clients, owners, facilities managers and end-users of an office building. It can optimise productivity in a number of ways. Not only in organising the office occupants, but also ensuring the environment is managed in a productive and efficient manner. Clements-Croome (2004) argued that intelligent buildings provide every occupant with productive, cost effective and environmentally approved conditions through a continuous interaction amongst its four basic elements:

- places (fabric, structure, facilities);
- processes (automation, control systems);
- people (services, users)
- management (maintenance, performance in use)

Sensors are used as automated tools/devices that support the building client and end-user's human, environmental and physiological needs towards maximizing overall comfort. These were claimed to enhance quality and efficiency of the workplace.

The Stoddart review (2016) highlights the way a smart office can assist with factors already highlighted as key factors affecting productivity. Environmental elements can be controlled by use of smart technology, such as Individual Thermal Clouds, these localised heating and cooling systems which provide a precise personal climate for the employee. By using responsive infrared heating elements and motion tracking sensors each employees' favoured conditions are maintained.

LED Smart Lights – are more than just lights; they can house sensors, cameras, microphones, vibration and CO2 detectors, these instruments can be used to alter the environment to the needs of the occupant so that they operate more efficiently. App control software allows employees to control environmental conditions from their mobile devices.

### 2.7.3 Agile working

Agile working is defined as:

*“something that brings people, processes, connectivity and technology, time and place together to find the most appropriate and effective way of working to carry out a particular task. It is working within guidelines (of the task) but without boundaries (of how you achieve it.) to ensure maximum productivity can be achieved”*. (Fishleigh, 2017:20-23)

Agile can be used to describe a space or methodology. In the context of different organisations, the definition of the word differs. Cheese et al (2009) indicates an organisations agility and connectivity are essential if it is to respond, or adapt, to unpredictable market conditions.

Office workplace environments were once considered quite stable, usually structured into departments, where largely process-based work was undertaken. The modern workplace now needs to be more! Harris, (2016) highlights that agile working includes working away from the office (at home or in “third places”), but also mobility within the office as workers share space and resources.

The need for agility and connectivity means that the workplace environment must be capable of being quickly and efficiently reconfigured to enable the formation and evolution of teams. Organisations that choose to adopt agile work principles and environments aim to be more responsive, efficient and effective, which in turn has been found to improve organisation performance and increases customer satisfaction. (Cushman and Wakefield, 2014).

Agile working empowers employees to work how, where and when they choose, it has been evidenced that productivity is increased, and services are improved by working in a way that suits best suits the employee. (Kamal, 2017) There is advantage to both the organisation and the employee. Some of the of the organisational benefits are:

- Increased productivity and efficiency
- Space savings / reduced property costs
- Reduced cost of travel/subsistence allowances
- Ability to match workforce to fluctuating demands
- Better utilisation of skills
- Reduced carbon footprint

- Improved business continuity – less disruption due to weather, office security issues, travel problems etc.
- Improved staff performance
- Ability to attract and retaining high quality talent
- Reduced absenteeism and related costs
- Reduced staff turnover with associated costs and reduction in lost knowledge, skills and experience Increased motivation and engagement of staff

Benefits to the employees are:

- Personal productivity – fewer distractions, improved focus, concentration, creativity, better use of skills and less frustration linked to fewer barriers
- Improved work life balance
- Increase in wellbeing, health and happiness – reduced stress, better sense of control, ability to integrate healthy eating and exercise into the day
- Increased engagement because of the autonomy and trust at work (enei, 2018)

## 2.8 Summary

From the literature reviewed within this chapter it is apparent that productivity in an office environment is not easy to measure. However as highlighted by Hayes, (2008<sup>2</sup>.) the principle self-assessment as a measure of productivity, whilst, not ideal, is better than no measure at all.

The literature review has also highlighted that elements such as the physical environment (spatial arrangements, office design, furniture), environmental conditions (air quality, noise, lighting levels) and technology and ways of working all effect productivity in the office setting.

This research will investigate where the employees of housing associations feel that the most benefit can be gained.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Introduction**

This chapter describes the methods used to gather the data relevant to the study. It describes the research design, population, sampling outcomes, and explains the method and procedures for data collection, analysis and interpretation of the research findings.

### **3.2 Research design**

A research design is the theoretical structure to which the research is conducted; It establishes the plan for the collection, measurement and analysis of data. (Kothari, 2004)

To carry out the research a mixed approach was taken, both quantitative and qualitative methods were used to gather the results for the study. According to Creswell (2004), Mixed method research is an approach that involves collecting both quantitative and qualitative data. By integrating the two forms of data, it is assumed that the combination of qualitative and quantitative approaches provides a more holistic understanding of the study.

Quantitative research investigates the subject by way of generating numerical data that can be translated into useable statistics. Quantitative research uses data to assess facts by discovering trends in the research.

Qualitative research methods are used to research; experience, meaning and perspective, most often from the standpoint of the participant. The information gathered is not usually open to counting or measuring. Qualitative techniques include 'semi-structured interviews', these seek views of the research topic with individuals who have experience in the study subject. This information can present a good background to the study and give an institutional perspective.

A secondary qualitative method will be used in the form of a case study, this will be used to identify the status quo of the environments to see if trends can identify between the case study information and structured questionnaire results. (Hammarberg et al, 2016)

Both Quantitative and Qualitative research is used in this study, they take the form of structured questionnaires, semi structured interviews and case studies,

these measure the opinions, and perceptions of staff members working within typical Welsh Housing Association offices.

### **3.3 Target population**

Creswell, 2005 describes the population for research as a group of individuals that has one or more characteristics in common and these characteristics are of interest to the researcher.

In the case of this research the target population are the employees of Pobl Group Housing association. The total target population size was 400 office-based staff that work within the groups head office.

### **3.4 Sampling**

The ability to survey the whole target population mean't that in the case of this research a sampling strategy wasn't required.

### **3.5 Data collection methods**

This research uses both primary and secondary data as methods of data collection. Data collected from sources such as questionnaires are considered as "Primary data" as it has been collected for the first time by the researcher.

Secondary data is information that has been collected by others and already exists somewhere (Kothari 2004).

#### **3.5.1 Primary data**

Primary data is original and sourced by the researcher. It can be gathered through questionnaire and structured interviews.

In this research, questionnaires were distributed to staff of Pobl Group, the largest housing association in wales, structured interviews were also held with facilities management professionals responsible for managing these office facilities (see appendix F).

By using a primary data as a method of data collection, interviews, observation and questionnaire allow the researcher to obtain information which otherwise could not be easily obtained.

### 3.5.2 Secondary data

Secondary data is data that has been gathered by others, second hand accounts of the people or situation written by others, these are collected from secondary sources of data such as: Journals, Books, Newspapers, Websites, Other research by academics. (Creswell, 2005)

The secondary data in this research was obtained by researching the literature contained in books, academic journals, and websites.

### 3.6 Data collection techniques

Creswell (2005) presents the view that no single technique or instrument should be adequate in collecting valid and reliable data.

To conduct this study three major tools were used to obtain adequate and reliable information for this study. A structured questionnaire, semi structured interviews and a case study were carried out.

#### 3.6.1 Case study

A case study allows a researcher to closely examine a subject within a specific setting. In general, a case study identifies a small geographical area or limited number of individuals as the subjects of study. Case studies are used to explore and investigate real-life situations through a detailed analysis of a limited number of events or conditions.

Yin (2009:18) defines Case Study as;

*“an empirical enquiry that investigates a contemporary phenomenon within its real-life context (especially when) the boundaries between phenomenon and context are not clearly evident”.*

A case study for research is used where the research question explains something by asking how and why. Case studies are also relevant where more in-depth explanations and descriptions are required. (Gog, 2015).

Yin, 2014 does highlight some critique around the reliability and generalisation of findings. A further criticisms of case studies in research is that it can all too often be subjective. The findings of the research rely considerably on the researcher and their assessment. (Bryman et al, 2011)

Yin, also highlights the flaw that if researcher is linked to the study it could affect the results. (Yin 2014, pp. 20-21)

The case study will consider the head office of Pobl Group, a large Welsh Housing Association. Information will be gathered and presented about the office environment and staff will be surveyed for their opinions of how it effects their productivity.

### **3.6.2 Questionnaire**

According to Kothari (2004), a questionnaire is a method of gathering information which uses a set of questions to collect useful data.

In the case of this study, questionnaires were used as one of the methods to collect data. An online application “Survey Monkey” was used to develop the questionnaire.

The respondents were contacted by email, and asked to participate, if they agreed, a link was provided to the survey application. The email requested that the survey was completed within 14 days. The survey was anonymous.

A set of 15 closed ended questions were set, and respondents were asked to highlight were on a Likert scale their opinion matched. (see appendix A)

### **3.6.3 Pre-testing of the questionnaire**

Prior to circulating the data collection questionnaire to the target population, a trial questionnaire was circulated to 15 staff members for pre-testing, this was carried out to determine any strengths or weaknesses questionnaire. The test respondents were asked to comment on:

- question format
- relevance
- reliability
- wording
- Question sequence.

The test respondents were chosen to represent a cross section of the organisation with regards to age, gender, position held within the company and office type in which they work. Some grammatical errors were noted, and it

was suggested that definitions were added to the questions relating to “Agile Working” and “Non-Territorial Working”.

Respondent who took part in the pre-testing stage were no included in the actual study. (see appendix B)

### **3.6.4 Interviews**

Interviewing is common format of data collection in qualitative research. According to Oakley, 1998, An interview is a framework which allows the practices and standards be not only recorded, but also achieved, challenged and as well as reinforced. (Jamshed, 2014)

In this study a semi structured interview was used see (appendix C), the researcher used open ended questions which allowed respondents to discuss freely their experiences and opinion of the issues raised in the interview questions. It allowed the researcher the opportunity to get in depth information.

### **3.7 Reliability and validity of data**

Best et al (2006:275) define validity as;

*“the quality of a data gathering instrument or procedure that enables it to measure what is supposed to measure”.*

To insure this research is valid a two-step process was followed. Firstly, the size of the population, and the returned sample, provided the research with suitable and sufficient information to allow a generalisation of the findings to the wider populations. Secondly, the methods used collect the data (case study, questionnaires, and interview) ensured quality data was collected.

Reliability is how a research procedure or method would perform should it be repeated. If the results were to be similar or identical the research would be considered as reliable. (Briggs et al, 2012). To ensure this research was reliable pre-testing was carried out, and results were studied for consistency.

### **3.8 Data collations**

Data collected from the questionnaires were vetted for consistency and completeness, by analysing the data quantitatively, percentages were used to show responses to the subject to identify trends. The data collected was exported into Microsoft Excel which enabled the findings to be presented in tables and chart form.

### **3.9 Ethical considerations**

Creswell (2005) indicates that it is good practice is to obtain permission from the organisation being used as the case study and who's employees are being

surveyed. In the case of this research approval was sought from the group chief executive, who also suggested obtaining permission from the groups staff forum. Cohen et al (2007) states that by using questionnaire to survey staff for research there will always be an intrusion into the life of the respondent, in terms of time taken to complete the survey, the level of sensitivity of the questions, or the possible invasion of privacy. In the case of this research permission was obtained from the organisation (see appendix E), and staff were not forced in to responding but strongly encouraged to respond, the decision was entirely theirs (see appendix F). The questionnaires were completed anonymously.

### **3.10 Summary**

This chapter has outlined the research methods that were chosen to provide the results needed to meet the aims and objectives of the study. By using a systematic approach to research design, it has ensured that this study meets principles of validity and reliability. A mixed method approach has been taken allowing both quantitative and qualitative data to be gathered. Cases study, questionnaires and semi structured interviews have been the main methods of data collection. The data analysis process has been described and ethical considerations have been outlined.

## CHAPTER FOUR: THE CASE STUDY

### 4.1 Introduction

This chapter outlines the “status quo” of the office chosen as the subject of the chase study, it will outline the environments that the questionnaires were used to measure against.

The accommodation (7-13, The Kingsway,) is housed in 3 individual blocks constructed in 1927 and interlinked by doors on each level. It comprises of a basement area, ground floor, and two upper floors. A further prefabricated floor was added at a later date and forms the third floor of 12-13 The Kingsway section of the building. The gross internal floor area is approx. 4300 square metres (46300 square ft)

### 4.2 Layout

#### 4.2.1 Offices

There are eight open plan office areas which contain within them private/cellular office and meeting rooms. Each office area has been allocated to a directorate.

