OFFICE DESIGN AND ITS IMPACT ON EMPLOYEE PRODUCTIVITY AT LOGISTIK DEPARTMENT (PDRM)

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MASTER OF HUMAN RESOURCES MANAGEMENT

UNIVERSITI UTARA MALAYSIA

APRIL 2014

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Thesis Submitted To

Othman Yeop Abdullah Graduate School of Business

Universiti Utara Malaysia

In Fullfillement of the Requirement for the

Master of Human Resources Management

Othman Yeop Abdullah
Graduate School of Business

Universiti Utara Malaysia

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ABSTRAK

Tujuan kajian ini diadakan adalah untuk membentangkan kesan terhadap reka bentuk di tempat kerja ke atas produktiviti Pasukan Polis. Data kuantitatif dikumpulkan melalui soalan yang diedarkan di kalangan Pegawai Polis di Jabatan Logistik Bukit Aman. Seramai 145 orang pegawai telah menyiapkan dan mengisi borang soal kaji selidik berkenaan. Hasilnya menunjukkan bahawa perabot, bunyi, lampu dan suhu mempunyai hubungan positif yang signifikan dengan produktiviti manakala susunan ruang tidak mempunyai hubungan yang signifikan.

ABSTRACT

The purpose of this research is to present the effect of work designs of work place have on the productivity of the Police Force. Quantitative date were collected via a questions distributed amongst the Police Officers in Logistic Department at Bukit Aman. A total of 145 officers completed the questionnaire. The result shows that furniture, noise, lighting, temperature and have a significant positive relationship with productivity while spatial arrangement has no significant relationship.

ACKNOWLEDGEMENTS

First and foremost, all praise is due to Allah Subhana-wa-ta'ala for bestowing me with health, knowledge and patience to complete this dissertation. The almighty, which's alone, made this accomplishment possible. I seek his mercy, favour and forgiveness.

I wish to begin by thanking my supervisor, Dr. Jasmani bin Mohd Yunus, thank you for the wisdom, understanding, and compassion that you have imparted to me and my ideas. I have been blessed to have such a brilliant mentor to help me navigate the dissertation process. I thank her very much for leading me through the whole process, with great care from his comments, consults, assistance, and advices.

I am grateful and a thousand million thanks go out my parents and my siblings for their extreme moral support, encouragement and patience during the course of studies as well as throughout my academic career. No personal development can ever take place without the proper guidance of parents. Appreciate a lot for their guidance, care, mentally and financially support provided during the hardest time in completed this dissertation. Thanks for my loving parents.

Similarly, I would like to thank all of the respondents and friends who have directly and indirectly assisted me in collecting the valuable data for this dissertation. Thanks for their support that have sustained me in through this final dissertation.

Rahmawaty bt Sirajuddin **Matrix No : 810573** **17 April 2014**

DEDICATION

Bismillahirahmanirrahim...

First of all, praise to Allah SWT for without His blessings, I would not have the strength and commitment to complete this dissertation. My particular thanks due to my supervisors, Dr. Jasmani bin Mohd Yunus (UUM) for her openness, accessibility, constructive suggestions and kind, patient manner has helped guide me through the dissertation process.

This dissertation is dedicated to my beloved lovely parents who frequently told me as a young child and growing woman that "with hard work you can accomplish anything and become what you desire." My parents' valuable support, sincere advice, and prayers carried me through and helped me succeed.

And last but not least I would like to dedicate this work to my siblings. Also to me dear friend Noor Aini bt Zainol Rashid, who accompany me in my studying journey and support me a lot.

I would not have been able to complete my Master degree without support of my family. Their confidence in my abilities has been driving me to successes and accomplishes the goals that I set.

This work is dedicated to my parents for their constant prayer and never ending love.

TABLE OF CONTENT

		PAGE
Permission to use		**i**
Abstrak		**ii**
Abstract		**iii**
Acknowledgement		**iv**
Dedication		**v**
Table of Contents		**vi**
List of Tables		**ix**
List of Figures		**x**
CHAPTER ONE		1
INTRODUCTION		1
1.1	Background of Research	1
1.1.1	Office Space Layout Impacts to Productivity	3
1.1.2	Furniture System & Ergonomics	4
1.1.3	Lighting & Acoustics Impact	5
1.1.4	Impacts from Temperature	5
1.2	Overview of Police Officers in the Logistic Department in Bukit Aman	6
1.3	Problem Statement	6
1.4	Research Objectives	11
1.5	Research Questions	11
1.6	Significance of the Study	12
1.7	Scope & Limitations of the Study	12
1.8	Organization of the Thesis	13

CHAPTER TWO **14**

LITERATURE REVIEW 14

2.0 Introduction 14
2.1 Defining Office Design 19
2.2 Defining Productivity 21
2.3 Office Design & Productivity 21
2.4 The Key Factors that Affect Employees' Productivity 24
2.5 Work Environment also has an Impact on an Individual's Ability to Work Safety, Competency and in a Compliance with Operational Performance Targets 25
2.5.1 Furniture 25
2.5.2 Noise 27
2.5.3 Lighting 32
2.5.4 Temperature 38
2.5.4.1 Productivity & Temperature 39
2.5.5 Spatial Arrangement 41
2.6 Office Design Impacts to Productivity 42
2.7 Relationship between Office Design & Productivity 44
2.7.1 Furniture 46
2.7.2 Noise 47
2.7.3 Lighting 49
2.7.4 Temperature 51
2.7.4.1 Productivity & Temperature 52
2.8 Research Framework 53
2.9 Hypotheses 54
2.10 Operational Definition 54
2.10.1 Productivity 54
2.10.2 Office Design 55
2.10.3 Furniture 55
2.10.4 Noise 56
2.10.5 Temperature 56
2.10.6 Lighting 56
2.10.7 Spatial Arrangement 57
2.11 Summary of Chapter 2 57

CHAPTER THREE **58**

METHODOLOGY **58**

3.0 Introduction 58
3.1 Research Design 58
3.2 Data Collection 59
3.3 Sampling 59
3.4 Data Collection Procedures 60
3.5 Techniques of Data Analysis 60

CHAPTER FOUR 61

RESULTS AND DISCUSSION 61

4.0 Introduction 61
4.1 Reliability Test Instuments 61
4.1.1 Reliability Test 61
4.1.2 Validity Test 62
4.2 Gender 63
4.3 Demographic Characteristics of Respondent Gender 63
4.4 Age 64
4.5 Pearson Correlation 64
4.6 Summary of Chapter 4 70

CHAPTER FIVE **71**

CONCLUSION AND RECOMMENDATION **71**

5.0 Conclusion 71
5.1 Office Design and Productivity 76
5.2 Recommendation 77
5.3 Future Research 78

LIST OF REFERENCES **81**

QUESTIONNAIRES **91**

LIST OF TABLE

PAGE

Table 1:	Cronbach Alpha Value for Pilot and Main Study	62
Table 2:	Distribution of Respondent According to Gender	63
Table 3:	Correlations between Furniture, Noise, Temperature, Lighting and Spatial Arrangement	65
Table 4:	Correlations between Furniture and Productivity	66
Table 5:	Correlations between Noise and Productivity	66
Table 6:	Correlations between Temperature and Productivity	67
Table 7:	Correlations between Lighting and Productivity	67
Table 8:	Correlations between Spatial Arrangement and Productivity	68
Table 9:	Correlations between Office Design and Productivity	68
Table 10:	Correlations between Furniture, Noise, Temperature, Lighting And Spatial Arrangement	69

LIST OF FIGURES

		PAGE
Figures 1:	Office Design and its Impact on Employee's Productivity	2
Figures 2:	Employee's Productivity	15
Figures 3:	Employee's Productivity (On-The –Job-Behaviour)	16
Figures 4:	Office Design & Productivity	19
Figures 5:	The Effect of Five Basic Elements on Productivity	53
Figures 6:	Respondents' Gender	63
Figures 7:	Respondents' Age Category	64

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Buildings exist to fulfil a purpose and office buildings it is “to support a commercial strategy, to accommodate innovative work processes, and to broadcast a particular set of business values” (CABE 2005). As companies and the type of work performed have evolved from the industrial age to the information age, so have the office buildings. Industrial age office interiors supported a hierarchical control structure characterized by large offices for management and bullpens for staff, while knowledge age office space is focused on the needs of the knowledge worker.

This evolution has led to the concept of the office as a tool to perform work, rather than a status symbol of achievement for the workers (Brill 2001). As different tools are utilized to perform different types of work, so must the office be different based on the work performed by the occupying company. There has been a significant amount of research done by architectural firms, furniture designers, and others to assess the appropriate office configuration for the different types of work, and there are a large number of solutions that could be the right fit for any one enterprise. Better outcomes and increased productivity is assumed to be the result of better office design. (Carnevale 1992, Clements- Croome 1997) states various stated literature pertain to the study of multiple offices and office buildings indicated that the factors such as dissatisfaction, cluttered workplaces and the physical environment are playing a major role in the loss of employees’ productivity. It is the quality of the employee’s office design that most impacts of the employee’s productivity.

How well they engage with the organization, especially with their immediate environment, influences to a great extent their error rate, level of innovation and collaboration with other employees, absenteeism and, ultimately, how long they stay in the job. Many managers do not have much flexibility in their staffing patterns in the short-term, and must "deal with the hand they are dealt." In such situations, controlling the office design is often the most feasible short-term option, beyond skill training, for improving productivity. There are other factors that when combined provide a more powerful determinant of employee productivity.

Figure 1: Office Design and its Impact on employee's Productivity

Hughes, J (2007) surveyed 2000 employees pertain to various organizations and industries in multiple levels. The reported results of these survey showed that nine out of ten believed that a workspace quality affects the attitude of employees and increases their productivity. Employees in different organizations have different office designs.

Every office has unique furniture and spatial arrangements, lighting and heating arrangements and different levels of noise. Reveals that good office design has a positive effect on employees' productivity and the same assumption is being tested in this research for the office. Many managers do not have much flexibility in their staffing patterns in the short-term, and managers must "deal with the hand they are dealt." In such situations, controlling the work environment is often the most feasible short-term option, beyond skill training, for improving productivity. There are other factors that when combined provide a more powerful determinant of employee performance. When these other factors are missing or diluted, the employee does come to work only for a pay check. In this case, the employee is present at work in body only, leaving their mind outside the gate.

1.1.1 Office Space Layout Impacts to Productivity

From the 1970's era until present day research on space design, the controversy of open plans versus private offices has been under review. Added to this are the increasing costs of real estate as companies more tightly manage their administrative and general expenses. Open plans are typically able to accommodate more workers per square foot than private offices. Current space standards are approximately 200 SF/person with the average enclosed office at 150 SF and the average workstation between 64-80 SF (GSA 2011). According to one productivity researcher "no one has ever expressed that they wished they had less space" (Stamer 2011). Despite whatever personal preferences or belief systems surrounding status around office space, the corporation is charged with finding cost effective tools and resources to enable employees to be productive and the current trends, technologies, and furniture systems are enablers which can facilitate or impede worker productivity.

The ability to do distraction-free individual work; Support for impromptu interactions, Support for meetings and focused group work; Comfortable workspace; Workspace that can accommodate drop-in visitors; Workspace adjacent to co-workers; Sufficient space for breaks; Access to needed technology; Access to daylight; and Air quality with some degree of temperature control (Brill 2001).

1.1.2 Furniture systems and Ergonomics

Ergonomics is widely recognized and studied in the manufacturing environment, yet understanding in the office environment has lagged. Research indicates that something as simple as a well designed office chair can increase job satisfaction by 27% and that ergonomically designed office furniture can have a positive 15.4% impact on productivity (Davies 2005). The assumption behind these productivity claims is that the typical office worker knows how to adapt this well-designed office chair to fit their particular physique. Office furniture providers have done a good job in assessing human characteristics and finding effective ways to produce furniture and peripherals to fit many different shapes and sizes, yet there are knowledge gaps for the people who actually purchase, deliver, and use this furniture. OSHA provides extensive information about the appropriate posture and chair adjustments needed to prevent muscle strain (OSHA 2011), but few employers provide an emphasis in making sure employees are aware of this information. Some companies are realizing this void and have organized office safety committees to address the day-to-day issues that can arise in a typical office environment and safety professionals suggest that employees receive basic training on ergonomics and how to adjust the office furniture provided to them as they would receive training on any other tool (Braganza 1994).