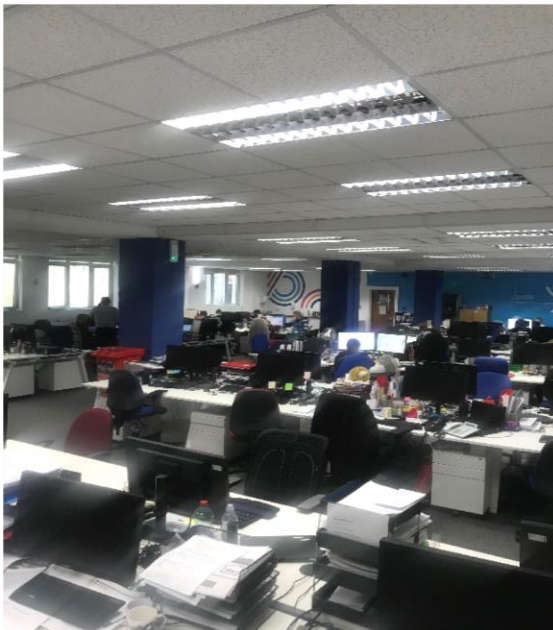


*Plate 1: Typical open plan office environment*



*Plate 2: Typical Open plan office environment*

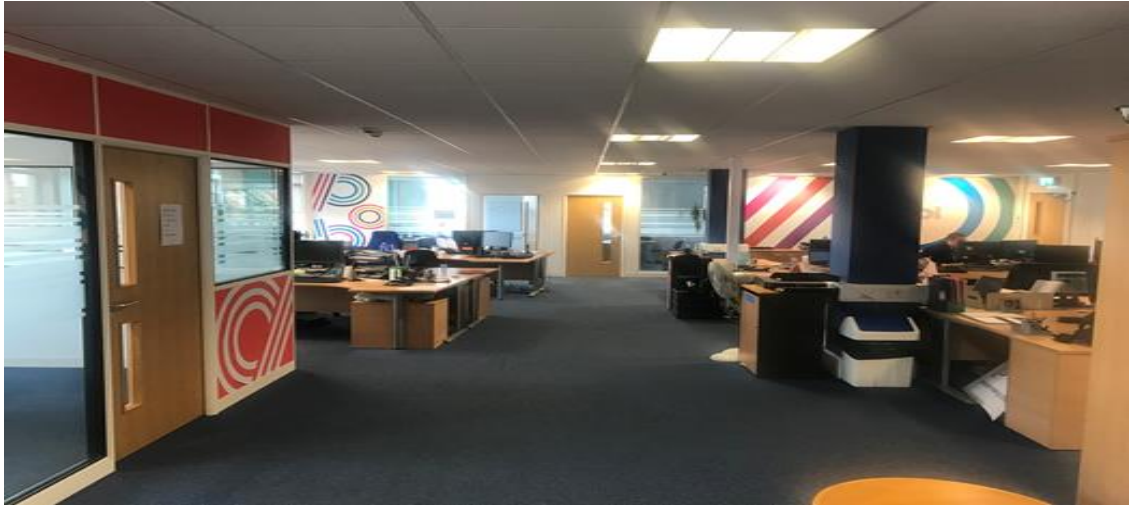


*Plate 3: Typical Office environment with cellular offices*

#### **4.2.2 Welfare facilities**

Within the office there are two staff dining areas and nine rest rooms, each containing a male toilet area, female toilet area, and disabled toilet. There are also three shower rooms provided. The condition of these facilities ranges from adequate to excellent.

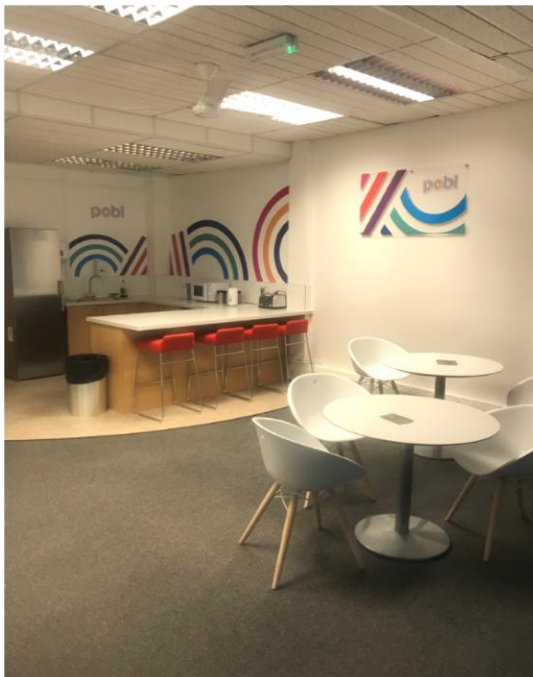


*Plate 4: Typical kitchen welfare area*

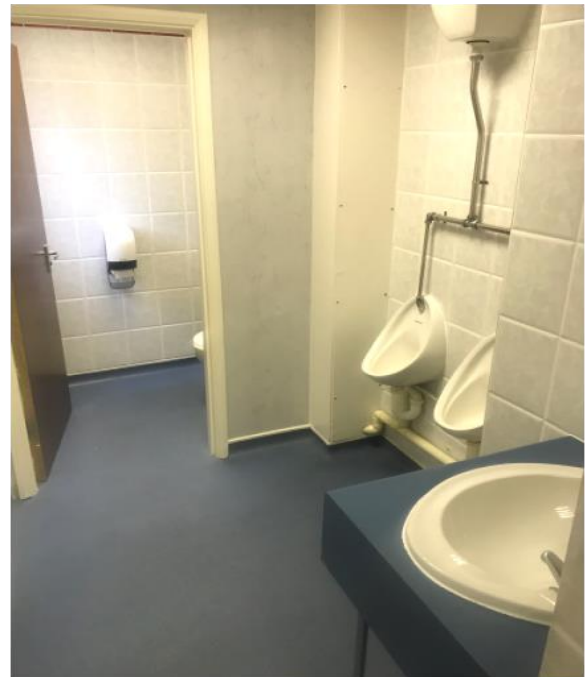


*Plate 5: Typical W.C area*

### 4.2.3 Meeting spaces

Throughout the office there are six formal meeting rooms that support the business's needs. These are used for training, formal and informal meetings, and one to one interviews with colleagues and members of the public.



*Plate 6: Typical four-person meeting room*

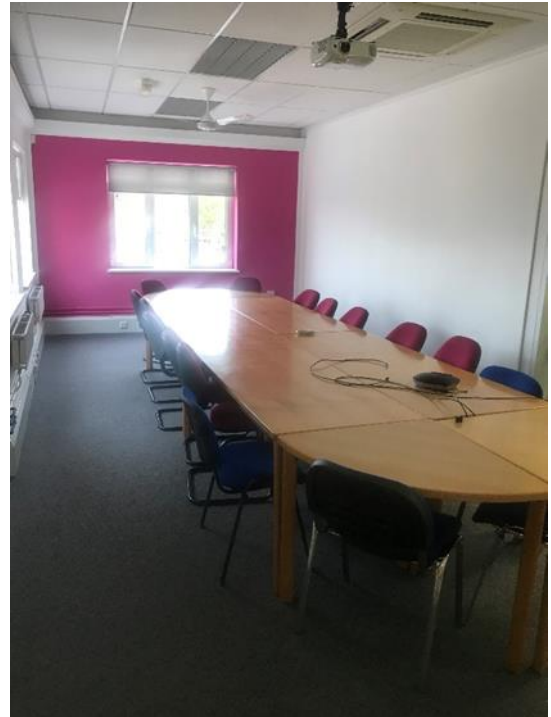


*Plate 7: Typical 16 person meeting room*



*Plate 8: Typical 1-2-1 space*

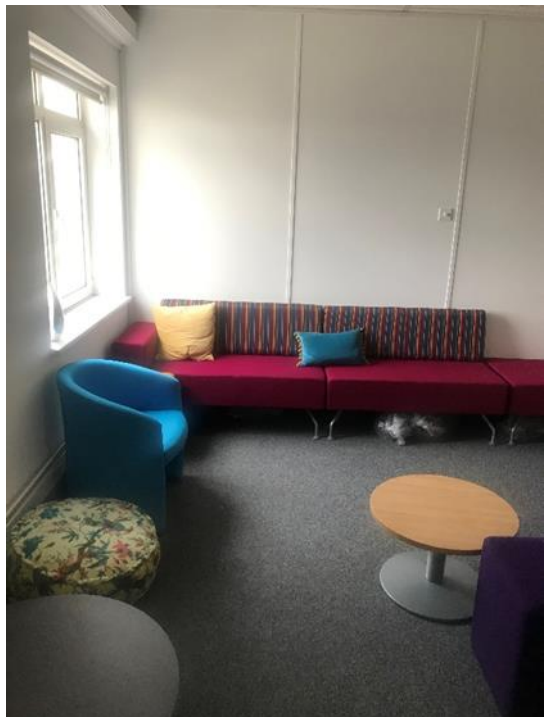


*Plate 9: Typical collaborative meeting space*

### 4.3 Spatial arrangements

There are wide variances in the use of office space ranging from 4.8m<sup>2</sup> (51 ft<sup>2</sup>) per employee to 34m<sup>2</sup> (365 ft<sup>2</sup>) per employee.

### 4.4 Aesthetics

#### 4.4.1 Colours

The organisation went through a merger in 2016, a new brand was developed, The new branding is built on strong vibrant coloured. The offices were redecorated at this time and large blocks of colour have been added.

#### 4.4.2 State of repair

Whilst the property is functional, and in a general good state of repair, many areas are in a tired condition and in need of modernisation. There are issues with the main roof in areas as well as water ingress over some window openings.



*Plate 10: Showing staining from water ingress on roof*

## 4.5 Furniture

As the business has expanded extra furniture has been procured, throughout the building there is a mixture of desking systems, set in various layouts, and all in different conditions. There is no consistent approach to operator seating. Meeting space and communal furniture is relatively recent and in a good condition.

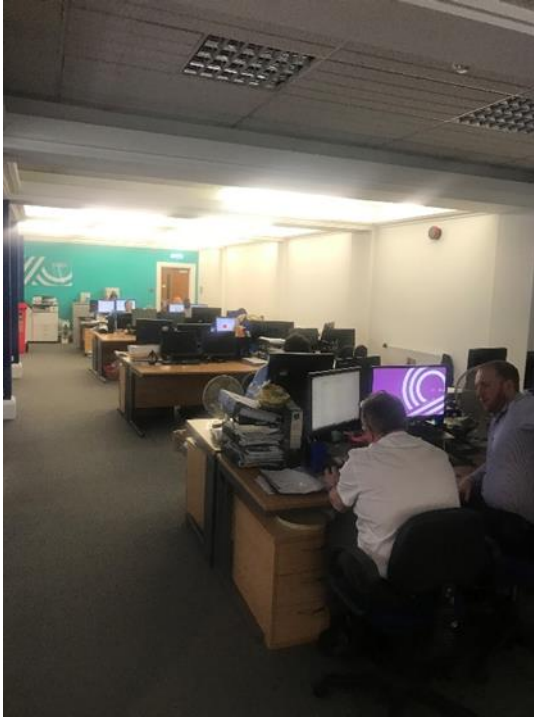


*Plate 11: Typical furniture type*

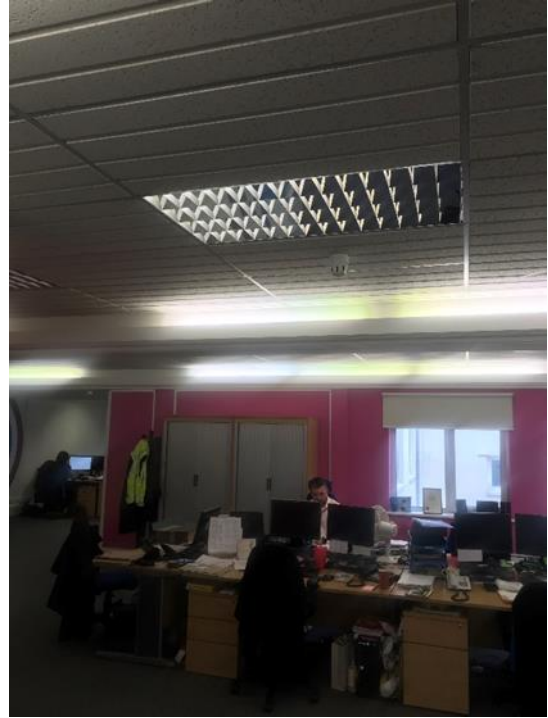


*Plate 12: Typical furniture type*

## 4.6 Air Quality

### 4.6.1 Temperature

The heating and cooling equipment in within the Swansea office are localised individual units, each floor is heated by floor standing system boiler, and there are cassette type air condition units placed in an ad-hoc manner around the building (usually in smaller offices or meeting rooms). There are minimal controls, these localised to the area and manually set.



*Plate 13: Typical gas fired heating system*



*Plate 14: Typical heat source with localised control*



*Plate 15: Ad-hoc Air condition ceiling cassette*

#### 4.6.2 Ventilation

There is limited mechanical ventilation, there is however excellent natural ventilation as all areas are served by openable windows.

#### 4.7 Lighting

Throughout the office accommodation there is traditional recessed ceiling grid cat 2 type lighting, designed to reduce glare for VDU operators, a LUX level of between 300-500 is maintained. Minimal controls, that either allow the lights to be on or off, no occupancy or light level sensors.

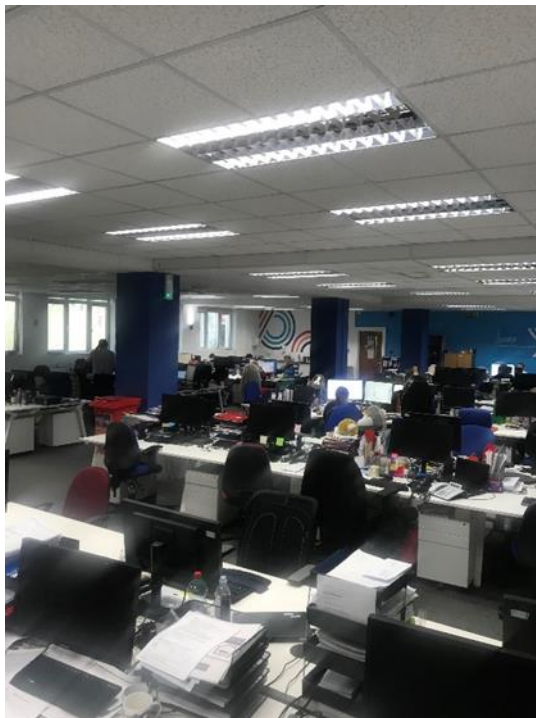


*Plate 16: Typical Cat 2 lighting*



*Plate 17: Typical natural lighting situation*

#### 4.8 Noise

Due to the open plan nature of the building there is always noise associated to a bustling office, the call centre is located in an open plan office with other staff, many areas have meeting spaces within the open area. Noise level appear to be high at times.