1.1.3 Lighting and Acoustics Impacts

The benefits of providing access to daylight have been described as an increased sense of well being for occupants and improved academic performance in schools. There are case studies reporting increases sales in Wal-Mart stores where natural light was available, and observed productivity increases by management at Lockheed (Callan 2006). There are negative productivity consequences when lighting issues are ignored. A study sponsored by the American Headache Society examined environmental impacts on migraine headaches. Workers who experience migraines are either absent or have reduced productivity which can contribute up to $13 Billion in lost productivity (Friedman 2009). Workers who experience migraines are either absent or have reduced productivity which can contribute up to $13 Billion in lost productivity (Friedman 2009). While the weather plays a large role in triggering migraines, the IEQ attributes which influence migraine episode are noted as noise and lighting. Some of the suggested remediation included: limiting exposure to video display terminals, changing the lighting, utilizing ergonomic chairs, and providing glare filters for non-VDT computer screens (Friedman 2009).

1.1.4 Impacts from Temperature

In a Finnish study which included five different office buildings, researchers examined temperature impacts to productivity. The researchers utilized internet-based questionnaires to examine both objective and subjective factors in perceived productivity. The questionnaires were completed over a 1-month period during each of the four seasons. While the researchers set out to assess temperature impacts to satisfactory air quality, they found human-related factors such as temporary mental well-being had a much stronger impact than temperature setting. Aside from that factor, 80 percent of occupants were most comfortable and found air quality most satisfactory at 22.5 C or 72.5 F (Kostiainen 2008).

1.2 Overview of Police Officers in the Logistic Department in Bukit Aman

This research was distributed to the level of employees (DSP, ASP, INSP) . Researcher tried to cover all the range and have a large number of answers from different employees in different jobs. The total of population around 800 Police Officers and only 145 officers from these departments were taken. The distribution among offices and number of employees taken from each office is given and primary data was collected through a structured questionnaire. Managers provided a summary of the results of employee perceptions of the work environment to encourage participation in the research. The survey focused on the relationship between office design and employees' productivity. The subjects were chosen using quota sampling, as every employee in the position analyzed within each unit was included as a subject.

1.3 Problem Statement

Management's new challenge is to create a office design that attracts, keeps, and motivates its workforce. The responsibility lies with all levels of the organization. Organization must step outside their traditional roles and comfort zones to look at new ways of working. They have to create a office design where people enjoy what they do, feel like they have a purpose, have pride in what they do, and can reach their potential. Today's workplace is different, diverse, and constantly changing. The typical levels of workers relationship of old has been turned upside down. Workers are living in a growing environment and have almost limitless job opportunities Carnevale (1992), Clements-Croome (1997).

What is the connection between office design and productivity? Office design and productivity shown that environment has a direct impact on the organization's financial and non-financial performance. There are two components to this environment; one is the organization's culture, the other is the climate within individual teams or work groups. The second connection between office design and productivity is at the team or work group level.

The American Society of Interior Designers (ASID, 1999) carried out an independent study and revealed that the physical workplace design is one of the top three factors, which affect productivity and job satisfaction. Brill et al (1984), ranked factors, which affect productivity according to their importance. The factors are sequenced based on the significance: furniture, noise, lighting and temperature. Springer Inc (1986) stated that an insurance company in a study revealed that the best ergonomic furniture improved productivity by 10 to 15 percent.

This is where the majority of work occurs in information-driven or knowledge-driven organizations. Much more than individuals, groups are responsible for innovation and for processes and practices that have the ability to move the organization forward. Recent global research has shown that there are only three things that have a material impact on the ability of groups of qualified people to perform at high levels. All are related to the environment or culture in which the team operates. With these components teams can perform at unexpected levels. Although examination of direct linkages between employee personality dimensions and performance outcomes is receiving increasing support (Hurtz and Donovan, 2000; Motowidlo and Van Scotter, 1994; Van Scotter and Motowidlo, 1996), what remains less clear is the interaction and influence of the context or place on this relationship.

Considering the increasingly large spans of control and reduced contact between employees and managers in work situations (De Meuse et al., 2001; Hendricks, 2001), an over-reliance on employee selection processes as a means of improving productivity and commitment may be a less effective approach than effectively managing office design. In addition, many managers do not have much flexibility in their staffing patterns in the short-term, and managers must "deal with the hand they are dealt. To keep employees satisfied today, it takes an entirely different approach than it did just a few years ago.

Other critical factors include the importance of praise and recognition, and compensation each cited by 28 percent of those surveyed. Six years ago praise and recognition was at the top of the list, cited by 47 percent of those surveyed. Other significant changes include concern over promotions. Only 4 percent of executives say that promotions are a big factor in keeping employees satisfied today, compared with 26 percent who said that in 1993.

Furthermore, the importance of compensation and benefits has risen to 28 percent from just 7 percent in the 1993 survey. An employee's workplace environment is a key determinant of their level of productivity. In any office design, consistent employee absenteeism can be a potential problem. Consistent absenteeism can be a result of a combination of many factors.

Lack of incentives, including employee insurance and performance bonuses or recognition, can cause employees to become apathetic and lose motivation. No performance or attendance policies mean that employees don't have to take responsibility for their own actions, including absenteeism and productivity. Unproductive working conditions can arise from any number of factors, including workers who are negative or disruptive (Sackett, 2001).

Unproductive working conditions can also result from a failure to equip employees with the right tools, training, software and supplies. Money is not a sufficient motivator in encouraging the superior workplace performance required in today's environment. All employees who submit ideas of merit that are implemented will receive company-wide recognition and a bonus related to the financial impact of the idea on the company.

The underlying thread is management has started to realize if its employees are dissatisfied, they can easily find employment elsewhere. So the smart managers and businesses have started to create a positive work environment to be the winners of tomorrow's workplace. It may not come as a complete surprise but the work we do in our office week out and week in is far more productive if the work takes place in a well designed office. A well designed office signals the values and objectives of the company and the use of design in office interiors communicates a company's values and identity (Bnet Business, 2008). So why is it that so many organizations still stuck with boring, unattractive and ultimately unproductive office designs? In most cases as always it comes down to two factors, office design cost both money and time. But these are short sighted costs.

Good office design can make a big difference in staff satisfaction, attraction, motivation and retention. It can also affect the level of knowledge and skills of workers, how innovative and creating they are, how they respond to business and technological change and how effective the organization is at attracting and retaining customers (Marcus, 1967). In order for employees to be productive, they have to be comfortable in their work environment. Proper lighting plays a huge role in the visual comfort of employees, customers and other occupants. Systems that provide proper light distribution with reduced glare and dimmable capabilities gives users ultimate customization and control.

Business leaders are urged to take more account of the links between good workplace design and improved business performance when planning and designing new buildings, and overhauling old ones.

The report, Impact of Office Design on Business Performance, has also argued that how workplaces are design is going to become more important in the future as more and more workers work remotely or outside a formal workplace. By next year, it has estimated, some 30 per cent of the world's top companies will have adopted a highly mobile work style model, with 35 per cent having a workforce located outside the boundaries of the conventional workplace. In past, every employee was housed in a cubicle or individual office. These days, there are fewer permanent addresses; not every employee needs a personal work station in a digital workplace (Tiernan Carsia, 2002). Work station walls are coming down, to open up views and allow occupants to enjoy natural light. Companies are striving to make offices a healthy and comfortable workplace, using ergonomic furniture and accessories, proper lighting, and a functional design to minimize discomfort and distraction and consequently making employees work more productively. Studies show that comfort and productivity are interrelated, and most experts agree that almost every office can benefit from a few changes in layout and organization.

Finding answers to following questions can help improve the comfort level of an office to increase the productivity of its people; many authors have noted that the physical layout of the workspace, along with efficient management processes is playing a major role in boosting employees' productivity and improving organizational performance (Uzee, 1999; Leaman and Bordass, 1993; Williams et al. 1985).

Employee productivity is often interrelated when it comes to office design in the workplace. He says that, ideally, a workplace should have a gym, a masseur and a lounge, because people are not robots and should be given the opportunity to rest in pleasant surroundings.

Leaman (1995) conducted a survey which is briefly highlighted here and results revealed that the productivity of the work is affected because the people were unhappy with temperature, air quality, light and noise levels in the office and this seems a good idea, because contemporary businesses are often idea-driven and employees need spaces where they can relax, be creative, share ideas and think privately when necessary (Leaman, 1995).

In conclusion, given that we spend more waking hours in the office than in our own apartments, it seems essential that offices become a home away from home and even something better most of us cannot afford private gyms! As employers explore ways to improve the health, wellness and productivity of the workforce, incentives have emerged as an attractive tool. But employers remain concerned that incentives not become money frivolously spent.

1.4 Research Objectives

1. Is there any significant relationship between furniture, noise, temperature, Lighting, spatial arrangement and productivity.
2. Is there any significant relationship between office design and productivity.

1.5 Research Questions

1. What are the significant relationship between furniture, noise, temperature, lighting, spatial arrangement and productivity?
2. What are the significant relationship between office design and productivity?

1.6 Significance of the Study

Many organizations still do not give much importance to office design. As many as 40 percent of the employees believe that their companies want to keep their costs low that is why their workplaces have bad designs; and 46 percent of employees think that the priority list of their company does not have office design on top. When data was summarized, almost one out of every five employees rated their workplace environment from, 'fair to poor'. 90 percent admitted that their attitude about work is adversely affected by the quality of their workplace environment. Yet again 89 percent blamed their working environment for their job dissatisfaction (Gensler, 2006). The situation is that they cannot even complain about them. These circumstances are affecting the performance of the employees greatly, in the form of delay in work completion, frustration, effect on personal growth etc. This study will try to find out the effects of office design in terms of furniture, noise, lighting, temperature and spatial arrangement on employees' productivity. The aim of the research project is to see how important is the architectural design of an office, with focus on the plan layout, and how it influences the productivity among the co-workers.

1.7 Scope and Limitations of the Study

- The sample size is not diverse enough to give the image of all organizations functioning in Logistic Department at Bukit Aman.
- The data collected was based on subjective productivity measurement; some other objective method of collecting data can also be used.
- The survey was conducted in English language so it limited only to English speaking employees.
- The survey was bound to be completed in a certain time, so time limit was a barrier from investigating more employees and acquiring more information.

1.8 Organization of the Thesis

As a result, workplace design now is largely influenced not only by trends in color, materials, furniture, lighting, and space planning, but also by environmental concerns. For today's designers, setting the mood and image is what corporate interior design is all about--open spaces, being colorful, not having a closed-door policy and using glass doors. In terms of keeping people, that builds community. Space drives function. The research issue is whether, how and in what way the physical office environment can help improve office work. It is important to bring together the different disciplines so that we may have an opportunity to measure and assess the influence of the physical office environment on the employees. In other words: an interdisciplinary approach is essential. It is also important to apply a holistic view to the office environment, since it is the totality of different factors that constitutes the actual office environment.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

A widely accepted assumption is that better office design produces better results. Mostly the office is designed with due importance to the nature of job and the individuals that are going to work in that office. The productivity of an employee is measured actually by the output that the individual produces and it is related to productivity. At corporate level, productivity is affected by many factors such as employees, technology and objectives of the organization. It is also dependent on the physical environment and its affect on health and employees' performance. Organizing a work space goes way back to the industrial revolution when managers were trying to find out how to make their workers more productive.

Initially, the goal was to reduce injuries, but over the years we've learned that carefully organizing your work space can improve productivity (Resnick and Zanotti, 1998). More than just improving productivity, when you personalize your work space, studies have shown you enjoy work harder and you have a greater sense of "organization well-being" (Wells, 2000).

Extensive research has been conducted on work environments and their effect on office workers. Factors such as lighting, noise, colour and many others could impact on staffs' creativity and productivity. One should first look at the difference between creativity and productivity. Fitzgerald, Talbot & Joniak (2007) define creativity as the process of a "new theory, invention, idea, service or a solution to a problem." The Oxford English dictionary describes productivity as "capability to produce, producing abundantly and effectiveness of the production effort. "It is therefore doing your tasks within the day effectively with little error.

Productivity also involves the amount of work one is able to do. Creativity is described in the Oxford English dictionary as “all created things, a production of human intelligence especially of the imagination”. Creativity and productivity work together in some cases but the researcher believes that they are still separate entities. Building designs and other physical factors within the work environment should correspond with the function of the organization and is staff. Abdou’s (2007) paper sheds light on building designs; he states that office spaces are to meet the requirements of the tasks performed by employees. Some physical factors that are proven to affect creativity include lighting, colour, plants and perhaps furniture (Ceylan 2008). Studies conducted on plants, lighting, temperature and even indirectly humidity all found to have an effect on productivity. (Fjeld an Bonnevie, 2002: Abdou, 2007; Mills et al.,2007, Tarren et al: 2007). It is therefore important to give attention to organisation’s physical factors in working environments because improving these factors may assist in productivity / creativity. It is also important to study the factors that hinder creativity / productivity so that organisations may have the knowledge to better understand the work environment they are providing for their staff and how to better it. The key factors that affect employees’ Productivity:-

- Those that are driven by procedures, protocols and management requirements.
- The factors that arise from premises, office or factory design (office design).

Figure 2: Employees' Productivity

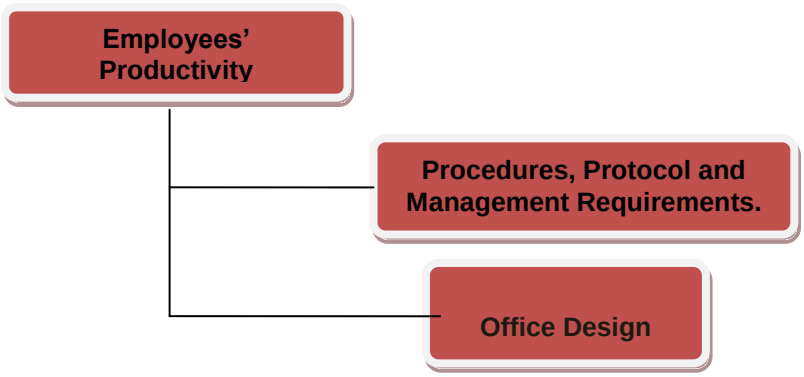
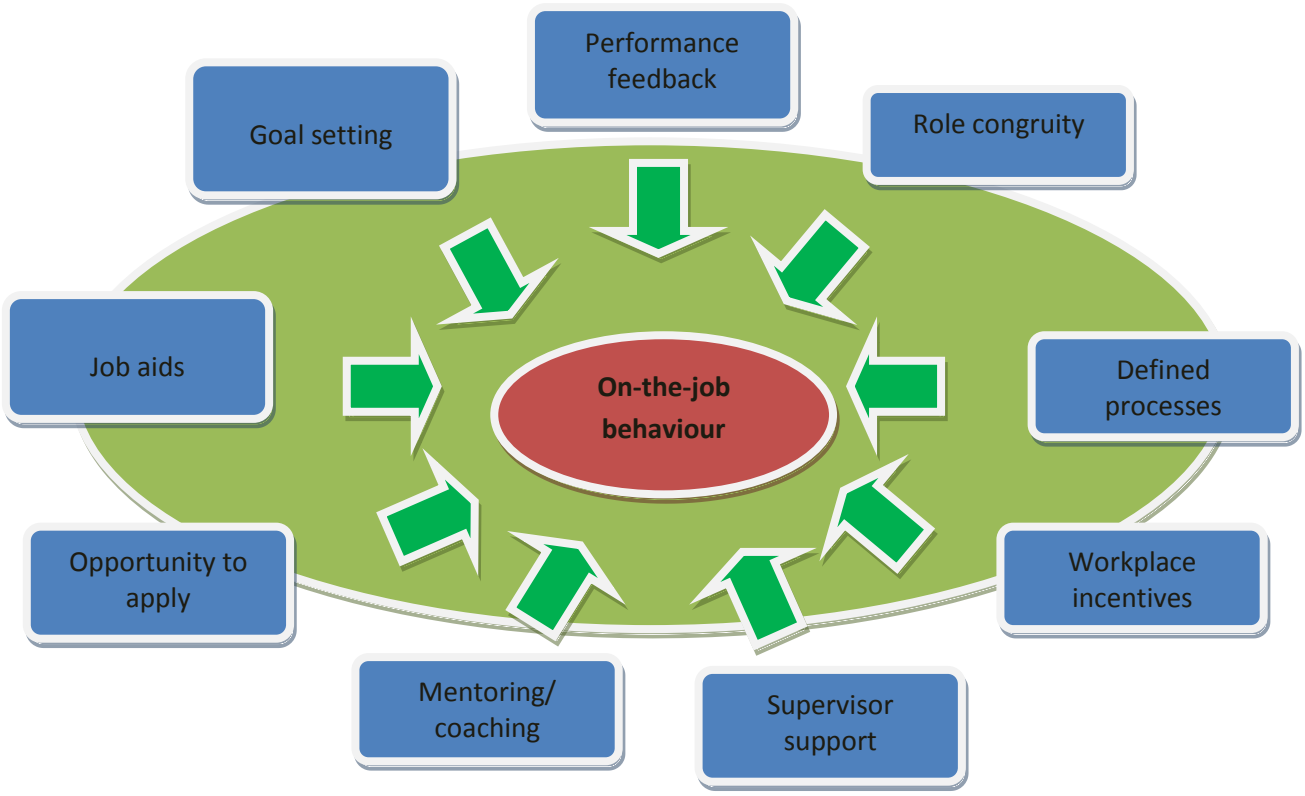


Figure 3: Employee's Productivity (On-the-job behaviour)



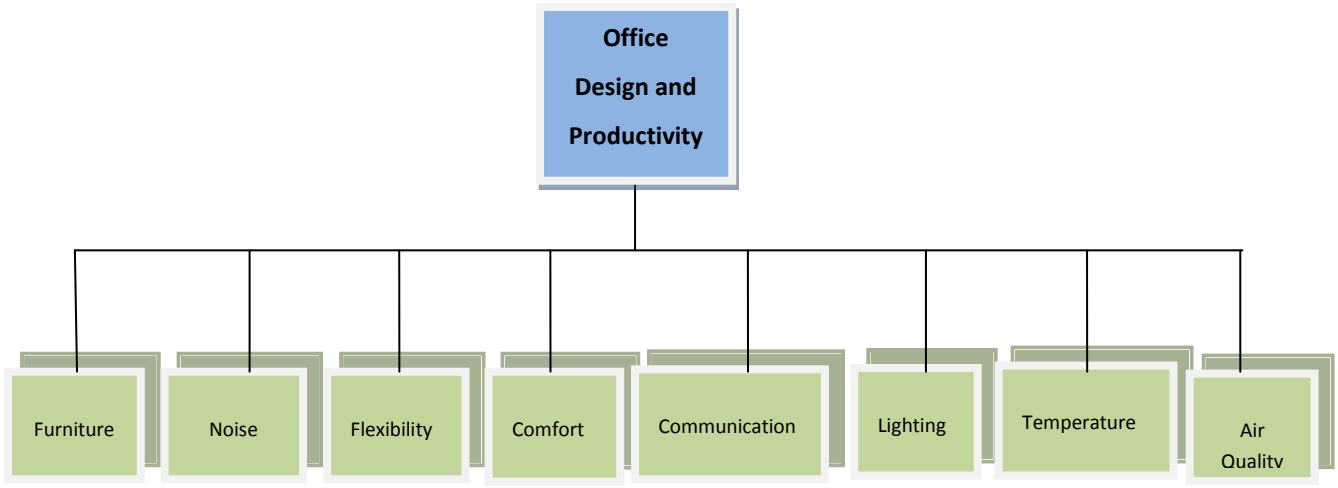
Goal setting is an important tool to attract motivation of the employee. There are two important purposes of goals in organizations are to guide the behaviour of individuals and to motivate them to perform at higher levels of effectiveness (Richards, M.D. 1978). Specific goals are more effective than generalized goals that difficult goals lead to greater performance than do easy goals, as long as the goals are accepted (Erez et al, M., Earley, P. C. And Hulin, C. L. 1985), and that frequent, relevant feedback is important for goal setting effectiveness (Latham, G. P, and Yukl, G. A 1975). Effective goals, those with the above characteristics, are likely to promote a greater frequency of the work style behaviours. They help generate commitment, both to the goals and to the organization, which results in people doing more than they are required to do (Morrisey, G. I., 1977).

Open communication is encouraged by the existence of effective goals. Members in groups with clear goals are more likely to communicate openly than those with unclear goals (Kiesler, S. 1978). **Performance Feedback** is an information exchange and conflict resolution process between the employee and supervisor. While the supervisor gives his/her feedback and requirements, the employee enables to give his her feedback regarding his/her requirements. Although this process is formal, it could be managed informally by gaining closer relations for two sides (Chandrasekar, K. 2011). Each employee has a role in the organization. These roles are explained in Job Descriptions forms in a formal way. Employees' roles and task should be allocated consistently by his / her supervisor (Chandrasekar, K.2011) which is defined as **role congruity. Defined Processes** is the organization's responsibility to explain the workflow through documenting and communicating (Chandrasekar, K. 2011). The organization should find out tools what motivates its employees and has set up formal and informal structures for rewarding employees that behave in the way required. Rewards may consist of a mix of internal rewards, such as challenging assignments, and external rewards, such as higher compensation and peer recognition (Chandrasekar, K. 2011). This rewarding explains **workplace incentives. Supervisor support** is crucial for employees to complete the job. Supervisors' interpersonal role is important to encourage positive relations and increase self-confidence of the employee. (Chandrasekar, K. 2011). Skilled and respected people are available to employees to help them to perform better in their current role and to assist them develop further into a future role. Chandrasekar. K. (2011) defines the situation as **mentoring/coaching.** Time and material resources should be available to employees, enabling them to perform to the best of their ability. Individual workloads and organizational systems and processes do not hinder employees from applying established skills or from practicing newly learned skills.

Thus, the employees should be provided **opportunity to apply.** The work environment is set up so that templates, guides, models, checklists and other such workplace aids are readily available to help minimize error rates and customer dissatisfaction. Therefore, Chandrasekar. K. (2011) discusses the necessity of **job aids.** There are various literatures that illustrate the relation between some of these factors and the productivity of the employee. There are different productivity definitions in literature. Rolloos, M. (1997) defined the productivity as, "productivity is that which people can produce with the least effort". Productivity is also defined by Sutermeister, R, A. (1976) as, "output per employee hour, quality considered". Dorgan , C.E. (1994) defines productivity as, "the increased functional and organizational performance, including quality". Productivity is a ratio to measure how well an organization (or individual, industry, country) converts input resources (labour, materials, machines etc.) into goods and services.

In some case, the productivity is measured considering performance increase as when there is less absenteeism, fewer employee leaving early and less breaks; whereas increase in performance can be measured by the number of units produced per employee per hour. In this study, subjective productivity measurement method is used. The measures of this method are not based on quantitative operational information. Instead, they are based on personnel's subjective assessments. Wang X, and Gianakis, G, A. (1999) have defined subjective performance measure as an indicator used to assess individuals' aggregated perceptions, attitudes or assessments toward an organizations product or service. Subjective productivity data is usually collected using survey questionnaires. Clements-Croom, D., Kaluarachchi, Y. (2000) discusses that subjective data can also be descriptive or qualitative collected by interviews.

Figure 4: Office design and Productivity



2.1 Defining Office Design

Office design is defined by BNet Business Dictionary (2008) as, "the arrangement of workspace so that work can be performed in the most efficient way". Office design incorporates both ergonomics and work flow, which examine the way in which work is performed in order to optimize layout.

Office design is an important factor in job satisfaction. It affects the way in which employees work, and many organizations have implemented open-plan offices to encourage teamwork. Office design is very vital in employee satisfaction, and the broad concept of office design also includes the workflow. The work is analyzed initially and it is identified that how it is accomplished and then the overall setting of the office is made according to that flow. This ensures the smooth running of work in the office without hindrances.