## 4.9 Technology

80% of the staff work from slimline laptops, linked to two monitors through docking hubs, each office has its own combined scanner, photocopier and printer. Some staff are able to work from tablets. Staff with laptops have the ability to “Skype Call”, there are an additional three video conferencing suites. The telephone is an early version of “Voice over IP”, there are issues as this system is out of date. Staff who require mobile phones have been provided with “Smart Phones”



*Plate 18: Typical office technology (printer/scanner)*



*Plate 19: Typical voice over IP phone*

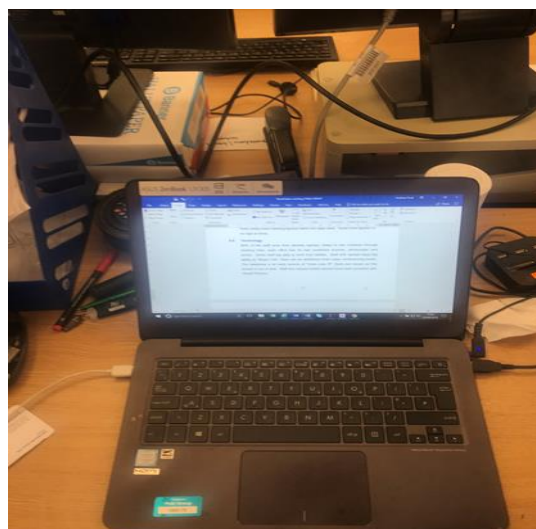


*Plate 20: Typical slimline laptop*

#### **4.10 Agile working**

The environment has been somewhat improved to consider “Agile Working”, the principle of agile working is one that has not been fully developed as yet within the organisation, hot desking areas are provided, the WIFI connection throughout the building is good, staff are supported with the ICT equipment required to work in an agile manner, however, all employees have their own work station, within a directorate floor setting. The current environment has not been designed with non-territorial or agile principles considered.

#### **4.11 Summary**

This chapter has described the case study environment so that the results of the study can be put into context, elements that work well can be highlighted, and recommendations for improvements made.

## **CHAPTER FIVE: PRESENTATION OF RESULTS, ANALYSIS AND DISCUSSION**

### **5.1 Introduction**

This chapter contains the analysis and interpretation of the case study data that has been collected by using questionnaires and carrying out semi structured interviews to meet objectives of the study.

As part of the research, an assessment of the office Pobl Group office design, layout and environment has been carried out to be used in conjunction with questionnaire results and structured interview feedback to establish any links between the workplace environment and employee productivity.

A total 300 staff members working in the head office of Pobl Group were contacted by email and asked to participate in the study by completing an online questionnaire. A total of 167 (55.6%) completed responses were received. The questionnaire comprised of 15 questions, responses were based on a five-point Likert Scale.

By analysing the results conclusions will be drawn, and recommendations made to assist in improving employee productivity with a Housing Association setting.

## 5.2 Findings and Analysis

### 5.2.1 Demographic characteristics of the respondents

#### Gender of respondents

The gender distribution of respondents is highlighted below, it is made up of 60% (100) Female and 40% (67) Male.

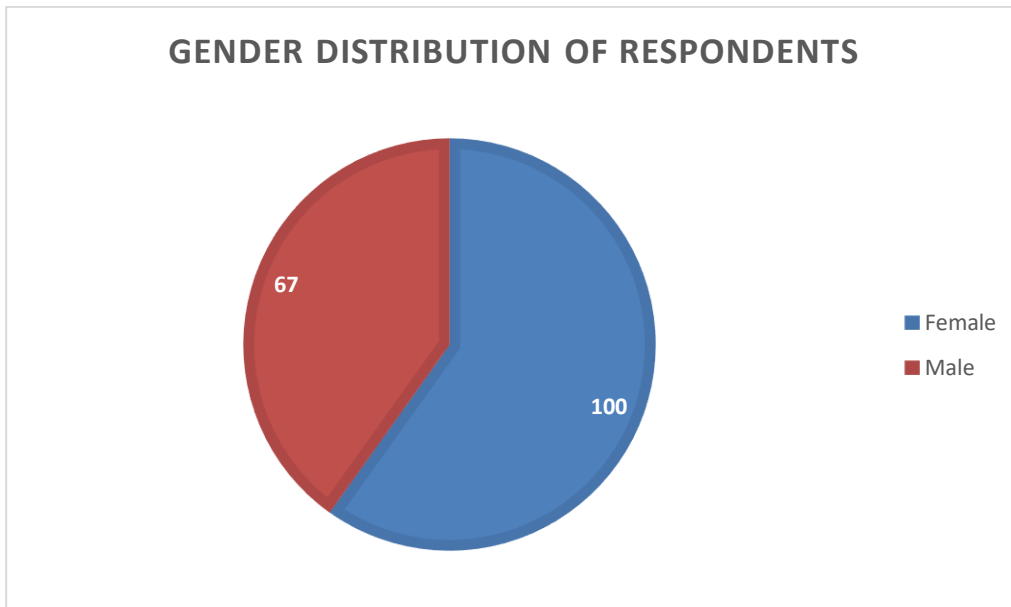


Figure 1: Gender distribution chart

### 5.2.2 Age of respondents

The age of the respondents was considered to be important when considering the impact of working environment on employees' performance.

The age bracket 35-44 accounted for the highest number of respondents with 34%, followed by 45-54-year olds with 27% then 25-34-year olds at 20% then 55-64-year olds at 14% then 18-24-year olds at 3% and the lowest group represented was the 65+ age bracket which only accounted for 2%

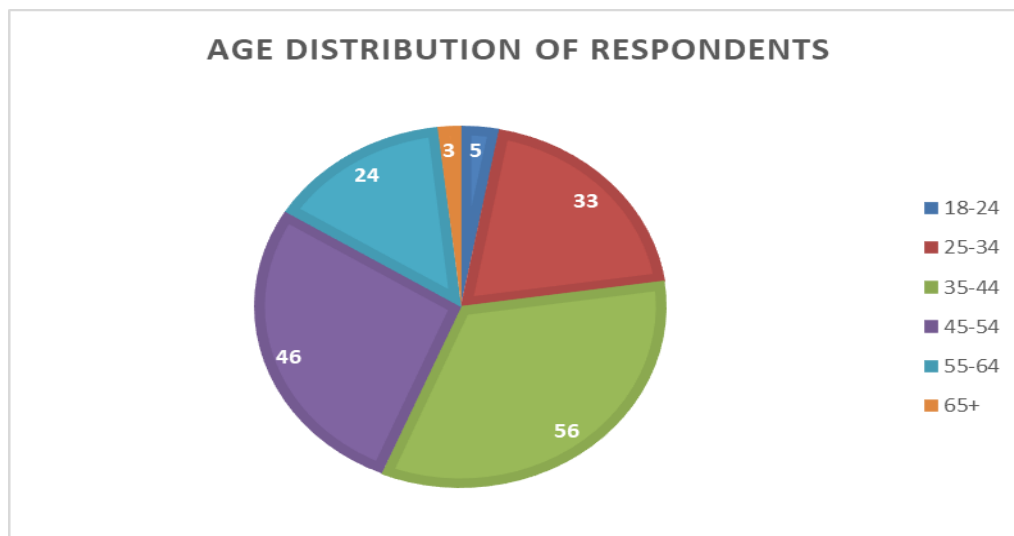


Figure 2: Age distribution chart

### 5.2.3 Organisational rank of respondents

The rank of respondents within the organisation was considered as part of the study and was used in order to answer the questionnaires.

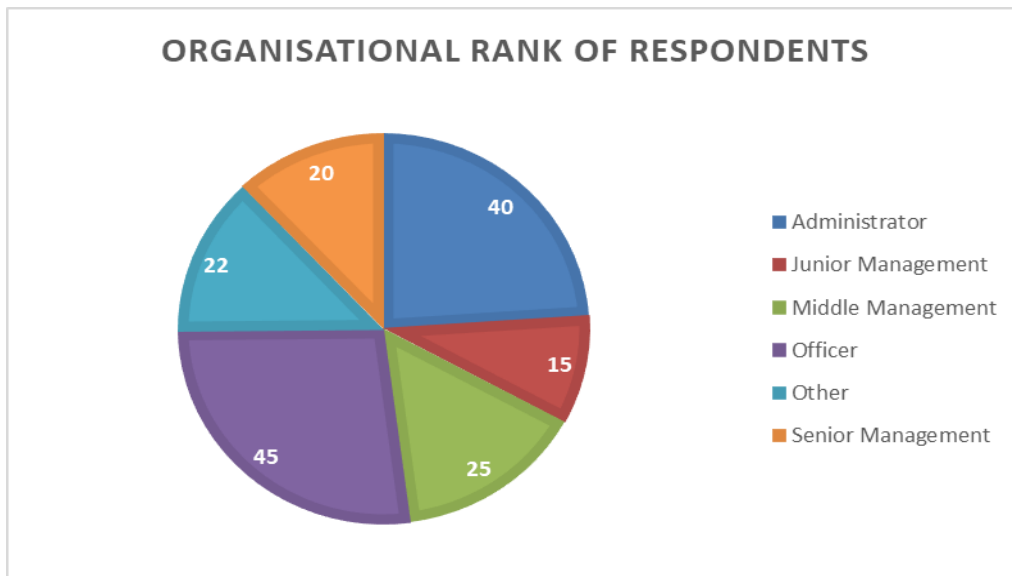


Figure 3: Organisational rank of respondents

#### 5.2.4 Respondents opinion on how their workplace environment effects their productivity

When asked how their Workplace Environment effects their productivity 13% (22 members of staff) believed it had a very positive effect, 29% (48 members of staff) thought it to be positive, 36% (60 members of staff) believed it was neutral, 19% (32 members of staff) thought it had a negative impact, and 3% (5 members of staff) suggested it had a very negative impact

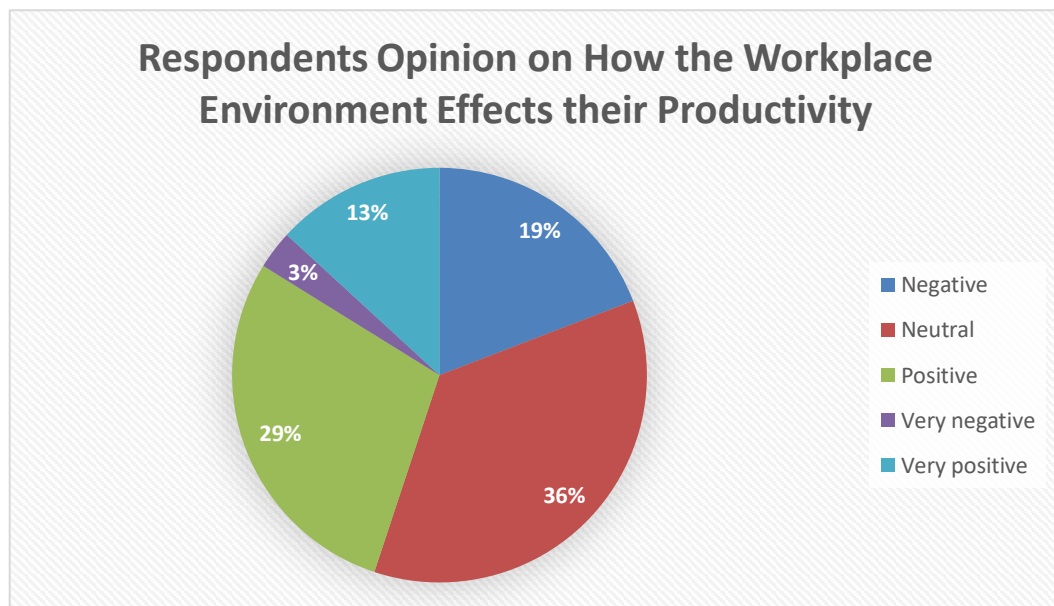


Figure 4: Chart showing respondents opinion on how their workplace environment effects their productivity

### 5.2.5 How respondents believe a comfortable office environment effects their productivity

Employees were asked do you think a comfortable office environment effects their productivity? 98% (165 employees) believed it did 2% (3 employees) did not respond to this question.

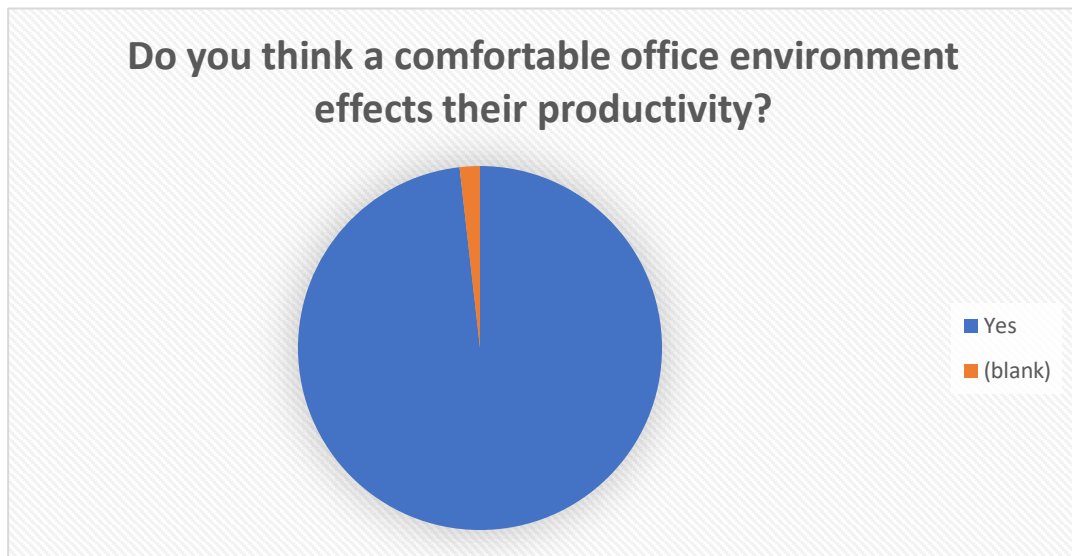


Figure 5: Chart showing respondents opinion on how a comfortable office environment effects their productivity

## 5.3 Physical factors effecting employee productivity

### 5.3.1 Numbers of staff occupying office layout types

There are eight office types in use with the building, 4% of the respondents work from a single occupancy cellular office, 11% work in a shared occupancy cellular office that contains accommodates between 1 to 5 employees, 47% occupy an office that is laid in an open plan format shared with more than 21 colleagues and has no privacy screens, 13% of respondents occupy an open plan office that accommodates between 11-20 employees and has no privacy screens, 12% occupy an open plan office that houses more than 21 members of staff and privacy screens are in place, 3% of respondents occupy an open plan office that accommodates 6 to 10 employees and privacy screens are in place, 5% of respondents occupy an open plan office that accommodates between 11 and 20 members of staff and privacy screens are in place, and 5% of respondents occupy an open plan office that accommodates between 6 and 10 members of staff and there are no privacy screens.

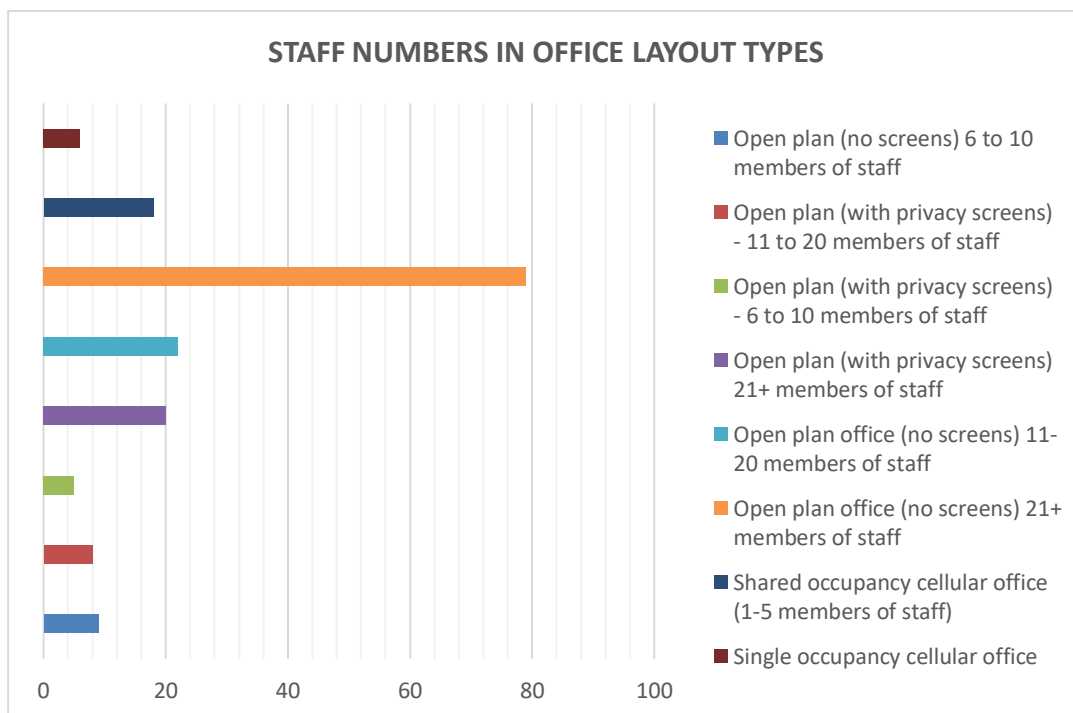


Figure 6: Staff numbers in office layout types

### 5.3.2 How respondents believe their office layout effects their productivity

The table below highlights respondent's opinion on how their office layout effects their productivity levels.

| Layout Type                                                     | Very Positive | Positive | Neutral | Negative | Very Negative |
|-----------------------------------------------------------------|---------------|----------|---------|----------|---------------|
| Open Plan Office 6 to 10 members of Staff No privacy Screens    | 0%            | 67%      | 22%     | 0%       | 11%           |
| Open Plan Office 6 to 10 members of Staff with privacy Screens  | 60%           | 20%      | 20%     | 0%       | 0%            |
| Open Plan Office 11 to 20 members of Staff no privacy Screens   | 9%            | 46%      | 36%     | 9%       | 0%            |
| Open Plan Office 11 to 20 members of Staff with privacy Screens | 13%           | 38%      | 37%     | 12%      | 0%            |
| Open Plan Office 21+ members of Staff no privacy Screens        | 6%            | 23%      | 34%     | 28%      | 9%            |
| Open Plan Office 21+ members of Staff with privacy Screens      | 5%            | 60%      | 25%     | 10%      | 0%            |
| Cellular Office shared between 1 and 6 members of Staff         | 17%           | 33%      | 33%     | 11%      | 6%            |
| Cellular Office single occupancy                                | 50%           | 33%      | 0%      | 17%      | 0%            |

Table 1: Table showing how respondents believe their office layout effect their productivity

These results are broadly in line with the findings presented by Haynes, (2008) the results do indicate that employees working from cellular type offices believe this type of layout effects their productivity in a predominantly positive manner.

Overall, the majority respondents believed the office layout had either a positive or neutral effect on their productivity. This could be because of two factors, firstly as highlighted by Haynes et al (2017) the office environment being open plan and providing a range of other physical layouts allows employees to be productive. And, secondly the work pattern undertaken by respondents is of a “club” nature were the open plan office supports the needs of employees to be highly autonomous and highly interactive. Employees occupancy is intermittent, tasks are shared and require concentration and interaction, Laing et al 1998 infers by matching work patterns types with office layouts allows employees to be more productive.

Research carried out by Haynes et al (2017) also highlighted that there are differences between genders and how the office layout effects their productivity. The table below does show a minor variance, the results indicate that the male respondents believed their office layout allowed them to be more productive. Indicating that in this instance that males feel more productive.

| Opinion on how Layout Effects Productivity Gender | Very Positive | Positive | Neutral | Negative | Very Negative |
|---------------------------------------------------|---------------|----------|---------|----------|---------------|
| <b>Male</b>                                       | 13%           | 39%      | 31%     | 15%      | 2%            |
| <b>Female</b>                                     | 8%            | 33%      | 31%     | 20%      | 8%            |

*Table 2: Table showing respondents opinion on how the office layout effects their productivity analysed by gender type*

### 5.3.3 Respondents opinion on how work station layouts effect productivity

Despite the dated work station approach throughout the office 58% (98 staff members) believe their work station layout has a Positive effect on their productivity (47%-79 members of staff positive, and 11% -19 members of staff very positive) 32% (54 members of staff) believe it has a neutral effect and 9% (13 members of staff negative and 2 members very negative).

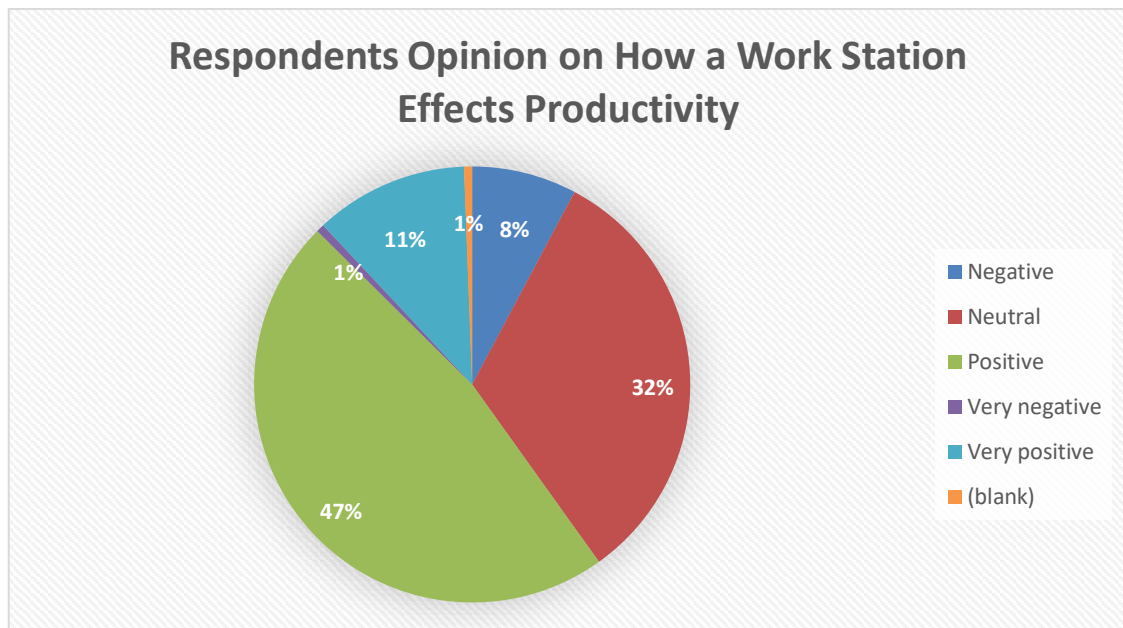


Figure 7: Chart showing respondents opinion on how a work station effects productivity

The results indicate that the majority of staff believe their work station has a positive effect on their productivity. By considering the views of I-Anzi (2009), Brill et al (1984), Stallworth and Kleiner (1996) these results could be improved further.

#### 5.3.4 Respondents opinion on how furniture and seating effects their productivity

The information received from respondents indicating effect of both furniture and seating is outlined below, the results are relatively similar, however the responses are received from different employees. Overall the opinion on furniture and seating is positive. These results are surprising given that a large proportion of the furniture and seating is dated, in poor condition, and of poor quality.

| Opinion              | Furniture<br>Number of<br>Respondents | Furniture % | Seating<br>Number of<br>Respondents | Seating % |
|----------------------|---------------------------------------|-------------|-------------------------------------|-----------|
| <b>Very Positive</b> | 18                                    | 11          | 20                                  | 12        |
| <b>Positive</b>      | 61                                    | 37          | 61                                  | 36        |
| <b>Neutral</b>       | 71                                    | 42          | 67                                  | 40        |
| <b>Negative</b>      | 14                                    | 8           | 16                                  | 10        |
| <b>Very Negative</b> | 2                                     | 1           | 2                                   | 1         |
| <b>No Response</b>   | 1                                     | 1           | 1                                   | 1         |
| <b>Total</b>         | 167                                   | 100         | 167                                 | 100       |

Table 3: Table showing respondents opinion on how furniture and seating effect productivity

These results are in contrast to the view presented by Sigh (2018), staff believe that the furniture provided that is dated and in poor condition still allows them to be productive. However, this may be because of the furniture still being safe to use and regular work station assessments being carried out.

However, despite the furniture being considered dated, in poor condition and of poor quality it still meets the needs of the employees from an ergonomic point of view and for that reason the results echo the findings of Mantooth et al (2017) and Singh (2018). Further improvements can be made by investing in dynamic office furniture which Ellegast (2012) has been proven to improve productivity.

### 5.3.5 Respondents opinion on how the availability of collaborative working and meeting space effects productivity

The responses received were as expected, 40% of respondents highlighted that the availability of formal meeting space effected their productivity in a positive way, as provided within the accommodation there are six formal meeting spaces. There are also several collaborative meeting areas and again respondents have highlighted that these areas support their productivity in a positive manner.

| Opinion              | Collaborative Meeting Space Number of Respondents | Collaborative Meeting Space % | Meeting Rooms Number of Respondents | Meeting Rooms % |
|----------------------|---------------------------------------------------|-------------------------------|-------------------------------------|-----------------|
| <b>Very Positive</b> | 19                                                | 11                            | 28                                  | 17              |
| <b>Positive</b>      | 65                                                | 39                            | 66                                  | 40              |
| <b>Neutral</b>       | 44                                                | 26                            | 39                                  | 23              |
| <b>Negative</b>      | 33                                                | 20                            | 29                                  | 17              |
| <b>Very Negative</b> | 6                                                 | 4                             | 2                                   | 1               |
| <b>No Response</b>   | 0                                                 | 0                             | 3                                   | 2               |
| <b>Total</b>         | 167                                               | 100                           | 167                                 | 100             |

*Table 4: Table showing respondents opinion on how the availability of collaborative working and meeting space effects productivity*

Given the amount and types of meeting space provided these results echo the finding of Garrett (2007) and Brager et al (2000) in that these types of spaces help to improve employee productivity, further improvement could be made by considering the view presented by Evidence space (2016) and ensuring appropriately sized rooms are provided.

### 5.3.6 Respondents opinion on how office decoration (colour, textures, finishes) effect productivity.

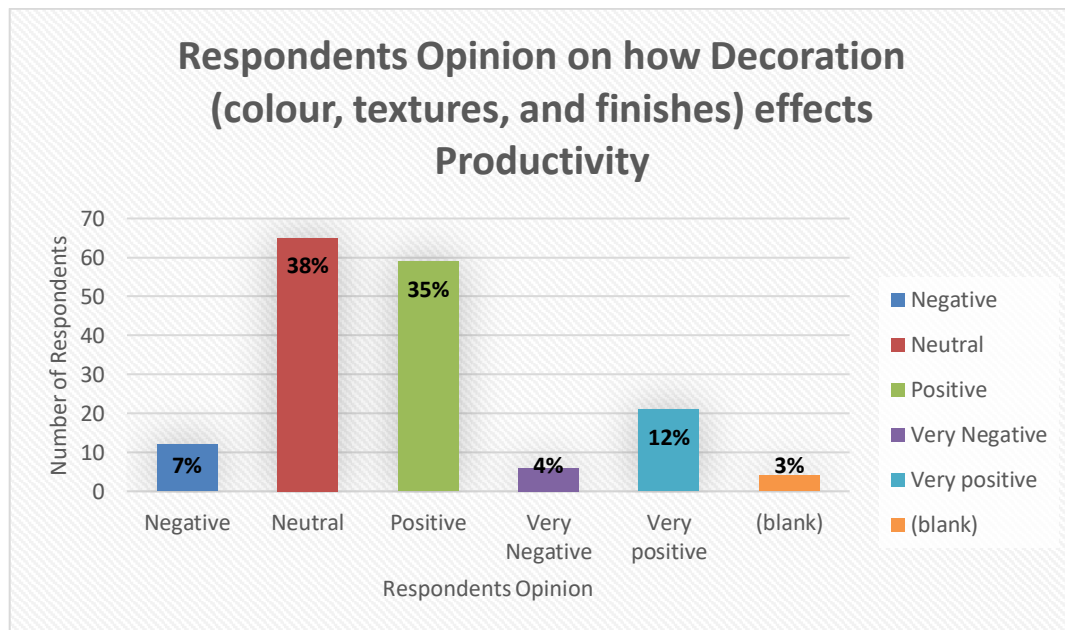


Figure 8: Chart showing respondents opinion on how decoration effects their productivity

Respondent were asked their opinion on how the office décor effected their productivity, as an Organisation the brand has been developed using bright pantone colours, it creates a fresh and vibrant environment. The results reflect this, 12% (21 employees) said it had a very positive effect on their productivity, 35% (59 employees) said it was a positive effect, 38% (65 employees) said it had a neutral effect, 7% (12 employees) said it had a negative effect, 4% (6 employees) believed it had a very negative effect. 3% (4 employees) did not reply.