Over the years, many organizations have been trying new designs and techniques to construct office buildings, which can increase productivity, and attract more employees. Many authors have noted that, the physical layout of the workspace, along with efficient management processes, is playing a major role in boosting employees' productivity and improving

organizational performance (Uzee, 1999; Leaman and Bordass, 1993; Williams *et al.* 1985). An independent research firm conducted a research on US workplace environment (Gensler, 2006) and a survey was conducted by taking a sample size of 2013. The research was related to; workplace designs, work satisfaction, and productivity. 89 percent of the respondents rated design, from important to very important. Almost 90 percent of senior officials revealed that effective workplace design is important for the increase in employees' productivity (Gensler, 2006).

Heath (2006) states, the biggest goal of all the business organization is to increase their productivity, thus decreasing their cost of production and making high profits. Although, there is very less amount of effort, which these organizations make in order to increase their productivity. Many employers have a very wrong view that productivity can be increased by giving their employees good pay package and timely increments for their work. What these employers are not aware of is that there are many other factors, which affects the performance of the employees in an organization. One of the major factors, which have an impact on the motivation level of the employees and their performance, is the workplace environment. The author says that the level of innovation of an employee, his performance in a team, his commitment to the job and other such factors are determined by the immediate work environment that the employee is surrounded with and his/her engagement level with the organization.

2.2 Defining Productivity

Rolloos (1997) defined the productivity as, "productivity is that which people can produce with the least effort". Productivity is also defined by Sutermeister (1976) as, "output per employee hour, quality considered". Dorgan (1994) defines productivity as, "the increased functional and organizational performance, including quality". Productivity is a ratio to measure how well an organization (or individual, industry, country) converts input resources (labor, materials, machines etc.) into goods and services. In this case, we are considering performance increase as when there is less absenteeism, fewer employee leaving early and less breaks; whereas in a factory setting, increase in performance can be measured by the number of units produced per employee per hour.

2.3 Office Design and Productivity

Over the years, many organizations have been trying new designs and techniques to construct office buildings, which can increase productivity, and attract more employees. Many authors have noted that, the physical layout of the workspace, along with efficient management processes, is playing a major role in boosting employees' productivity and improving organizational performance (Uzee, 1999; Leaman and Bordass, 1993; Williams *et al.* 1985).

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The final outcome of the survey suggested that department can enhance their productivity by improving their workplace designs. A rough estimation was made by executives, which showed that almost 22 percent increase can be achieved in the company's performance if their offices are well designed. But practically, many organizations still do not give much importance to workplace design. As many as 40 percent of the employees believe that their companies want to keep their costs low that is why their workplaces have bad designs; and 46 percent of employees think that the priority list of their company does not have workplace design on top. When data was summarized, almost one out of every five employees rated their workplace environment from, 'fair to poor'. 90 percent admitted that their attitude about work is adversely affected by the quality of their workplace environment. Yet again 89 percent blamed their working environment for their job dissatisfaction (Gensler, 2006).

The Gensler 2006 U.S. Workplace Survey reveals that workplace design has a very real impact on companies' bottom lines. In fact, the effect of office design on worker productivity in the U.S. is estimated to be at least $330 billion annually for the eight industry groups sampled in the survey, according to an analysis and an independent research firm conducted a research on US workplace environment (Gensler, 2006). These survey findings suggest businesses that ignore the design and layout of their workplaces are failing to optimize.

According to the survey, office workers believe they would be 21% more productive if given a better working environment. Almost half say they would log an extra hour per day under such improved circumstances. The Gensler 2006 U.S. Workplace Survey is part of the firm's annual inquiry into the impact of design on business performance and builds on an earlier workplace survey conducted by Gensler's U.K. office. "Businesses are waking up to the fact that the workplace is much more than just real estate and a means to house their people," said

Diane Hoskins, an Executive Director at Gensler. "They are embracing performance-focused workplace design as a strategic business initiative--as the forum that can drive employee excellence, business objectives, and ultimately, the bottom line." According to the survey, nine in ten workers believe that better office design leads to better overall employee performance, and also makes a company more competitive. Most people spend fifty percent of their lives within indoor environments, which greatly influence their mental status, actions, abilities and performance (Sundstrom, 1994). Better outcomes and increased productivity is assumed to be the result of better workplace environment. Better physical environment of office will boosts the employees and ultimately improve their productivity.

Various literature pertain to the study of multiple offices and office buildings indicated that the factors such as dissatisfaction, cluttered workplaces and the physical environment are playing a major role in the loss of employees' productivity (Carnevale 1992, Clements-Croome 1997). Hughes (2007) surveyed 2000 employees pertain to various organizations and industries in multiple levels. The reported results of these survey showed that nine out of ten believed that a workspace quality affects the attitude of employees and increases their productivity.

Employees in different organizations have different office designs. Every office has unique furniture and spatial arrangements, lighting and heating arrangements and different levels of noise. Over the years, many corporations have been trying new designs and techniques in office buildings, which can promote productivity, and attract more employees (Amina Hameed, ShehlaAmjad, 2009).

Many authors have noted that, the workplace design, along with effective management processes, is playing an important role in increasing employees' productivity and boosting organizational performance (Uzee, 1999; Leaman and Bordass, 1993; Williams et al. 1985).

Research by the architects, Gensler (2006) of 200 UK businesses managers showed that an improved workplace would boost employee productivity by 19 percent and their own productivity by 17 per cent. These improvements have great implications for the economy if proven. Gensler (2006) followed up this research in a survey of 2,000 office employees in the USA which showed that 90 per cent of the respondents believed that better interior design and layout result in better general employee performance.

Some studies have suggested that people have an innate desire to be in contact with nature White and Heerwagen, (1998); windows provide a means for establishing visual contract with nature while at work. Heerwagen and Orians (1986) found that people occupying small windowless offices were much more likely to have pictures of natural scenes on their wall than were people with easy access to windows, possibly as a way of compensating for the absence of real natural scenes. An alternative explanation is that, in a small office, the view out the window may be the only source of environmental stimulation.

2.4 The key factors that affect employees' productivity.

Management driven factors include the development of:

1. Organization plans such as the allocation of responsibilities at all levels of the organization, definition of job descriptions and the degree of access to the management and administrative support needed to complete their tasks;
2. Working patterns, shift-working, break times, absence or holiday cover; and
3. Health and safety policies, including the provision of training, development of safe working practices and the adequate supply of protective clothing and equipment.

The factors that arise from premises, office or factory design:

1. Furniture
2. Noise
3. Lighting
4. Temperature
5. Spatial Arrangement

For the reasons which follow, we believe that the personality factors conscientiousness, agreeableness, and extraversion-will work specifically through goal orientation and relationship work environment preferences on their way to influencing job performance and commitment. The personality factors openness to experience and emotional stability will manifest themselves in relationship and system maintenance work environment preferences, and through their influence on such preferences will affect job performance and commitment.

2.5 Work environment also have an impact on an individual's ability to work safely, competently and in compliance with operational performance targets.

2.5.1. Furniture

Redecorating or relocating office, spend some thinking about the decor and set up. The way an office is set up, along with the furniture and office accessories used, can dictate the productivity of entire team. Of course, it depends on organization. Some need to be able to easily communicate with one another in person, or share their screen with a neighbor while others may need peace and quiet, or a room where they can talk openly without disturbing the people in surrounding *cubicles*.

Office furniture comprises of desks chairs, the filing system, shelves, drawers, etc. All these components have a specific role to play in the proper functioning of any office and the productivity and the efficiency of the employees and one of the most important thing to be considered while buying office furniture is to ensure whether it is ergonomic or not. Ergonomics of office furniture is important because an employee has to work with them for the entire time that he is on office, and if they are uncomfortable and not user friendly, their working style and efficiency gets hampered considerably, in turn affecting the overall organizations. Non-ergonomic office furniture can also lead to health problems of employees, which again has an adverse effect on the productivity.

Ergonomic office furniture ensures that each employee gels well with the things around him, like desks, chairs, computer alignment and even environmental factors. If the employee is uncomfortable due to any reason, his work is bound to get affected. If all factors surrounding the employee are ergonomically correct, then the employee will be comfortable and remain motivated to give his best (Braganza 1994)).

These days' organizations consult, and even employ ergonomic experts that advice people on how to improve their office ergonomics and what type of furniture would be suitable to make the ergonomics of a work place better. Having ergonomic office furniture reduces the chances of any risk injury. They are designed in manner that makes them safe to be had around and also reduce the possibility of any accidents in the work place and to increase productivity. Office furniture like desks can be designed to give greater leg room and adequate support to the elbows while working on the computer. The positioning of the computer monitor and the mouse should also be adequate, so that the user does not have to strain his vision to view and stretch uncomfortably far to reach them.

Office furniture helps the organization tremendously in increasing its productivity, and at the same time taking care of the employees' health. The design and look of the working space is one big factor in determining the productivity of employees, so it really pays off to invest in comfortable and high quality furniture for the office. Perhaps the largest number of environmental psychology studies of workspace has focused on floor configuration and furniture layouts in the open plan office.

Research indicates that these environmental factors have the greatest influence on worker satisfaction and performance (Brill, Margulis, & Konar, 1985; Hatch, 1987; Sullivan, 1990; Vischer, 1989). Studies have tended to focus on the height and density of workstation partitions, the amount and accessibility of files and work storage, and furniture dimensions such as work surfaces as being these elements of furniture and spatial layout which have the most effect not only on the satisfaction of individual workers but on the performance of teams. One study indicated that the additional investment in ergonomic tables and chairs for workers yielded a 5-month payback in terms of increased productivity (Miles, 2000).

2.5.2 Noise

It is probably the most frequently forgotten of the environmental pollutants whose effects can be far-reaching. Noise harms us in more ways than we can think of and at times without us even knowing about it. We cannot have a noise free world but we sure can have a noise safe world. There are various sources of noise pollution. In some places noise from construction projects predominate, while in others it is vehicular traffic or noise from airports. Other sources include the noise in occupational settings or even the noise of simultaneous conversations. In our country unleashed loudspeakers disturb the neighbourhood on seemingly endless nights, where the laws are either battered in the name of religion or just for fun.

Talking of the business world, office noise poses some serious concerns. But the severity of this potential problem is overlooked. In a recent study completed for the American Society of Interior Designers (ASID) by (Yankelovich Partners, 2001), 70% of office workers polled agreed that productivity can increase if office noise is decreased. **"**Noise is defined as a physiological concept involving unwanted sound perceived by the listener as being unpleasant, bothersome, distracting or physiologically harmful." (Cohen & Weinstein; 1982 in Navai & Veitch, 2003), Irregular sounds such as speech is said to be the most bothersome.

The hum of a computer is less stressful because it is a constant sound (Navai & Veitch, 2003). Glass et al. (1971) in (Navai & Veitch, 2003) suggest that sound that is controlled by the individual is also seen as less stressful. Therefore conversations from co-workers and music are seen as more stressful because they are uncontrollable sounds (Navai & Veitch, 2003). Noise stemmed from communication is not the only cause of noise on office environments. External noise such as traffic and other external noises such as office equipments may also cause discomfort in office environments.

A study conducted by (Bitner, 1992) in Arnerlov & Bengtsson, (2007) suggested that quiet zones be implemented into offices. For example, a quiet corner where employees will be able to read quietly, the purpose of these areas will be for employees to escape the office noise and allow themselves to relax for a period of time. But a subsequent study (conducted for ASID by LC Williams and Associates, 1999) proved that business executives do not acknowledge office noise: 81% of those who polled reported they were not concerned with office noise. Through this discrepancy, it is apparent that companies must increase their attentiveness of the acoustic environments of open-office spaces, if business success is to be achieved. Beyond productivity, office acoustics also affects employee health and safety.

Many studies acknowledge that noise (even at low levels) is a cause of stress that causes health problems such as digestive disorders, headache, hypertension, and ulcers. Unhealthy employees not only would be a cause of concern but also their health is directly proportional to their productivity and hence their performance. One of the most important aspects of an open office, as far as productivity is concerned, is the ability to conduct work without distraction. Architects and interior designers have a big and profound responsibility to design functional and sound safe environments. It is very difficult, if not impossible to meet these goals without considering acoustics. Acoustics is essential to the functioning of almost every type of environment.

Some environments can even become dangerously loud and unsafe for the occupants. In order to effectively address these issues, acoustics should be considered in the design phase itself. If your space does not meet the needs of the end user or is found to be unsafe, you could be held liable, and worst yet, you could be putting people in danger. Very often, noise does not produce visible results.