These results echo the views of Osmond and O'Reily (2007) in that aesthetics do play a part in employees being productive, however the information published by Executive Accountant (1993) does not ring true in this environment as the colours within the case study environment and bright and vibrant and far from pastel.

## 5.4 Environmental factors effecting employee productivity

### 5.4.1 Respondents opinion on how room temperature and the ability to control it effect employee productivity

When asked about how the office room tempriture effected their productivity the majority of the responses were of a negative nature, 8% ( 13 employees) found it to have a very negative effect, 32% (54 Employees) found it to have a negative effect, 26% (43 employees) found it to have a neutral effect, 21% (36 employees) suggested it had a positive effect and 5% (8 employees) said it had a very positive effect and 8% (13 employees) did not provide a response.

Similar responses were received when responents were asked about how the ability to control room temprature effected their productivity. Again the majority of those question provided negative responses, 12% (21 employees) said it had a very negative effect, 38% (63 Employees) believed it to be of a negative effect, 18% (30 employees) stated it had a neutral effect, 21% (35 employees) said it effected them in a positive way, 9% (15 employees) found it effected them in a very positivie way, and 2% (3 employees) did not provide a response.

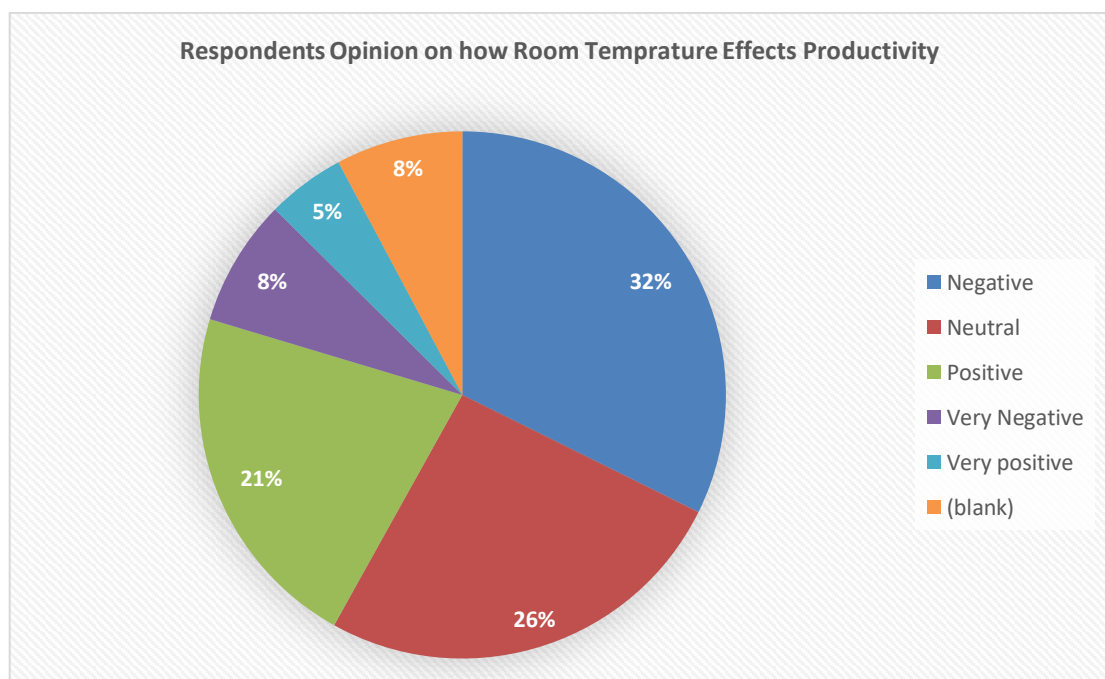


Figure 9: Respondents Opinion on how room temperature effects productivity

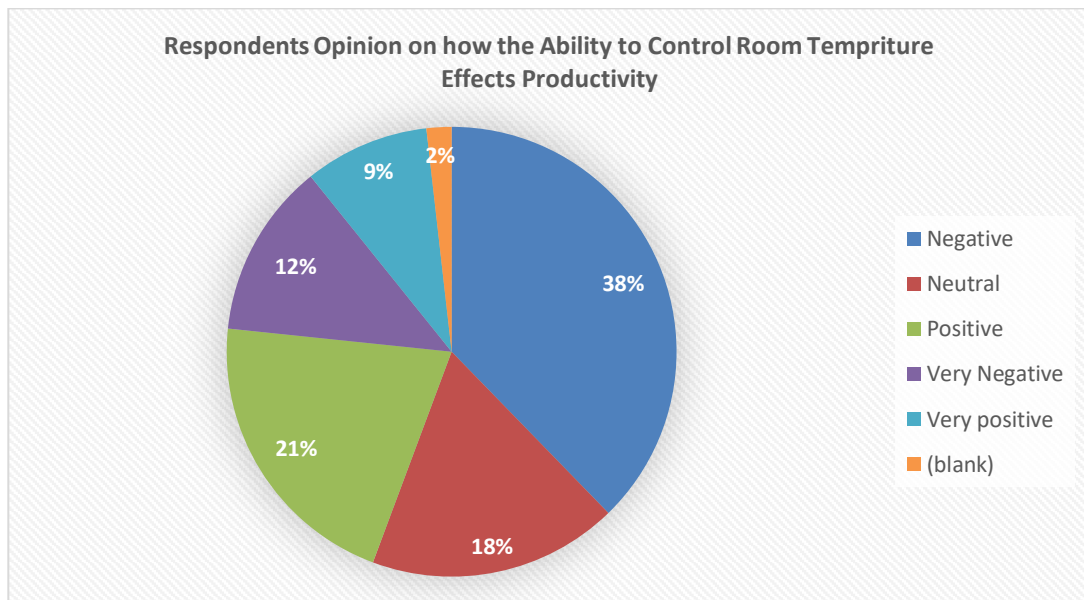


Figure 10: Respondents opinion on how the ability to control room temperature effects productivity

The results were analysed one step further to see how the room temperature effected employee's opinion on how it effected their productivity. From the table below you can see that staff who work in large open plan offices that accommodate more that 21 members of staff found that room temperature effected their productivity in a predominantly negative way.

This could be as a result of being un-able to control the temperature at a level that satisfies everybody within the office, or the heat generated by body temperatures within a space un-able to be compensated for due to the lack of natural ventilation or comfort cooling.

| Room Temperature Office Layout                          | Very Positive | Positive | Neutral | Negative | Very Negative | No Response |
|---------------------------------------------------------|---------------|----------|---------|----------|---------------|-------------|
| Open Plan Office 6 to 10 members of Staff               | 0%            | 21%      | 29%     | 21%      | 7%            | 22%         |
| Open Plan Office 11 to 20 members of Staff              | 10%           | 33%      | 23%     | 27%      | 0%            | 7%          |
| Open Plan Office 21+ members of Staff                   | 3%            | 17%      | 25%     | 42%      | 11%           | 2%          |
| Cellular Office shared between 1 and 6 members of Staff | 6%            | 22%      | 39%     | 17%      | 3%            | 3%          |
| Cellular Office single occupancy                        | 17%           | 50%      | 16%     | 0%       | 0%            | 17%         |

Table 5: Table showing respondents opinion on how the room temperature effects their productivity based on their office layout.

The results reflect the findings of Clements-Croome and Derek, (2008), Lan et al (2010) in that a comfortable working environment is one that promotes productivity, and that a relationship does exist between indoor office temperature and productivity. The results of this research do outline that in smaller offices where there are less variances between individual temperature preference employees feel that it effects their productivity less.

#### 5.4.2 Respondents opinion on how the natural ventilation of the office effects employee productivity

The responses received to this question were quite equally spread across positive, negative and neutral opinions. 34% (57 employees) of respondents said it had a positive effect (which include very positive and positive) 39% (66 employees)said it had a negative effect and 26% (43 employees)said it had a neutral effect and 1% (1 employee) did not respond. The natural ventilation provided through openable windows on the front and rear of elevations of the building this could account for the relatively equal spread as employees in the middle of the office will not experience the effects as much as those on the peripheries.

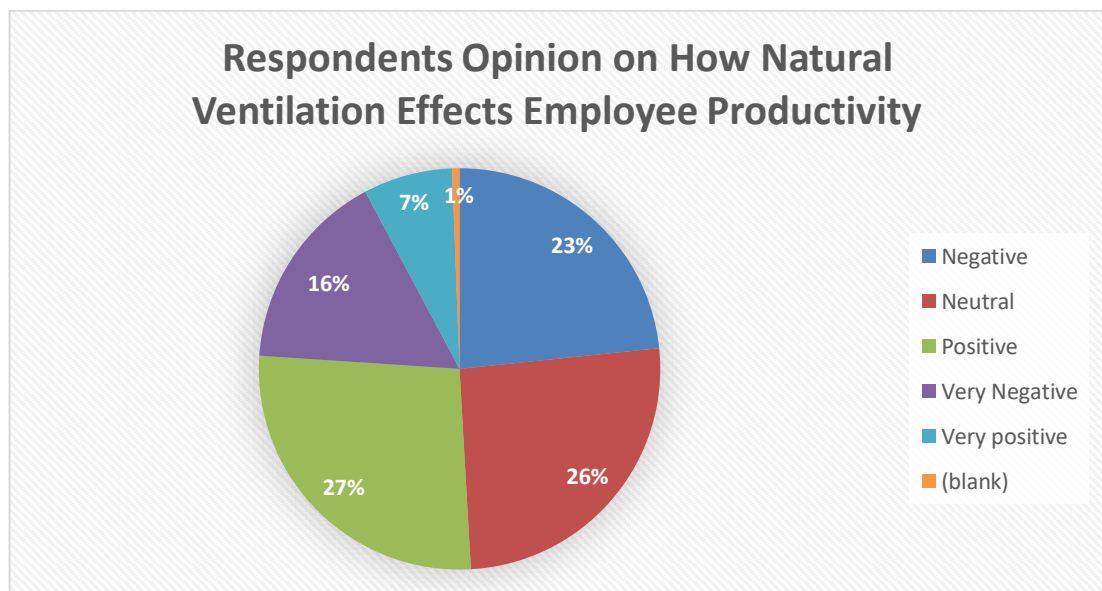


Figure 11: Chart showing respondents opinion on how natural ventilation effects employee productivity.

### 5.4.3 Respondents opinion on how the mechanical ventilation of the office effects employee productivity

Respondents were asked what effect mechanical ventiation had on their productivity, the majority of respondents – 40% (67 employees) highlighted that it did not effect their productivity, 3% (5 employees) said it had a very positive effect, 19% (32 employees) indicated it had a positive effect, 26% (43 employees) said it effected them in a negative manner and 11% found it had a very negative effect. This is likely to be as a result of mechanical ventilation only being installed in parts of the building.

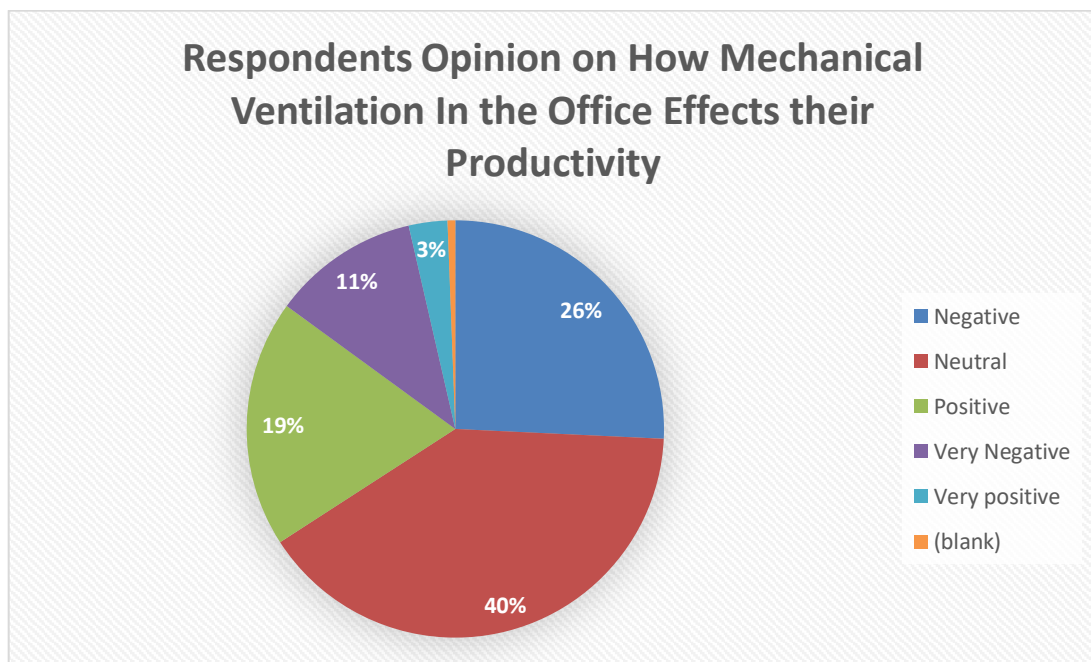


Figure 12: Chart showing respondents opinion on how mechanical ventilation of the office effects employee productivity

#### 5.4.4 Respondents opinion on how the natural light in the office effects employee productivity

When questioned about how Natural Light effected their productivity 7% (12 employees) indicated that it had a very positive effect on their productivity, 22% (37 employees) said that that it effected them in a positive manner, 23% (38 employees) thought it had a neutral effect, 34% (56 employees) said it had a negative effect, and 13% (22 employees) believed to have a very negative impact. 1% (2 employees) chose not to respond.

These result are to be expected given that approx. 50% of the office space benefits from very little or no natural light.

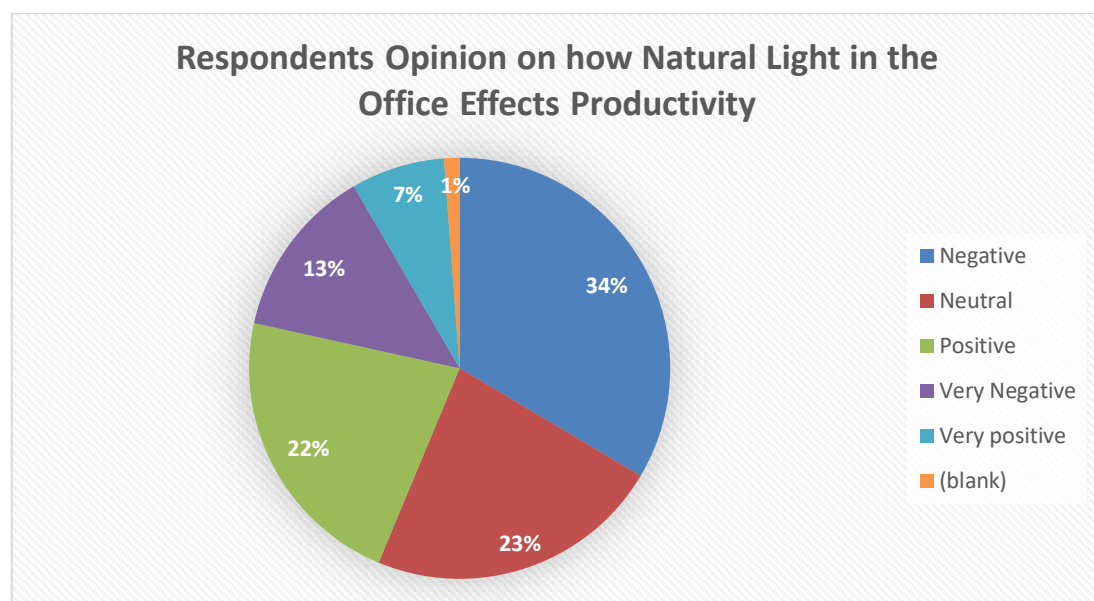


Figure 13: Chart showing respondents opinion on how natural light in the office effects their productivity.

These result reflect the view of Veitch (2005), it indicates that occupiers who have access to natural daylight are more productive, There are limitations to this part of the study and the results reflect this given the access to natural light for all respondents and the fact that all respondents did not experience the same amount of natural light.

#### 5.4.5 Respondents opinions on how the artificial light in the office effects employee productivity

Respondents were asked how the artifical light within the Office effected their productivity, the results highlighted that the artificial lighting, for the majority it had a negative effect, 10% very negative (17 employees) and 34% (54 employees) negative, 28% (46 employees) said it had neither a positive or a negative effect, 23% (39 employees) said it effected them in a positive way and 4% (6 employees) thought it had a very positive effect. 1% chose not to comment.

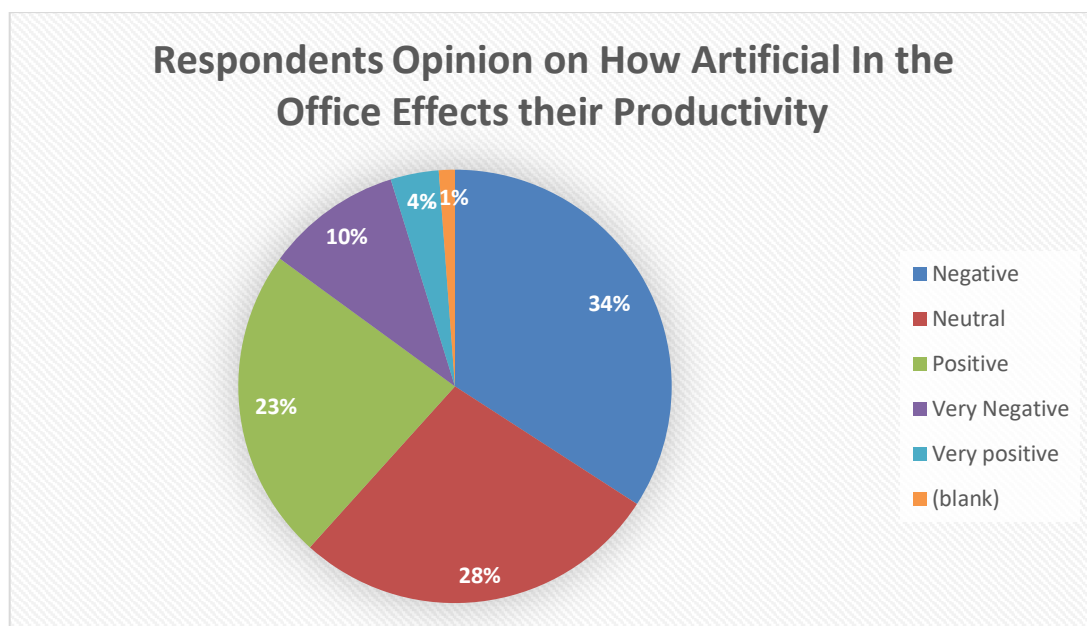


Figure 14: Chart showing respondents opinion on how artificial light in the office effects productivity.

These results go against views presented by Roethlisberger and Dickenson (1939) in the historic “Hawthorne Experiment” where they indicate that lighting is relatively unimportant when considering productivity, in many settings artifical lighting is essential for employees to be productive, being able to control artifical lighting levels to suit the task, individual or environment will improve productivity

#### 5.4.6 Respondents opinions on how having the ability to control artificial light in the office effects employee productivity

Respondents were asked their opinion on how having the ability to control artificial lighting levels effected their productivity, given that their current environment has little or no control. (Lighting is either on or off and limited zoned controls over large areas) 13% (22 employees) indicated that the current set up had a very negative effect on their productivity, 34% (56 employees) said it had a negative effect, 23% (38 employees) said it didn't effect them in either a positive or negative manner, 22% (37 employees) said it had a positive effect and 7% (12 employees) said it had a very positive effect 1% (2 employees chose not to respond.

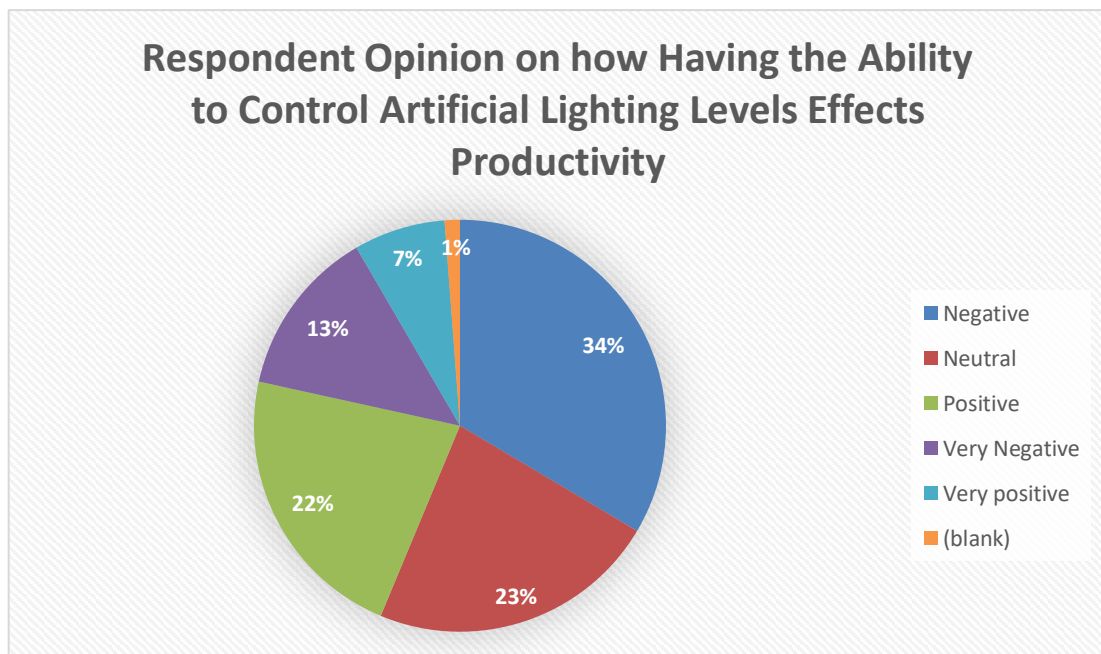


Figure 15: Chart showing respondents opinion on how having the ability to control artificial light in the office effects productivity

The results are as expected given the lack of lighting controls, and are in line with the findings of Boyle et al (2003), by giving individuals control of their lighting levels higher rates of productivity can be achieved.

#### 5.4.7 Respondents opinion on how noise in the office effects their productivity

When questioned on how noise in the office effects respondents productivity the responses were predominantly negative, 17% (29 employees) believed it had a very negative effect, 31% (51 employees) believed it to be negative, 32% (54 employees) said it didn't effect them in either a positive or negative manner, 3% (5 employees) said it had a very positive effect, and 13% (21 employees) said it effected them in a positive way. 4% (7 employees) did not respond to the question.

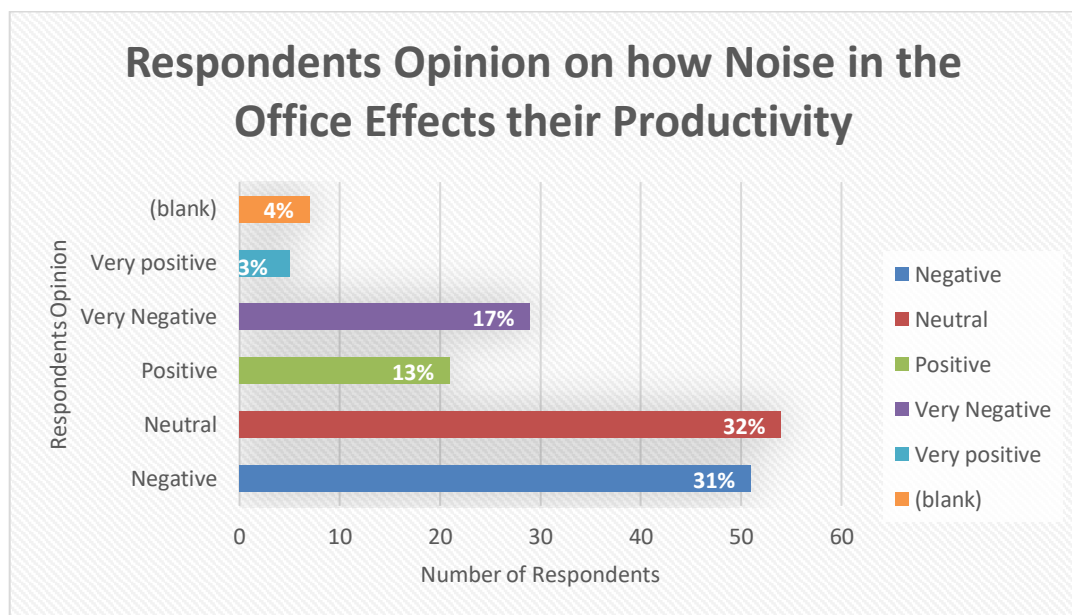


Figure 16: Chart showing respondents opinion on how noise in the office effects their productivity

The noise data was analysed further to see if respondents opinion on noise reflected on their office layout and whether privacy screens improved their opinion on noise, the table below highlights that staff who work in an office with privacy screens feel that noise effects them less. There is a slight exception in open plan offices with between 11-20 staff members and no privacy screens, this is likely to be as a result of staff being accommodated within this type of environment being predominantly site based and spending long period out of the office.

| The Effect of Noise Office Layout                               | Very Positive | Positive | Neutral | Negative | Very Negative | No Response |
|-----------------------------------------------------------------|---------------|----------|---------|----------|---------------|-------------|
| Open Plan Office 6 to 10 members of Staff No privacy Screens    | 0%            | 11%      | 22%     | 56%      | 11%           | 0%          |
| Open Plan Office 6 to 10 members of Staff with privacy Screens  | 0%            | 20%      | 60%     | 20%      | 0%            | 0%          |
| Open Plan Office 11 to 20 members of Staff no privacy Screens   | 5%            | 23%      | 27%     | 18%      | 18%           | 9%          |
| Open Plan Office 11 to 20 members of Staff with privacy Screens | 12%           | 13%      | 13%     | 50%      | 0%            | 12%         |
| Open Plan Office 21+ members of Staff no privacy Screens        | 1%            | 6%       | 32%     | 31%      | 25%           | 5%          |
| Open Plan Office 21+ members of Staff with privacy Screens      | 0%            | 20%      | 45%     | 35%      | 0%            | 0%          |
| Cellular Office shared between 1 and 6 members of Staff         | 5%            | 17%      | 28%     | 28%      | 22%           | 0%          |
| Cellular Office single occupancy                                | 17%           | 17%      | 50%     | 16%      | 0%            | 0%          |

Table 6: Table showing respondents opinion of how noise effects their productivity in relation to their office layout

As identified in the literature review noise is believed to be the factor that most effects employee productivity, Folsom (2003) and Mak et al (2012) both found correlation between noise in the office environment and productivity. This research has also identified that there is a link between noise, office layout type and its effect on productivity, it has also found that in some instances this can differ depending on the type of work being carried out within the office. It is also evident that by installing some form of sound proofing such as Privacy screens can slightly improve productivity.