That is why probably, people believe that noise does not cause health hazards. But as per different studies, noise creates health hazards affecting children the most, with extremely high noise levels even causing hear loss in newborns (Sundstrom, 1994).

Another factor, which might create unhealthy environment in the organization, is noise. Noise in the work environment can lead to much health related problems like stress and tension, which poses danger to psychological health of the employees. In order to reduce noise in the office, organizations should have equipments, which run without noise. This would be helpful in maintaining peace and a quiet working environment in the organization.

A proper work environment is one, where the employees are provided with comfort and any such situation which might pose danger to the mental or physical health of the employee are avoided. In order to create a proper environment for the employees, organizations can use the above mentioned techniques.

These techniques will prove to be very helpful in creating an atmosphere, which would be very beneficial for the employees. It will also boost the motivation level of the employees as well as it would also help in increasing the productivity of the employees. Scand (2002) states, that there are five requirements, which should be fulfilled in order to provide physiologically fit work environment to the employees. As according to the author, work should be designed in a manner that every individual is allowed to influence his work, methods and practices. This allows an individual to maintain his individuality at work. The design of the work should be self explanatory for the employee, which means that the employee should be able to understand the work process easily. The employees should be provided with opportunities to showcase all their skills. They should also be provided with opportunities to enhance and develop new skills. Organizations should take care that the employees have an environment where they get a chance to make human contacts and co-operation with other employees during their work.

Employees should have satisfactory working hours, so that they are able to fulfil their obligations apart from job, which includes duties towards family and society (Scand, 2002). The most stressful type of noise is one that is uncontrollable. Participants state that vocal noises from colleagues are the most disruptive. A possible solution to the noise within office spaces was stated in the literature review. As stated before only half of the participants stated that they have plants within their office environment.

The literature further suggested that quiet zones be implemented into office environments as this will give employees an area free of noise and gibes employees time to de-stress (Sundstrom, 1994).

Exposure to noise is an important stressor and predicts irritability, somatic complaints, anxiety, and depression (Melamed, 1992). Furthermore, although intense noise is difficult to bear for practically anyone, even mild or intermittent noise may affect certain vulnerable subjects with "noise annoyance" (the emotional reaction to noise at exposure). Noise annoyance is associated with "noise sensitivity" (the physiological reaction to noise), an individual trait quite stable over time which may predict depression (Stansfeld, 1992). Current studies of noise in offices have adapted techniques for measuring noise levels in industrial environments.

Workers in open plan workspace tend to judge noise to be a primary source of discomfort and reduced productivity (Hedge, 1986; Oldham, 1988; Stokols & Scharf, 1990; Sundstrom, Herbert, & Brown, 1982).

Acoustic comfort studies have focused on correlating physical measures, such as signal-to-noise ratios at different densities, background noise levels and intensities, and speech intelligibility under differing physical conditions, with occupant judgements of distraction and annoyance (Ayr, Cirillo, & Martellota, 2001; Chu & Warnock, 2002; Mital, McGlothlin, & Faard, 1992). Efforts to control office noise through more absorbent surfaces, sound-masking systems and behavioral controls have been undermined by increasing office densities and collaborative work in modern workspace.

2.5.3 Lighting

Up until recently, the only purpose of indoor lighting was to aid with visually directed tasks when there wasn't enough external light. But a recent discovery has shown that light has an impact beyond merely helping us see. Non visual receptors in the retina of the eye form nerve pathways that directly influence our biological clock, the part of our brains that controls and moderates sleep and wakefulness, directly affecting our levels of alertness.

Light is an important therapy treatment for individuals who suffer from SAD (seasonal affective disorder). SAD includes depressive symptoms and is experienced by approximately six out of one hundred people in the developed world, primarily in the autumn and winter months, when the days are shorter. Some studies shows as much as 10 percent of people are affected (Terman M, 1989).

Seasonal Affective Disorder (SAD) is a type of clinical depression related to morning light deprivation, usually in the late fall and winter days. It is an acute depression, which can be a serious, life threatening condition and thus requires medical advice. Treatment of SAD consists of exposure to high light levels for 30 minutes each day, preferably before 10:00 a.m. It is now being suggested that modern working conditions can make these symptoms worse, as many workers spend the majority—if not all—daylight hours indoors, exposed to little, if any, natural light. Common knowledge, backed up by scientific research proves that the quality of indoor lighting in the office can have significant effects on the performance and the well-being of employees. In just the last few years, the understanding of how light an impact upon our health has grown by leaps and bounds. The brightness of office light effects alertness, concentration, and task performance. Adjusting the type and quality of light can significantly improve working experience and productivity. Over-lighting can actually make a workplace uncomfortable and distracting. In addition, giving workers control over their

lighting has been demonstrated to increase productivity and workplace satisfaction. Newer technologies such as T8 lamps with electronic ballasts increase the lighting output, eliminate flickers, offer an excellent color rendition (have a high Color Rendering Index) and save energy. Also, direct/indirect linear suspended fixtures eliminate glare and increase the visual comfort of the occupants. Dimmable intelligent lighting systems allow the user to control light levels and save energy. Task lamps relieve inefficient overhead lights of their massive duties, notably reducing energy use and over lighting. It is easier to turn off localized lighting when it isn't needed than to shut off lighting from a general overhead source. Using direct lighting to illuminate specific areas instead of relying on ceiling fixtures that light entire rooms is an innovative idea. Task lamps and desk lamps are essential pieces of office equipment, offering workers the control they need to be comfortable and productive, while reducing energy use.

Dimmers, sensors and multiple switches also enable varied lighting levels to match needs. Giving workers control over their lighting has been found to result in energy savings and increased workplace satisfaction. Task specific or directed lighting makes for a more comfortable and aesthetic workspace. An over lit office can be uncomfortable and increase agitation and distraction. Workers who use computer display terminals typically prefer relatively low lighting levels to minimize glare and reflections on their display screens. On the other hand, workers who read, write and draw on paper typically prefer higher lighting levels so they can see small letters and fine details. Older workers, and others with weak vision, also need higher lighting levels (Heerwagen, 2000).

The ability to adjust lighting levels is particularly important for workers seated near windows, who must adapt to varying levels of sunlight during the day and workers who require adjusted lighting levels for the different daily tasks that they perform.

Lighting in an office is debatable as some suggest little lighting keeps individuals focused while others argue that well-lit spaces increase productivity. From the many studies we've come across, it seems that there is a strong correlation between natural light and employee efficiency (Marcus, 1967). Employees use lighting for visual tasks. Indoor lighting is relied upon because of a lack of external or natural light inside office spaces (Mills et al. 2007).

Therefore bad lighting can be defined as incorrect lighting for a particular task and 'good lighting' is said to increase productivity, reduce stress and it may also assist in making indoor environment more pleasant (Cushman.n.d) and Mills et al. (2007). Studies conducted on lighting and ist effects on office workers' productivity will be observed in this section. Crushman, (n.d) revised a study conducted at a research centre, Renssealaer Polytechnic Institute. This study was conducted on office workers and the effect lighting had on their productivity. Results showed that workers had to take breaks more often due to the poor lighting conditions; this resulted in about 80 minutes of lost time per week for each worker. It was therefore concluded that improvements in lighting could increase productivity. Cushman; (n,d.) included a further study in his paper showing that "*a 16% improvement in productivity at a West Bend Mutual Insurance facility was attributable to a lighting up grade."* Natural light illuminate ranges from 2000 to 100 000 lux whereas typical indoor illuminates at about 500 lux. Indoor lighting is also said to have less "short wave length blue spectrum" than natural light. (Mills et al. 2007). This short wave length light is said to be important in the biological effects of the body. The "short wave length blue spectrum' is also said to have a higher colour temperature. This temperature has been studied and has shown to increase mental activity. (Mills et al. 2007) '...drowsiness has been observed to be higher under lower colour temperature lighting when comparing 3000k with 5000k." (Mills et al.; 2007). The purpose of Mills et al. (2007)'s research paper was therefore to test the effects of lighting on

office workers in a real life context."With this background information in mind, it can be postulated that the new high correlated temperature lights would have significant effects upon feelings of wellbeing, alertness, concentration and possibly work performance in those exposed to it. "(Mills et al. (2007))

There is no doubt that people find daylight more pleasant than electric lighting as their primary source of light. Wells (1967), Manning (1967), and Markus (1967) in the UK; Cuttle (1983) in the UK and New Zealand; Heewagen and Herrwagen (1986) in the USA; and Veitch (1993) in Canada, have all shown that high percentages of survey respondents prefer to work by daylight. Similarly, people prefer to sit at desks that are beside windows rather than further back in the room, especially when those windows have access to direct sunlight (Markus, 1967, Aldworth & Bridgers, 1971; Collins 1975 Ludlow, 1976; Cuttle, 1983; and Heerwagen and Heerwagen 1986). People's preference for daylight may be partly due to their negative view of electric lighting. ***Cuttle*** (1983) found that people believe that working by daylight results in less stress and discomfort than working by electric light, and that working by electric lighting is deleterious to health, particularly in the long term.

However, there is no scientific evidence to support any negative effects of electric lighting on long-term health. Bad lighting has been described by the literature as the incorrect lighting for tasks that need to be conducted by that organization. The literature found that 'good lighting' was able to reduce stress, increase physical well-being, increase productivity and creativity and even have a positive effect on depressive symptoms. It was established that the majority of participants have artificially lit offices spaces. Majority of participants stated that they are satisfied with the lighting within their office space, although they would prefer more natural lighting. Majority of participants also stated that lighting has an effect on their mood.

The literature found connections between creativity, mood and lighting, therefore organizations can look at lighting that will enhance employees' mood and therefore increase creativity. (Mills et al.2007).

Participants reported that the new lighting increased their feelings of well-being and therefore work performance. Lighting may have a considerable impact on productivity but other factors can also contribute to a decrease in productivity, these were not taken into account in the Mills et. al (2007) study. These other factors could include factors such as personal issues and a lack of sleep could also have an impact on productivity. Participants preferred the new high correlated colour temperature lighting. Some participants asked to keep the new lighting. According to Mills et al. (2007) further research is needed to study the cost efficiency of the new lighting included ways to reduce energy costs. Improving Productivity with Light Controls and total light control affects worker productivity, although the exact impact is hard to establish in a commercial environment. It's reasonable to postulate that productivity improves at least 5 percent when workers can control their own visual environment, although productivity gains as small as 1 percent still make lighting control systems an excellent investment, with a payback period of seven months or less. In a factory or other industrial setting, "productivity" is commonly calculated as a measurement of output per worker; in retail, the measurement is generally related to sales per worker. But productivity is much harder to define in non-industrial spaces such as corporate headquarters. In this environment, productivity encompasses a much wider range of variables. Some things are measurable—for example, how quickly and accurately tasks are completed. But productivity is affected by numerous things that are not so easily quantified—for example, employee motivation, vigilance, persistence, distractibility, corporate culture, sense of well-being and other imponderables. Into this complex calculation, we insert the proposition that lighting controls

improve worker productivity. This includes control over any aspect of the visual environment, including dimming controls for electric lights as well as shade controls for daylight. Research has shown that people experiencing positive emotional states tend to be more productive (Wright and Cropanzano, 2000), and that positive emotional states can be reinforced by providing people with their preferred work environment. Since daylight is almost universally preferred to electric lighting, it is likely that increased use of daylight will support workplace productivity. Lighting of the most important elements of the internal environment because most activities are directly related to the sense of sight. This environment will not be appropriate, no matter how good planning or quality furniture unless lit good and sufficient and stable. Lighting unstable causing waste of space in the headquarters staff, The beneficiaries will meet in the place, which they see as a stable lighting and leave the other (Smith,1986:p163). Lighting research has tended to distinguish between the effects on building occupants of artificial, interior lighting and of natural light or day lighting from windows. Day lighting research has linked increased comfort and productivity with window size and proximity, as well as with view out, control over blinds and shielding from glare (Hedge, 2000; Leather, Pyrgas, Beale, & Lawrence, 1998; Mallory-Hill, van der Voost, & Van Dortmost, 2004). In their overview of the effects of different kinds of artificial lighting on task performance and occupant satisfaction, (Boyce, Veitch, Newsham, Myer, Hunter ,2003) concluded that current office lighting standards are preferred by most people carrying out typical office tasks in a simulated office environment, where workers used controls to exercise their lighting choices. The study results made a distinction between visual comfort—lighting needed to perform well on office tasks—and satisfaction, or lighting judged to be aesthetic exposure to noise is an important stressor and predicts irritability, somatic complaints, anxiety, and depression (Melamed, 1992).