## 5.5 Ways of working and effects on productivity

### 5.5.1 Respondents views on agile working and how it effects their productivity

Respondent were asked if the organisation had an agile working policy, 48% (80 employees) said yes, 25% (41 employees) said no, 26% (44 employees) were unsure and 1% (2 employees) did not respond.

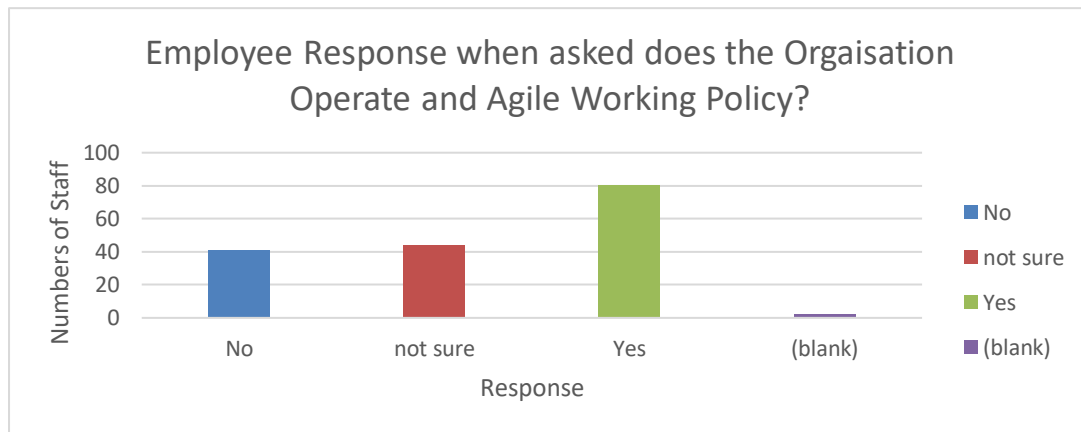


Figure 17: Chart showing employees responses to being asked whether the organisation has an agile working policy?

Respondents who indicated they were aware of the policy were asked how it effected their productivity 39% (31 employees) indicated it had a very positive effect, 43% (34 employees) indicated it had a positive effect, 15% (12 employees) said it didn't have an effect 1% (1 employee) said it had a negative effect and 2% (2 employees) did not respond.

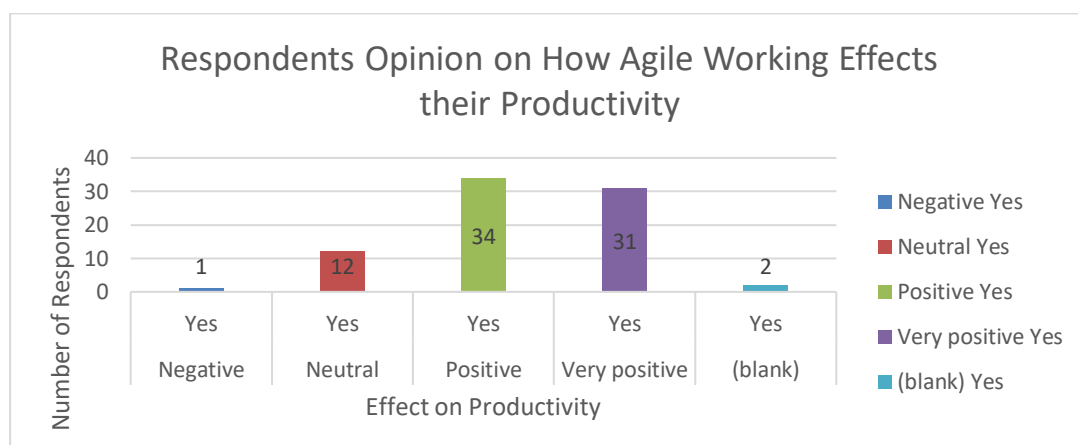


Figure 18: Chart showing respondents opinion on how agile working effects their productivity

These results are inline with the views presented by Cushman and Wakefield (2014), Kamal (2017) and Enei,(2018) in so much as employees who work in an agile manner are more productive, there are benefits to both the organisation and the employee. Where an organisation or job role can work in an agile way the environment should be designed or altered to assist the principles.

## 5.6 Discussion of results

The findings of this research reflects the broad view presented by Humphries, (2005) in that relationships between office environment and productivity are predominantly related to design features. These features include; layout design, space requirements, furniture, comfort controls for lighting and temperature, and aesthetics. It is believed by many that a quality workplace environment that considers these design issues can motivate employees and therefore produce better results.

By comparing the information studied in the Literature review, the evidence gathered from the case study and the responses taken from the questionnaire, it is clear that the workplace environment does effect employee productivity. This research breaks down the elements in an attempt to identify what areas staff believe are the most important.

The Literature review highlighted that physical and environmental elements within the office workplace can influence productivity. The case study assessed the “status quo” and the research questionnaire and interviews provided respondents opinions on what has the greatest effect.

The physical elements included office layout, work station layout, office furniture, seating, and office aesthetics. When considering layouts, furniture, support spaces and facilities respondents indicated that on the whole these elements effected their productivity in a positive or neutral manner despite the environment being dated. This is in contrast to views presented by Interviewee A who believed that: an ergonomic design of floor space considering anticipated staff movements, and flow of traffic through the office environment is the most critical element. Interview D also indicated that layout and design is the key element but this was linked to new ways of working such as designing for Agile working principles.

Respondents also believe the aesthetics of the office also allowed them to be productive, and this was in line with the evidence provided in the literature review, however the view presented in the Executive Accountant (1993), where it suggested pastel colours promotes productivity in the office was found not to be the outcome in the case study environment.

The environmental issues included temperature and the ability to control it, humidity, lighting levels (natural and artificial) and the ability to control it, and noise. The responses received to these question were more in line to the information gathered in the literature review, and the dated environment identified in the case study building. Interviewees B & C also indicated that environmental elements, namely issues associated to lighting and temperature levels have the greatest effect on employee productivity. Interviewee B highlighted issues related to temperature resulted in staff finding it hard to work due to being cold/hot/uncomfortable. Interviewee A & D both made the valid point that environmental elements do have an effect but acknowledged that it is a difficult area to improve as personnel preference of occupants will differ considerably.

The research has also highlighted the alternative ways of working have a part to play improving productivity, in-line with the view presented by Kamal, (2017) that by supporting employees to work how, where and when they choose, productivity can be increased. Interviewee D highlighted that having just undertaken a project to refurbish an environment considering agile working has had a greater effect than any previous projects where improvements to physical and environmental elements have been made.

By employing agile working principles and designing the workplace to support these principles, employee productivity can be increased and additional benefits such as reduced property cost (due to lower occupancy level) can be made.

## **5.7 Summary**

By reviewing the information collected from both the survey and interviews it is clear to see that employees believe that the office environment does influence their productivity. Whilst there is sufficient information to suggest that all the elements researched and surveyed do have an effect, the information does allow us to draw the conclusion that environmental factors such as lighting, temperature, and noise have the greatest negative impact on employee productivity.

## **CHAPTER 6: SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Introduction**

This chapter outlines the major findings that became apparent from the study the conclusion drawn from the finding and any recommendation. It will also outline any limitations to the study and make recommendations for further related research.

The study investigated the effect of working environment on employees' productivity within welsh housing associations. The research was centred around the case study subject: The Swansea office of Wales's largest Housing association Pobl Group. The study was carried out find what elements of the working environment had the greatest influence on employee's productivity so that recommendations for improvements can be made. A research framework was developed which categorized the elements that are believed to have the greatest effect on employee productivity in the office environment.

These elements were broken down into three categories:

- Environmental Elements (Noise, Office Temperature, Lighting)
- Physical Elements (Office Layouts, Furniture, Aesthetics)
- Technology and Ways of Working

A descriptive questionnaire, based on the elements highlighted in the framework, was used to survey all employees working with the Swansea office. A descriptive questionnaire was used so that respondents' opinions and views could be measured against a Likert scale. All 300 employees working in the Swansea Office were contacted and asked to participate, a total of 167 responses were returned, this gave a fair representation of demographics of the population in terms of gender, age, and position within the environment. A series of structured interviews were also undertaken in order to gain a perspective from facilities management staff that deal with the issues believed to effect employee productivity.

The data gathered was collated and analysed using Microsoft Excel and pivot tables. It was quite apparent that all the elements identified influence

employee's opinion on how workplace environment effects their productivity. This study has highlighted were the biggest negative impacts are and allowed recommendations to be suggested on how improvements can be made.

## **6.2 Summary of main findings**

The office environment is widely acknowledged as being one of the main factors effecting employee productivity. The physical and environmental elements need to be well considered for the type of task or role that will operate from within that office setting. This was found to be true in the case of this research as 98% of respondents believed that a comfortable environment improved employee productivity.

This study investigated the effect of the office environment on employee productivity using the Pobl Group Swansea office as a case study. The study was broken down into two parts:

- a study of the physical and environmental elements that were in-situ, this included layout office design, furniture, collaborative working spaces and meeting rooms available, welfare facilities, technologies, lighting systems, HVAC systems, and finishes, this was presented in a report format with photographic evidence.
- A questionnaire to survey occupants and interviews with facilities management staff. The results of this were analysed and information collated into a series of graphs, charts and tables.

The findings of the case study will be used to make recommendation on how to improve the productivity in the workplace for similar organisation.

This study has revealed that many respondents believe that environmental issues such as, room temperature and the ability to control it, the ability to ventilate the office environment both naturally and mechanical, and the control of lighting levels (both natural and artificial) all have a negative effect on productivity. This is to be expected given the dated nature of the equipment and layout of the case study environment.

Noise was also found to be one of the biggest elements to effect employee productivity, however the respondents that have privacy screens between their

desks felt the noise in their environment had less of an effect on their productivity.

The research also identified deficiencies with the physical nature of the office environment. The majority of respondents worked from open plan offices that housed between 6 and 10 members of staff, many believed that this type of layout allowed them to work in a productive manner, in this type of office, again, where privacy screens had been placed between the desks the percentage of respondents who believe their productivity was supported in a positive manner was increased. Larger open plan offices with more than 21 occupants displayed the highest percentage of respondents who believe the layout had a negative effect on their productivity, again this type of environment where privacy screens between the desks have been installed evidenced improved opinions on productivity.

Surprisingly, given the range of historical work station layouts and furniture that are considered to be dated and in a poor condition, the majority of respondents believed the negative impact on productivity to be quite low.

When asked about aesthetics of the office a large proportion of the respondents believed it had a positive effect on their productivity, this was to be expected as the building had been subjected a recent redecoration project that introduced the vibrant colours of the group brand. The negative responses were very limited. This was also the case when asked about the availability of meeting rooms and collaborative meeting space, at least 50% of the respondent were of the view that the current situation had a positive influence on productivity.

One of the key findings for the organisation is the effect that employees believe an agile working has on their productivity, a large proportion of those surveyed were unaware of the ability to work in an agile manner, and those that did believed that it had a positive impact on their productivity.

### 6.3 Conclusions

This study has researched the effect of the office environment on employee productivity using the opinions of the employees operating from the Swansea office of Pobl Group as a case study. The following research questions were set and conclusions drawn.

- **Does the office environment have an effect on employee productivity?**

The results of the study highlight that the office environment does affect and influence employee productivity. By identifying the deficiencies of the case study environment and surveying the effect on employee productivity, recommendations for improvements can be made.

- **What elements of the office environment have the greatest effect on employee productivity?**

The findings of the study have identified that environmental elements relating to lighting, ventilation, temperature and noise are the key areas where improvements could be made to the office as means to improve employee productivity. Physical elements have a limited effect on employee productivity and where negative responses have been received these can be related back to deficiencies with environmental elements.

- **Can employee productivity be improved by allowing employees to work in a more agile environment?**

The findings of the study have identified that improvements in productivity can be gained by promoting an agile working policy and providing an environment which supports such policy.

## 6.4 Recommendations

Based on the information presented in the findings and conclusions of this study, the recommendations have been outlined for consideration by Pobl Group as a means of improving its workplace environment in order to increase employee productivity. This study has identified elements within the three main areas that are considered to be deficient and found to have a negative impact on employee productivity, the following recommendations can be used to improve the case study subject and be used as guidance for similar organisations experiencing similar issues.

### 6.4.1 Environmental Recommendations

**Lighting** – whilst the office is compliant the results of the survey highlighted that Lighting (both natural and artificial lighting) is an element that staff believe has a significant effect on their productivity, consideration should be given to installing the following measures:

- Integrated digital lighting management system - This system utilises occupancy sensors to share information on the occupancy patterns of the office and daylight sensors placed in areas close to external windows to allow the environment to benefit from natural lighting in an effective way. If programmed and controlled correctly it will provide and the perfect environment in which employees can work with higher levels of productivity. There are added bonuses to integrated lighting management systems, energy wastage is kept to a minimum and when couple with LED CAT 2 lighting can prove more cost efficient. This type of system can also give employees some control over the lighting levels within their work environment
- In order to increase the positive effect of natural light, it is recommended that replacing ceiling tiles with a similar product that high levels of light reflectance can ensure full advantage taken of natural daylight in open-plan spaces, this in turn reduces the quantity of artificial lighting required to illuminate the area.
- Consideration should also be given to furniture layouts to ensure that desk that have surfaces with high reflective qualities are not positioned directly under artificial lighting fixtures.

**Thermal comfort (room temperature)** – Thermal comfort was reported by respondents as having a major effect on their productivity levels. Maintaining comfortable conditions to help promote productivity levels requires can be achieved by balancing a number of factors, these include a correctly specified HVAC system, adequately sized facility for the occupation levels, and solar gain. Thermal comfort is difficult to achieve in a way that all occupants are satisfied, individuals occupants' preference will always play a part. However, HVAC systems such as a comfort cooling with heat recovery will allow more flexibility over differing areas within the same office. In the case study building replacing the existing wet heating system with this type of HVAC system would allow staff to have control over temperature be it to hot or cold. This would be a certain improvement as the majority of the building does not benefit from any form of comfort cooling.