2.5.4 Temperature

Mills et al. (2007)'s study set out to show the effects of "high correlated colour temperature fluorescent lights" on work performance. The study was conducted in offices of Standard Life Healthcare offices in the UK. New lights with correlated colour temperature florescent lamps increased the amount of short light wavelength with a colour temperature of 17 000 k. (Mills et al. 2007) the intervention grow showed a number of improvement in different areas such concentration, mood, energy, memory and also showed to have less fatigue. "Within the group analysis yielded, an almost 20 percent increases in the mean work performance score in the intervention group, with only marginal changes within the control group. What temperature works best for one's productivity depends on one's body. For a thin person, a higher temperature might be better. But for someone not as thin, a lower temperature may work better. Currently there are no regulations governing high temperature levels in offices and the responsibility of employers to their employees in this respect, although the World Health Organization recommends a maximum working temperature of 24ºC.

High Temperature Levels: Employee lethargy and tiredness as a result of increased body temperature lead to possible efficiency decreases. **Low Temperature Levels:** Low Temperature Levels decrease in efficiency due to cooler body heat and shivering. **High humidity** In itself may not be a direct problem, but it does increase our susceptibility to high temperature levels as evaporation of body sweat is impeded. **Low Humidity** levels have a debilitating effect on our ability to breathe and swallow without discomfort as our mouths and noses can become dry due to the increased level of evaporation in the surrounding environment (Knight 1980, Harper 1961, Hemmes et al 1960).

2.5.4.1 Productivity & Temperature

An ergonomics study by the Cornell Institute in the US concluded that there were definitive links between the efficiency/productivity levels of workers and the environmental conditions in offices. In other words, colder workers could mean more errors and therefore higher costs for the employer. Temperature and humidity monitoring in office environments has often been overlooked as a mechanism for ensuring that a workforce is both happy and efficient. Health and Safety regulations mean that some form of ongoing monitoring should be carried out by employers, but, in addition, regular monitoring could also help companies and organizations to identify how environmental conditions can be adjusted to help improve productivity and efficiency within the office workplace.

The final outcome of the survey suggested that businesses can enhance their productivity by improving their workplace designs. A rough estimation was made by executives, which showed that almost 22 % increase can be achieved in the company's performance if their offices are well designed. The American Society of Interior Designers (ASID, 1999) carried out an independent study and revealed that the physical workplace design is one of the top three factors, which affect performance and job satisfaction. The dissertation results showed that 31 % of people were satisfied with their jobs and had pleasing workplace environments. 50 % of people were seeking jobs and said that they would prefer a job in a company where the physical environment is good. "Indoor temperature is one of the fundamental characteristics of the indoor environment." (Seppanen; Fisk William & Lei, 2006). There have been contradicting statements about the optimum temperature for a comfortable environment is twenty five degrees Celcius. Seppanen; Fisk William & Lei, (2006) disputes this saying that the optimum temperature for productivity is about twenty two degrees Celsius.

Both sources agree that incorrect temperature decreases productivity and both suggest that temperature is an important factor to consider when analysing work environments. (Abdou 2007), it is therefore of importance to find the impact of an individual employee temperature requirements on the productivity of other their co-workers. Many offices today have air and also to cool down office environments. A study conducted in Washington found a nine percent improvement in productivity when air conditioning was introduced into the office (Abdou 2007). One should look at how individual temperature affects co-workers. This should be taken into more consideration in open plan offices, where choosing an individualistic temperature comfort may impact on other co-workers more greatly then in closed offices.

Indoor temperature was described as "one of the fundamental characteristics of the indoor environment." (Seppanen; Fisk William & Lei, 2006). Incorrect temperatures can decrease workers productivity and it was found that participants were not fully satisfied with the current temperatures within their office environments. Majority of the participants stated that the office temperatures have an effect on them; it then becomes more important to establish why participants are not satisfied. It was also found that productivity could be improved when workers are able to control the temperature within their offices spaces.

Perhaps further research needs to be conducted on methods that will allow offices workers to control the temperatures within their office spaces without affecting the requirements of co-workers. More research is needed within this regard.

Temperature and ventilation can work conjointly in that good ventilation could bring in cool fresh air. Majority of the participants stated that their office spaces are air-conditioned. More importantly it was found that majority of participants prefer air-conditioned office spaces. Productivity can be improved when air-conditioning is introduced into office environments.

Although the majority of participants stated that their office space is air-conditioned and this corresponds with what they prefer, majority are still not satisfied with the indoor temperatures. It was also further established that opening a window may not be the best solution for allowing more ventilation into the office space because majority of participants are not seated near to a window. More research is needed to identify why it is that participants are not satisfied with the indoor air temperatures and research is needed as to what method can be introduced to better cool down temperatures.

2.5.5 Spatial arrangement

There are many minute issues, which should be given proper consideration while designing workstations so that employees do not face any health problems later. For example the shelves and storage spaces/ spatial arrangement in the workstation should be placed at comfortable level, so that employees do not face any problem due to that.

In case if it is necessary to have high storage spaces then the employees, who are supposed to use them, should be provided with training and precautionary measures, which should be implemented while using such spaces. Employees may also be at risk from indoor air pollutants, which can lead to respiratory diseases in employees. In order to avoid any such situations, the organization should take proper steps. For example, the air conditioners should be cleaned timely; other equipments that give out exhausts should be installed at places where there are proper ventilation facilities (Rashid, M., Kampschroes 2006).

Studies have tended to focus on the height and density of workstation partitions, the amount and accessibility of files and work storage, and furniture dimensions such as work surfaces as being these elements of furniture and spatial layout which have the most effect not only on the satisfaction of individual workers but on the employee productivity.

One study indicated that the additional investment in ergonomic tables and chairs for workers yielded a 5-month payback in terms of increased productivity (Miles, 2000). To gain a better understanding of the office workers, several studies provide evidence that office workers are uncomfortable in open plan configurations and prefer private enclosed workspace (Brennan, Chugh, & Kline, 2002; Fried, Slowik, Ben-David, & Tiegs, 2001; Ornstein, 1999).

In addition, aspects of psychological comfort such as territoriality and privacy are strongly affected by spatial layout: office size and location is linked with status; partitioning influences acoustic as well as visual privacy; amount of office storage is linked with territoriality and status (Fischer, Tarquinio, & Vischer, 2004; McCusker, 2002; Vischer, 2005; Vischer, McCuaig, Nadeau, Melillo, & Castonguay-Vien,2003; Wells, 2000).

2.6 Office Design Impacts to Productivity

According to the (Gensler, 2006), the average American worker is 42, has been with the company for 6.3 years and works in an office with 210 workers in a company of 3,711 employees**.** Other characteristics of the average American worker are a feeling of less time to think in the office due to increasing pressures while over 14 percent of social time is spent with work activities and colleagues (Andreo 2008).

Thomas Davenport (2005), and his colleagues interviewed 41 companies which were in the process of redesigning space for knowledge workers (Thomas Davenport 2005).

This research provided insight into what knowledge workers need to be effective in a workplace:

- There is a preference for an enclosed office, but knowledge workers communicate more effectively in open space.
- Knowledge workers prefer geographic locations where there are others with similar expertise.
- Knowledge workers are mobile, spending up to half their time outside the office while still working productively. This is balanced with time spent in the home office where they connect with each other and fulfil a need to be part of the larger enterprise.
- Knowledge workers both collaborate and concentrate. There is a need for the physical work space to provide solutions for both types of work.
- Knowledge workers communicate to those closes by.

The concept that technical (or knowledge) workers do not communicate with co-workers whose space is 30 meters or more apart (Wineman, Kabo, and Davis, 2009). While technology allows communication around the world, this 25 year old concept really represents having co-workers with whom you have respected professional relationships readily available for sharing concepts and brainstorming in real time. Shalley (1995) studied the effects of the physical workspace on both productivity and creativity and learned the type of task and goals associated with the task impact whether the worker performed better alone or in the presence of others. The study revealed high production expectations were fulfilled better by those working alone, whereas a goal for a creative solution was fulfilled better in the presence of others. This confirms a need for knowledge workers to have both collaborative space and space to focus.

Furniture designer and manufacturer, Haworth, discovered that knowledge workers value dedicated team rooms because they allow the collaboration and cognitive processes required to do their jobs while also providing control over their environment. Some of the features most valued were the whiteboards which they called “displayed thinking”, and the portable furniture which enabled flexible working arrangements. Another finding is that the presence of the team rooms conveyed a sense of status to the project team and communicated to others the value of the team’s contributions (Augustin 2009).

An interesting concept called equity theory addresses the notion that employees have an inner sense of what value their inputs are to the organization and how those balance with their outputs, or rewards. Many employees view office space as a form of recognition or status. If the employee was assigned to “better” space there was a tendency to perform at a higher level, where if assigned to “lesser” space there was a tendency to perform at a decreased level. This was called the equity theory (Voss 2009). For today’s knowledge worker the underlying lesson is that if workspace changes are made that may be viewed as a step backward, a method of restoring status needs to be addressed or productivity levels may be adversely impacted.

2.7 Relationship between Office Design and Productivity

Over the years, many organizations have been trying new designs and techniques to construct office buildings, which can increase productivity, and attract more employees. Many authors have noted that, the physical layout of the workspace, along with efficient management processes, is playing a major role in boosting employees’ productivity and improving organizational performance (Uzee, 1999; Leaman and Bordass, 1993; Williams et al. 1985).

(Gensler 2006), workplace design has a very real impact on companies' bottom lines. In fact, the effect of office design on worker productivity in the U.S. is estimated to be at least $330 billion annually for the eight industry groups sampled in the survey, according to an analysis and an independent research firm conducted a research on US workplace environment (Gensler, 2006).

These survey findings suggest businesses that ignore the design and layout of their workplaces are failing to optimize. According to the survey, office workers believe they would be 21% more productive if given a better working environment. Almost half say they would log an extra hour per day under such improved circumstances. (Gensler, 2006), Workplace Survey is part of the firm's annual inquiry into the impact of design on business performance and builds on an earlier workplace survey conducted by Gensler's U.K. office.

"Businesses are waking up to the fact that the workplace is much more than just real estate and a means to house their people," said Diane Hoskins, an Executive Director at Gensler. "They are embracing performance-focused workplace design as a strategic business initiative--as the forum that can drive employee excellence, business objectives, and ultimately, the bottom line." According to the survey, nine in ten workers believe that better office design leads to better overall employee performance, and also makes a company more competitive. Nearly 90 percent of senior executives, including occupants of the C-suite, feel that a better physical working environment would have a positive impact on their company's bottom line. They also estimate that their companies would be able to perform an average of 22 percent more work if their companies had better designed physical working environments (Brill et. al, 1984). The work environment can also have an impact on an individual’s ability to work safely, competently and in compliance with operational performance targets (Leaman, 1995). It is important to address the following:

2.7.1 Furniture

Office furniture comprises of desks chairs, the filing system, shelves, drawers, etc. All these components have a specific role to play in the proper functioning of any office and the productivity and the efficiency of the employees and the most important thing to be considered while buying office furniture is to ensure whether it is ergonomic or not.

Ergonomics of office furniture is important because an employee has to work with them for the entire time that he is on office, and if they are uncomfortable and not user friendly, their working style and efficiency gets hampered considerably, in turn affecting the overall organizations. Non-ergonomic office furniture can also lead to health problems of employees, which again has an adverse effect on the productivity. Ergonomic office furniture ensures that each employee gels well with the things around him, like desks, chairs, computer alignment and even environmental factors. If the employee is uncomfortable due to any reason, his work is bound to get affected. If all factors surrounding the employee are ergonomically correct, then the employee will be comfortable and remain motivated to give his best (Davies, 2005).