**Ventilation** – Levels of natural ventilation are good within the case study building; however mechanical ventilation is limited. A supply and extract systems is recommended, this will ensure a constant, and reliable rate of ventilation throughout the office. This also improves any security issues associated with natural ventilation through open windows, and possible effects on productivity through external noise. This system should be designed in conjunction with and HVAC system replacement.

**Noise** - within the office was another major area that staff believed effected their productivity in a negative way, a specialist acoustic survey should be carried out, however the following measures are recommended as a way of improving this issue.

- Respondents who work from desks with privacy screens as part of their work stations reported that noise effected their productivity less than those without them, for that reason it is recommend that desk privacy screens are installed to all desks. Also, by using furniture, partitions and acoustical panels to divide areas, different acoustic performance zones can be housed within the same environment. Sound is diffused and spread evenly over the space.
- In conjunction to the recommendation to replace the ceiling tiles with a product with high levels of light reflectance, the replacement of the suspended ceiling should also be specified considering acoustic performance.

- In meeting areas or collaborative working space located within an open plan office environment there is the need for acoustic separation between employees working at their desks and people utilising the meeting space, by installing ceiling rafts, canopies and vertical baffles appropriate levels of privacy can be achieved.

#### 6.4.2 Physical Recommendations

**Office Layout** - Overall, the respondents of this survey felt that the open plan environment contributed to their levels of productivity in a positive way, however, open plan offices where occupancy levels were no more than 10 employees were where respondents felt most productive. Offices housing between 10 and 21 employees also were thought to have a positive effect on employee productivity, only when the occupancy levels were raised to 21+ employees did higher levels of negative impacts on productivity get recorded. The results were also cross referenced against the effect that temperature has on employee's productivity and the biggest negative effect was recorded in offices with 21+ employees. For these reasons it is recommended that where possible open plan offices should be limited to less than 20 employees. The office layout results also indicated that productivity is improved in the open plan setting where privacy screens were in-situ between desks.

**Furniture** – The furniture within the case study building is considered to be dated, and in poor condition, however respondents believed that it in general has a positive effect on their productivity, I believe this to be because of the size of desks and other furniture that allow staff to not to have to consider the benefit of new furniture as it has met the historical needs of their role.

It is however recommended that in the short term a survey of the existing furniture be carried out for health and safety reasons, and a programmed replacement of existing furniture be carried out so that staff can work in a more dynamic fashion, in line with any change to suggested working practices such as agile working. The benefits to the organisation will be two-fold, not only will it allow staff to be more productive but may also result in a more economic use of space which could result in reduced property costs.

**Seating** – a low percentage of negative impacts were received, this is because of the group health and safety team carrying out regular work station assessment and actively replacing operator seating with ones that are recommended for individuals. It is recommended that this procedure continues.

**Aesthetics / Decoration** – A large proportion of respondents believed the aesthetics and decoration of the case study office had a positive effect on their productivity. The case study office has recently been redecorated using blocks of colour as feature walls with other areas in white, this gives a modern vibrant feel. As a result, the recommendation would be to continue to keep the office

accommodation in a good decorative state using colour to enhance areas. It can be used promote the corporate image of a company, and makes the office environment more visually appealing, friendly and less hostile.

**Meeting and collaborative space** - The case study office had various formal meeting and collaborative meeting spaces, and this reflected in the respondents view that overall the current situation had a positive effect on their productivity. A review of these space should be undertaken to ensure that they are adequately sized.

#### **6.4.3 Ways of working**

The results highlight that not all respondents were aware an agile working policy, and some were unsure of what it concerned. However, those who were aware of it found it to have a positive effect on their productivity despite the case study building not being entirely agile friendly. It is recommended that all staff are made aware of an agile working policy and that further investment be made into the technology, and physical elements (desking, collaborative areas, alternative meeting and working solutions) that allow staff to work more productively in any part of the building or in some circumstance in other settings at any time.

#### **6.5 Suggested areas for further study**

This study has investigated the effect of the work place environment on employees' productivity so that areas for improvement can be highlighted. Each element could be researched as a study, however an area that warrants further research is "how an office environment supports agile working". There appear to be advantages to both staff and organisations from promoting this way of working, and organisations doing as much as they can to facilitate it.

#### **6.6 Limitations to the study**

The use of a case study in research can be thought of as a limitation, as often it is difficult to generalise the outcomes to a wider population. Every effort has been made to evidence the case study environment and the other methods of data collection have been designed to be used in a general situation.

Whilst some may consider this as a limitation, others may utilise this research as a means of identifying further studies utilising other environments as the case study subject.

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## APPENDIX A

## How Office Environments effect Employee Productivity

1. Which Welsh Housing Association do you work for?

\* 2. What is your gender?

☐ Female

☐ Male

\* 3. What is your age?

☐ Under 18

☐ 18-24

☐ 25-34

☐ 35-44

☐ 45-54

☐ 55-64

☐ 65+

\* 4. What percentage of your working day do you spend in the office?

☐ 0-25%

☐ 26-50%

☐ 51-75%

☐ 76-100%

\* 5. Which category best describes your job role?

☐ Administrator

☐ Officer

☐ Junior Management

☐ Middle Management

☐ Senior Management

☐ Other

\* 6. What type of office do you currently occupy?

☐ Open plan (with privacy screens) - 6 to 10 members of staff

☐ Open plan (with privacy screens) - 11 to 20 members of staff

☐ Open plan (with privacy screens) 21+ members of staff

☐ Open plan (no screens) 6 to 10 members of staff

☐ Open plan office (no screens) 11-20 members of staff

☐ Open plan office (no screens) 21+ members of staff

☐ Single occupancy cellular office

☐ Shared occupancy cellular office (1-5 members of staff)

\* 7. In your opinion do you feel that your work office environment has a positive or negative impact on your productivity?

- ☐ Very positive
 ☐ Negative  
☐ Positive
 ☐ Very negative  
☐ Neutral

\* 8. In your current work office environment what effect do you believe the following have on your productivity?

|                                                                            | Very positive         | Positive              | Neutral               | Negative              | Very negative         |
|----------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Office Layout (open plan, cellular, other)                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Work station layout                                                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Furniture                                                                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Seating                                                                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Access to equipment (proximity of photocopiers, printers, scanners, other) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Availability of collaborative working space                                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Availability of meeting spaces                                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Condition of circulation space                                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Condition / repair of office areas                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Welfare facilities                                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Other (please specify)

\* 9. In your current work office what effect do the following environmental conditions have on your productivity?

|                                             | Very positive         | Positive              | Neutral               | Negative              | Very Negative         |
|---------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Room temperature                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The ability to control room temperature     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Natural ventilation                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mechanical ventilation                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Humidity                                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Natural lighting                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Artificial lighting                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The ability to control lighting levels      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Noise                                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Decoration - colour, textures, finishes etc | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Other (please specify)

\* 10. Does your organisation utilise Non Territorial Working working practices?

Non-Territorial Working allows employees who work out of the office for significant periods of time to call ahead and reserve work space.

- ☐ Yes  
☐ No  
☐ Not sure

#### How Office Environments effect Employee Productivity

11. If yes, what effect does it have on your productivity?

- ☐ Very positive  
☐ Positive  
☐ Neutral  
☐ Negative  
☐ Very negative

\* 12. Does your organisation operate an Agile working policy?

Agile working is a way of working in which an organisation empowers its people to. work where, when and how they choose

- ☐ Yes
- ☐ No
- ☐ not sure

#### How Office Environments effect Employee Productivity

13. If yes, what effect does it have on your productivity?

- ☐ Very positive
- ☐ Positive
- ☐ Neutral
- ☐ Negative
- ☐ Very negative

\* 14. Do you think a comfortable work office environment improves productivity?

- ☐ Yes
- ☐ No

15. In your own words, what elements would you choose to alter / improve within your work office environment in order to improve your productivity?

## APPENDIX B

**Andrew Ford**

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**From:** Andrew Ford <andrew.ford@gwalia.com>  
**Sent:** 11 January 2019 12:23  
**To:** Andrew Poole; Warren Lloyd; Kathryn Charles; Katie Lewis  
**Cc:** Development West  
**Subject:** Msc Dissertation Survey

Hi All

I am after a favour, I need to do some testing of a survey being used for my dissertation research, I would be grateful if you could complete the survey from the link below.

<https://www.surveymonkey.co.uk/r/NSDL2M6>

Many Thanks for your help

Regards

Andrew

## APPENDIX C

## **INTERVIEW QUESTIONS FOR RESEARCH STUDY**

### **“The Effect of The Office Environment on Employee Productivity:**

#### **The Case Study of Pobl Housing ”**

Name:

Organisation:

Designation:

Gender:

Age:

Level of Qualification:

Date:

1. What is your level of experience of dealing with the elements of the office environment?
2. How long have you been involved with managing office environments?
3. From your experience which elements of the office environment has the greatest impact on employee productivity?

Physical Elements (layout, furniture, meeting space etc)

Environmental Elements (Noise, lighting levels, temperature etc)

Ways of working (agile working, non-territorial)

4. Why do you think this element has the greatest effect?
5. What recommendations would you make to improve the office environment to increase levels of employee productivity?
6. Does your organisation employ agile working principles?
7. If yes has your environment been designed to accommodate these principles?
8. Has this improved employee productivity?

## APPENDIX D

## Andrew Ford

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**From:** Andrew Ford <andrew.ford@gwalia.com>  
**Sent:** 15 January 2019 11:16  
**To:** Aimee Howard; Amanda Griffiths HR; Andrea Westrop; Andrew Elliott; Anthony White; April Rossiter; Asset Management; Bus Man Communications; Bus Man Heads Of; Bus Man Human Resources; Bus Man Learning & Development; Bus Man Systems Team; Bus Man Tapestry; Business Development Committee; Business Solutions (Email Group); Business Systems; BusinessContinuity; Caroline McCarthy; Chief Executives Dept; Darren Emanuel; Darren Raz-Nick; Development West; DFNIT Procurement; DNB; DNB New Business; DNB Service Support; Dylan Martin; Estates and FM (Kingsway only); Finance Mail Group; Gareth Eynon; GCS (Kingsway only); Gemma John; Hayley Hullah; HCW Data Changes; HCW Senior Management Team; Heads Directors and Exec Team; Helen Jones; Jo Read; Joanne Easey; Jodie Rose; Judith Condell; Julie Hughes; Kathryn Charles; Kathryn Evans; Katie Roberts; Kim Horne; Leighton Morgans; Lucie Thomas; Lyn Pipe; Magazine; Melanie Fenton; Natasha Daniels; Neighbourhood; Neighbourhood - Housing Officers; Neighbourhood - Income; Neighbourhood Care & Support; Neighbourhood Elderly Team; Neighbourhood Lettings Team; Neighbourhood Service Improvement Team; Neighbourhood Tenancy Management; Neighbourhood TMO; Nicola Roderick; Pamela Davies; Paula Hall; Rebecca Jacobs; Rebekah Richards; Rhian Chapple; Roger Federer; Sarah R. Sen; Stephen Thomas; Stuart Taylor; Student Homes; support; Susan James; Technical; Tony Hart  
**Subject:** Msc Dissertation Research Survey

Hi All

My Name Is Andrew Ford and I am a Commercial Project Manager within Pobl Group, For the last 8 years I have been heavily involved in the facilities management of the groups office accommodation.

I am currently carrying out research for my MSc dissertation in Property & Facilities Management.

The Aim of the study is to investigate the effect of the work place environment on employees' productivity within Welsh Housing Associations.

To assist with my research, I would be grateful if you would take the time to complete the questionnaire from the web link below. The survey should take less than ten minutes and respondents can remain anonymous as there is no need to provide contact details.

<https://www.surveymonkey.co.uk/r/NSDL2M6> -

**I understand that your workload takes priority, but I would be grateful if I could receive your responses within the next two weeks.**

Please feel free to circulate the link to other colleagues in the Housing Association sector who may not have received it.

**Confidentiality:** All responses will be treated with confidence.

If you require any further information or have any enquiries, please contact

Regards

## APPENDIX E

**Andrew Ford**

---

**From:** Andrew Ford <andrew.ford@gwalia.com>  
**Sent:** 14 January 2019 12:41  
**To:** Pobl Forum  
**Subject:** Msc Dissertation

Hi All

I am currently carrying out research for my MSC and would like to circulate this email to staff – Amanda Davies suggested I run it past the forum first, can you let me know ASAP of any objections

\*\*\*\*\*  
\*\*\*\*\*

I am currently carrying out research for my MSc dissertation in Property & Facilities Management. The Aim of the study is to investigate the effect of the work place environment on employees' productivity within Welsh Housing Associations.

To assist with my research, I would be grateful if you would take the time to complete the questionnaire from the web link below. The survey should take less than ten minutes and respondents can remain anonymous as there is no need to provide contact details.

<https://www.surveymonkey.co.uk/r/NSDL2M6> -

**I understand that your workload takes priority, but I would be grateful if I could receive your responses within the next two weeks.**

Please feel free to circulate the link to other colleagues in the Housing Association sector who may not have received it.

**Confidentiality:** All responses will be treated with confidence.

If you require any further information or have any enquiries, please contact

Regards

Andrew

**Andrew Ford**  
**Commercial Project Manager**

## APPENDIX F

| Designation                   | Sector  | Gender | Age | Qualification            | Time in the Industry |
|-------------------------------|---------|--------|-----|--------------------------|----------------------|
| Head of Facilities Management | Housing | Male   | 49  | MBA, CIWFM               | 25 years             |
| Facilities Officer            | Housing | Male   | 21  | Level 3 Facilities IW/FM | 3 Year               |
| Facilities Manager            | Housing | Male   | 42  | Level 4 Facilities       | 8 Years              |
| Facilities Manager            | Housing | Male   | 48  | Level 4 Facilities IW/FM | 7 Years              |