These days' organizations consult, and even employ ergonomic experts that advice people on how to improve their office ergonomics and what type of furniture would be suitable to make the ergonomics of a work place better. Having ergonomic office furniture reduces the chances of any risk injury. They are designed in manner that makes them safe to be had around and also reduce the possibility of any accidents in the work place. Office furniture like desks can be designed to give greater leg room and adequate support to the elbows while working on the computer. The positioning of the computer monitor and the mouse should also be adequate, so that the user does not have to strain his vision to view and stretch uncomfortably far to reach them. Office furniture helps the organization tremendously in increasing its productivity, and at the same time taking care of the employees' health (Fuhr, 2011).

2.7.2 Noise

It is probably the most frequently forgotten of the environmental pollutants whose effects can be far-reaching. Noise harms us in more ways than we can think of and at times without us even knowing about it. We cannot have a noise free world but we sure can have a noise safe world.

There are various sources of noise pollution. In some places noise from construction projects predominate, while in others it is vehicular traffic or noise from airports. Other sources include the noise in occupational settings or even the noise of simultaneous conversations. In our country unleashed loudspeakers disturb the neighborhood on seemingly endless nights, where the laws are either battered in the name of religion or just for fun (Sundstrom, 1994).

Talking of the business world, office noise poses some serious concerns. But the severity of this potential problem is overlooked. In a recent study completed for the American Society of Interior Designers (ASID) by (Yankelovich Partners, 2001), 70% of office workers polled agreed that productivity can increase if office noise is decreased. But a subsequent study (conducted for ASID by LC Williams and Associates) proved that business executives do not acknowledge office noise: 81% of those who polled reported they were not concerned with office noise. Through this discrepancy, it is apparent that companies must increase their attentiveness of the acoustic environments of open-office spaces, if business success is to be achieved. Beyond productivity, office acoustics also affects employee health and safety.

Many studies acknowledge that noise (even at low levels) is a cause of stress that causes health problems such as digestive disorders, headache, hypertension, and ulcers. Unhealthy employees not only would be a cause of concern but also their health is directly proportional to their productivity and hence their performance.

One of the most important aspects of an open office, as far as productivity is concerned, is the ability to conduct work without distraction (Scand, 2002). Architects and interior designers have a big and profound responsibility to design functional and sound safe environments. It is very difficult, if not impossible to meet these goals without considering acoustics. Acoustics is essential to the functioning of almost every type of environment. Some environments can even become dangerously loud and unsafe for the occupants. In order to effectively address these issues, acoustics should be considered in the design phase itself. If your space does not meet the needs of the end user or is found to be unsafe, you could be held liable, and worst yet, you could be putting people in danger. Very often, noise does not produce visible results. That is why probably, people believe that noise does not cause health hazards. But as per different studies, noise creates health hazards affecting children the most, with extremely high noise levels even causing hear loss in newborns (Sundstrom, 1994). Virtually every space demands acoustic attention in order to function for its specified purpose.

Architects and Interior designers have a notion that acoustically treated spaces are not aesthetically appealing. But thanks to the perseverance of certain individuals and their constant innovative study and experience, today's acoustics have both 'beauty and brains'.

Allowing the end-users to experience true acoustic comfort in the spaces designed will be appreciated anytime. Noise can cause irritation, annoyance, anxiety, anti-social behavior, hostility and violence. It should not be forgotten. When one is designing an open office, he should always consider the acoustic impact of the materials being used. Think about where are the people being placed, how the job types are being grouped, sound masking, the type of telephones being used, panel heights and ceiling systems. There are plenty of solutions available to combat potential acoustic problems in open-office spaces in order to facilitate employee productivity. In the past, there has been a stigma associated with acoustic products.

Some professionals think they’re utilitarian and that they limit your design options, but this could be nothing but taking one further away from the truth. Today with the endless options in acoustic themes and with the widened horizon of designers who now combine architecture with acoustic designing, an acoustically perfect, well furnished office could be designed which will take care of noise and will also give the visual delight of perfect interior designing (American Society Interior Design by Yankelovich partners, 2001).

2.7.3 Lighting

Up until recently, the only purpose of indoor lighting was to aid with visually directed tasks when there wasn't enough external light. But a recent discovery has shown that light has an impact beyond merely helping us see. Non visual receptors in the retina of the eye form nerve pathways that directly influence our biological clock, the part of our brains that controls and moderates sleep and wakefulness, directly affecting our levels of alertness. Light is an important therapy treatment for individuals who suffer from SAD **(seasonal affective disorder).** SAD includes depressive symptoms and is experienced by approximately six out of one hundred people in the developed world, primarily in the autumn and winter months, when the days are shorter.

Some studies shows as much as 10 percent of people are affected. Seasonal Affective Disorder (SAD) is a type of clinical depression related to morning light deprivation, usually in the late fall and winter days. It is an acute depression, which can be a serious, life threatening condition and thus requires medical advice (Callan, 2006). It is now being suggested that modern working conditions can make these symptoms worse, as many workers spend the majority—if not all—daylight hours indoors, exposed to little, if any, natural light. Common knowledge, backed up by scientific research proves that the quality of indoor lighting in the office can have significant effects on the performance and the well-

being of employees. In just the last few years, the understanding of how light impacts upon our health have grown by leaps and bounds. The brightness of office light effects alertness, concentration, and task performance. Adjusting the type and quality of light can significantly improve working experience and productivity.

Over-lighting can actually make a workplace uncomfortable and distracting. In addition, giving workers control over their lighting has been demonstrated to increase productivity and workplace satisfaction. Newer technologies such as T8 lamps with electronic ballasts increase the lighting output, eliminate flickers, offer an excellent color rendition (have a high Color Rendering Index) and save energy (Malin, 2003). Also, direct/indirect linear suspended fixtures eliminate glare and increase the visual comfort of the occupants. Dimmable intelligent lighting systems allow the user to control light levels and save energy. Task lamps relieve inefficient overhead lights of their massive duties, notably reducing energy use and over lighting. It is easier to turn off localized lighting when it isn't needed than to shut off lighting from a general overhead source. Using direct lighting to illuminate specific areas instead of relying on ceiling fixtures that light entire rooms is an innovative idea (Cuttle, 1983). Task lamps and desk lamps are essential pieces of office equipment, offering workers the control they need to be comfortable and productive, while reducing energy use. Dimmers, sensors and multiple switches also enable varied lighting levels to match needs (Malin, 2003). Giving workers control over their lighting has been found to result in energy savings and increased workplace satisfaction. Task specific or directed lighting makes for a more comfortable and aesthetic workspace. An over lit office can be uncomfortable and increase agitation and distraction. Workers who use computer display terminals typically prefer relatively low lighting levels to minimize glare and reflections on their display screens. On the other hand, workers who read, write and draw on paper typically prefer higher

lighting levels so they can see small letters and fine details. Older workers, and others with weak vision, also need higher lighting levels. The ability to adjust lighting levels is particularly important for workers seated near windows, who must adapt to varying levels of sunlight during the day and workers who require adjusted lighting levels for the different daily tasks that they perform (Marcus, 1967).

2.7.4 Temperature

For a thin person, a higher temperature might be better. But for someone not as thin, a lower temperature may work better. Currently there are no regulations governing high temperature levels in offices and the responsibility of employers to their employees in this respect, although the World Health Organization recommends a maximum working temperature of 24ºC. Regulation 7 of the Workplace (Health, Safety and Welfare) Regulations 1992 states that during working hours, the temperature in all workplaces inside buildings shall be reasonable'. It should be stressed however, that temperature alone may not ensure 'reasonable' comfort, as other factors such as air movement and relative humidity will also have a part to play (Kostiainen, 2008).

High Temperature Levels: Employee lethargy and tiredness as a result of increased body temperature lead to possible efficiency decreases. **Low Temperature Levels:** Low Temperature Levels decrease in efficiency due to cooler body heat and shivering. **High humidity** In itself may not be a direct problem, but it does increase our susceptibility to high temperature levels as evaporation of body sweat is impeded. **Low Humidity** Levels have a debilitating effect on our ability to breathe and swallow without discomfort as our mouths and noses can become dry due to the increased level of evaporation in the surrounding environment.

2.7.4.1 Productivity and Temperature

An ergonomics study by the (Cornell Institute, 1999) in the US concluded that there were definitive links between the efficiency/productivity levels of workers and the environmental conditions in offices. Although by no means completely representative of all kinds of environments and all type of industry, the research concluded that higher temperatures (in the region of 24- 25ºC) resulted in fewer keyboard errors than occurred at temperatures of around 19ºC.

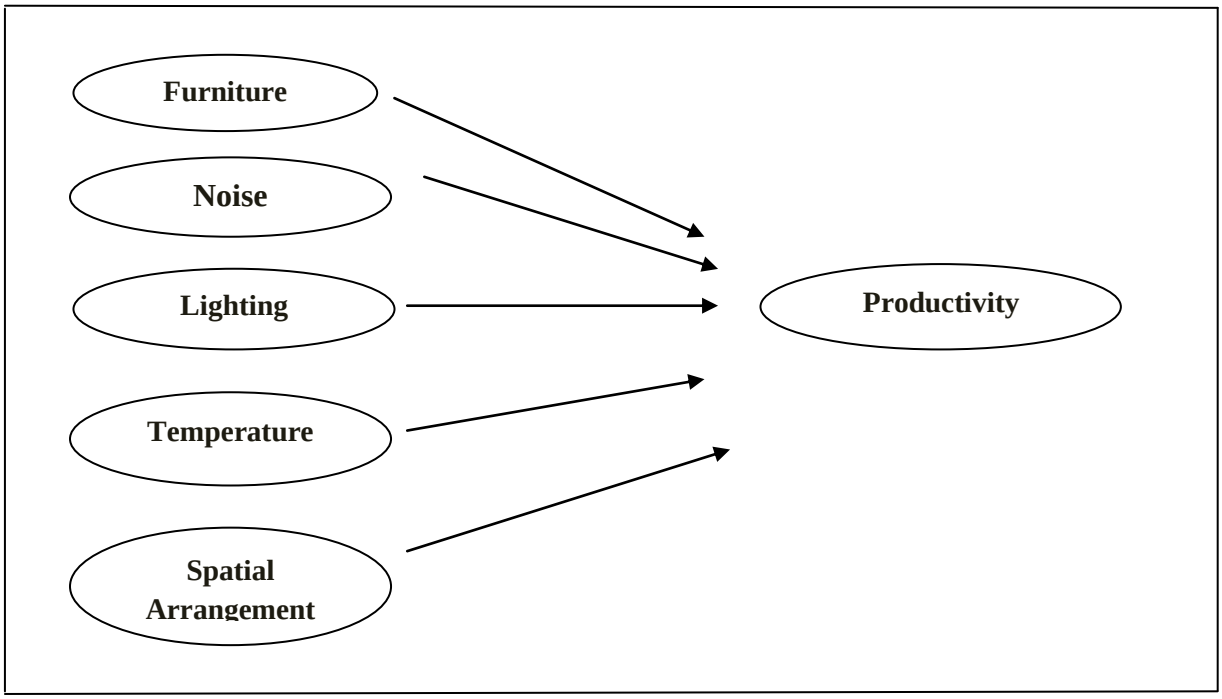
In other words, colder workers could mean more errors and therefore higher costs for the employer. Temperature and humidity monitoring in office environments has often been overlooked as a mechanism for ensuring that a workforce is both happy and efficient. Health and Safety regulations mean that some form of ongoing monitoring should be carried out by employers, but, in addition, regular monitoring could also help companies and organizations to identify how environmental conditions can be adjusted to help improve productivity and efficiency within the office workplace.

In March 2006, (Seppanen, Fisk William & Lei, 2006) a survey was conducted by taking a sample size of 2013. The dissertation was related to; workplace designs, work satisfaction, and productivity. 89 percent of the respondents rated design, from important to very important. Almost 90 percent of senior officials revealed that effective workplace design is important for the increase in employees' productivity. The final outcome of the survey suggested that businesses can enhance their productivity by improving their workplace designs. A rough estimation was made by executives, which showed that almost 22 % increase can be achieved in the company's performance if their offices are well designed.

2.8 Research Framework

Based on the literature review, the relationship between office design and productivity was conceptualized and depicted in Figure below. The relationship is defined in such a way that the set of factors impact on an individual, which in turn determine the final outcome in terms of increased or decreased productivity of that individual. These factors have different impacts on different employees based on their gender.

Figure 5: The effect of five basic elements on productivity



Independent Variables **Dependent Variables**

Five indicators of office design such as furniture, noise, temperature, lighting and spatial arrangement were considered for study in the second survey. Different office design factors such as furniture, noise, lighting, temperature and spatial arrangement were used to determine the extent of the loss in productivity.

2.9 Hypotheses

Hypothesis is a tentative statement that proposes a possible explanation on certain phenomenon or events. A functional hypothesis is a testable statement which may include a prediction when it been constructed. The following are hypotheses that affected with this thesis:-

H1 : There a significant relationship between furniture and productivity.

H2 : There is a significant relationship between noise and productivity.

H3 : There is a significant relationship between temperature and productivity.

H4 : There is a significant relationship between lighting and productivity.

H5 : There is a significant relationship between spatial arrangement and productivity.

H6 : There is a significant relationship between office design and productivity.

2.10 Operational Definition

2.10.1 Productivity

Productivity is a measure of the rate at which outputs of goods and services are produced per unit of input (labour, capital, raw materials, etc). It is calculated as the ratio of the amount of outputs produced to some measure of the amount of inputs used. Productivity measures are used at the level of firms, industries and entire economies. Depending on the context and the selection of input and output measures, productivity calculations can have different interpretations. Improving productivity can have connotations of economising on the use of inputs-for example, adopting efficient production processes that minimise waste. Equally, improving productivity can have connotations of yielding more output — for example, using resources in activities or with technologies that generate more output.

Conceptually, productivity is a 'supply-side' measure, capturing technical production relationships between inputs and outputs. But, implicitly, it is also about the production of goods and services that are desired, valued and in demand.

Productivity is defined as a comprehensive measure of how efficiently and effectively achieved their major objectives. It is the relationship between outputs and inputs during a given period (Lawlor, 1985; Murdick, Render & Russell, 1990; Sumanth, 1984). It is construed as the ability and willingness of an economic unit to produce maximum possible output with given inputs and technology. Higher the output per unit of input, higher is the productivity. To calculate productivity, it is necessary to identify first which outputs and which inputs are to be used.

2.10.2 Office Design

The arrangement of workspace committed, so that work can be performed in the most efficient way. The primary purpose of an office design is to provide a workplace and working environment primarily for administrative and managerial workers. These workers usually occupy set areas within the office design, and usually are provided with desks, PCs and other equipment they may need within these areas. An office design will be divided into sections for different companies or may be dedicated to one company. In either case, each company will typically have a *reception* area, one or several meeting rooms, singular or open-plan offices, as well as toilets. (Adams, Scott 2002)

2.10.3 Furniture

Furniture refers to large movable articles usually used to make establishments fit for living and working. They include chairs and tables. In other usage the word can also be used to characteristics that are typical of an individual. The word may have slight variations in usage in other contexts Office furniture comprises of desks chairs, the filing system, shelves,

drawers, etc. these components have a specific role to play in the proper functioning of any office and the productivity and the efficiency of the employees and the most important thing to be considered while buying office furniture is to ensure whether it is ergonomic or not. If all factors surrounding the employee are ergonomically correct, then the employee will be comfortable and remain motivated to give his best (Davies, 2005).

2.10.4 Noise

In common use, the word noise means any unwanted sound. In physics and analogy electronics, noise is a mostly unwanted random addition to a signal; it is called noise as a generalization of the acoustic noise "static". In our country unleashed loudspeakers disturb the neighbourhood on seemingly endless nights, where the laws are either battered in the name of religion or just for fun (Sundstrom, 1994).

2.10.5 Temperature

Is a numerical measure of hot or cold? Its measurement is by detection of heat radiation or particle velocity or kinetic energy or by the bulk behaviour of a thermometric material.

2.10.6 Lighting

Lighting or illumination is the deliberate use or light to achieve a practical or aesthetic effect. Lighting includes the use of both artificial light sources like lamps and light fixtures, as well as natural illumination by capturing daylight. Day lighting (using windows, skylights or light shelves) is sometimes used as the main source of light during daytime in buildings. This can save energy in place of using artificial lighting, which represents a major component of energy consumption in buildings. Proper lighting can enhance task performance. Improve the appearance of an area or have positive psychological effects on occupants.

2.10.7 Spatial Arrangement

The property possessed by an array of things that have space between them (spacing). Aspects of psychological comfort such as territoriality and privacy one strongly affected by Spatial Layout: Office size and location is linked with status: partition influences acoustic as well as visual privacy, amount of office storage is linked with territoriality and status (Fisher, Targuinio, & Fisher, 2004, Mc Cusher, 2002, Vischer et al (2003) and Wells, 2000).

2.11 Summary of Chapter 2

This chapter has presented related theories and previous research on work designs and productivity. The theoretical framework and hypotheses to be tested in the researches have also been discussed. The next chapter will elaborate on the methodology used in this research.

CHAPTER 3

METHODOLOGY

3.0 Introduction

Due to the impacts of technology, reward systems, career growth, meaningful work assignments, work/life balance and other factors which BOSTI found to impact 76% of an employee's job satisfaction (Olson 2002), a structured interview and explanatory Case Study approach was selected. This enabled the researcher to document the overall business context of an organization and its' impact on the work produced within that organization.

3.1 Research Design

Research design is a basic research and it is a field survey through self administered questionnaires. Primary data is collected through a survey. Descriptive statistics are used to analyze the data. Content analysis procedures (Spradley, 1979) are used to determine relationships between subjects' answers. Office workers in different offices in order to collect informations required to meet the objectives of the study, secondary data is obtained from books, articles from journals, and official web sites. The effects of design features are compared to other organizational factors. Questions are structured to discover which organizational factors (i.e., workplace design features, management support, technology and equipment, and coworker support) in relevant workplace workers perceive to hamper or encourage their ability to perform effectively.

3.2 Data Collection

The questionnaire in this research is base on the relationship between office design and employees' productivity. Questionnaire consisted of 24 questions; 4 questions on each variable. Out of these, 4 questions were on productivity, based on the technique of subjective productivity measurement. Subjective productivity data was gathered from the employees, supervisors, clients, customers and suppliers. **The survey** was directly administered by the supervisors or managers of the employees. The productivity measure used was the Minnesota Satisfactoriness Survey (MSS) (Gibson et al, 1977). The strength of the MSS is its broad definition of performance, including assessments of the quality and quantity of an employee's work, and their overall dependability and promo ability.

3.3 Sampling

This survey was distributed to the level of employees (DSP, ASP, INSP) and researcher tried to cover all the range and have a large number of answers from different employees in different jobs. The total of population is 800 employees and total of 145 employees from these departments were taken. The distribution of sample among offices and number of employees taken from each given office. Primary data was collected through a structured questionnaire. Observation was also used to collect the required information. Managers provided a summary of the results of employee perceptions of the work environment to encourage participation in the research. The survey focused on the relationship between office design and employees' productivity. The subjects were chosen using quota sampling, as every employee in the position analyzed within each unit was included as a subject.

3.4 Data Collection Procedures

The primary data collection method employed in this study is self-administered questionnaire. The questionnaire filled by and returned to the researcher once completed and the results was analysis. The purpose of pilot study is to minimize the errors occur during the actual research and allows modification on the questionnaire before it is distributed during the actual study. Besides, pilot study also able to reduce the risk of wasting money and time on redoing the survey. Respondents were given enough time in answering the questionnaire carefully and were assisted if they were confused, to ensure they fully understand and provide the appropriate answer. Beside, to ensure the questionnaires are return to the researcher, the respondents were required to answer the questionnaire when they received and straightaway returned once completed. The duration for data collection is approximately one month.

3.5 Techniques of Data Analysis

Two surveys were developed as techniques of data analysis to collect information for the study under consideration. Surveys provide quick, inexpensive, efficient and accurate means of assessing information about the population. Survey questions were a combination of open ended questions and fixed alternative questions. Open ended questions allow respondents to express their opinion about a particular issue in their own words. Fixed alternative questions allow respondents to choose from given limited alternative responses, the one closest to their answers. For example, such a question might be, on a scale of 1-4; how your productivity changed during the last year' (Black and Lynch, 1996 and Laitinen 1999). The use of combined of open ended and fixed alternative questions potentially allow for greater response information than single type questions. A combination of nominal and ordinal scales was used.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Introduction

This section discussed based on the objective of the study. The data obtained the analyzed by using a Statistical Package for Social Science (SPPS) version 18.0. Research findings support the existence of an important link between a good physical working environment and the performance of a company. Thus, the quality of a working environment has a strong influence on the productivity and profitability.

4.1 Reliability Test Instruments

4.1.1 Reliability Test

The result for reliability test of pilot and main study is shown in Table 4.1 below. Initially, the alpha value for the pilot study is 0.620 (good) for IV (work design) and 0.801 (very good) for DV productivity. By referring, to the highest value of the "Cronbach alpha value if item deleted', few questions were deleted and it has resulted in the increase of alpha value.

Hence, the alpha values for all variable are 0.754 (Independent Variables), 0.823 (Dependent Variables).

Table 1 : Cronbach Alpha Value for Pilot and Main Study

Variables	Alpha (By Original Researcher)	Pilot Study	Main Study
Work Design (IV)	**0.88**	**0.754**	**0.707**
Productivity (DV)	**0.78**	**0.823**	**0.926**

The analysis of Cronbach alpha for the main study has resulted in different values. The Alpha value for Independent Variables has reduced from 0.754 (good) to 0.707 (good). On the other hand, the alpha value for Dependent Variable has increased from 0.823 (very good) to 0.926 (excellent). Except for the alpha of work design, the alpha values for the other two variables are higher than the alpha of the original researcher (0.70).

4.1.2 Validity Test

Validity of the instruments is examined by content validity. Instrument used in this research were not simply constructed by the researcher herself but they were adopted from three established instruments and used by many researchers before. The first instrument is the work design, a part of the office design survey, which was developed by Gensler (2006), the second one is the Productivity Questionnaire developed by (Uzee, 1999).

4.2 Gender

The figure below shows that the majority respondents were male with 53 percent compared to female with only 47 percent.

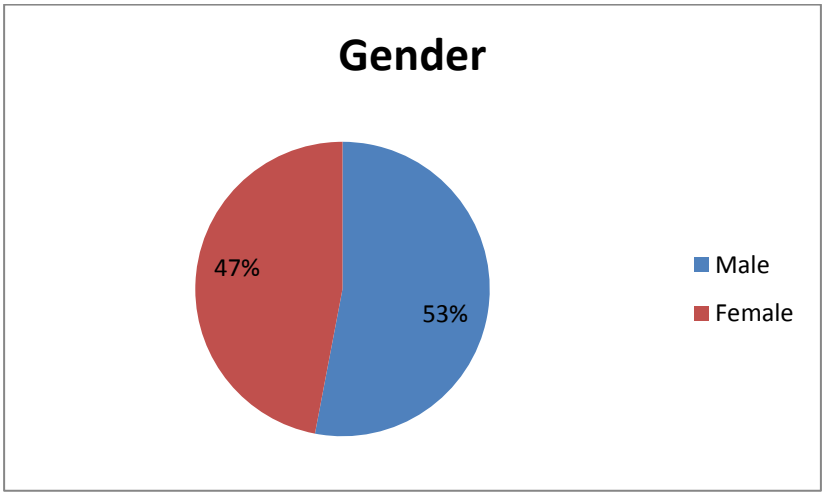


Figure 6 : Respondents' gender

Referring to figure 6, the respondents were largely dominated by 77 male (53%) and 68 female (47%). The majority age of Police Officers for the respondents is 31-35 years (62 respondent), followed by 36-40 years (61 respondent) and 41 years and above (22 respondent) and none of the respondents are in the age between 21 to 30 years old.

4.3 Demographic Characteristics of Respondent Gender

Gender	Numbers	Percentage
Female	68	47
Male	77	53
Total Number	**145**	**100**

Table 2: Distribution of respondent according to gender

4.4 Age

From the figure below, the majority age of Police Officers are 31-35 years (62 respondents), followed by 36-40 years (61 respondents) and 41 years and above (22 respondents) and there is no Police Officer between the age of 21 to 30 years old.

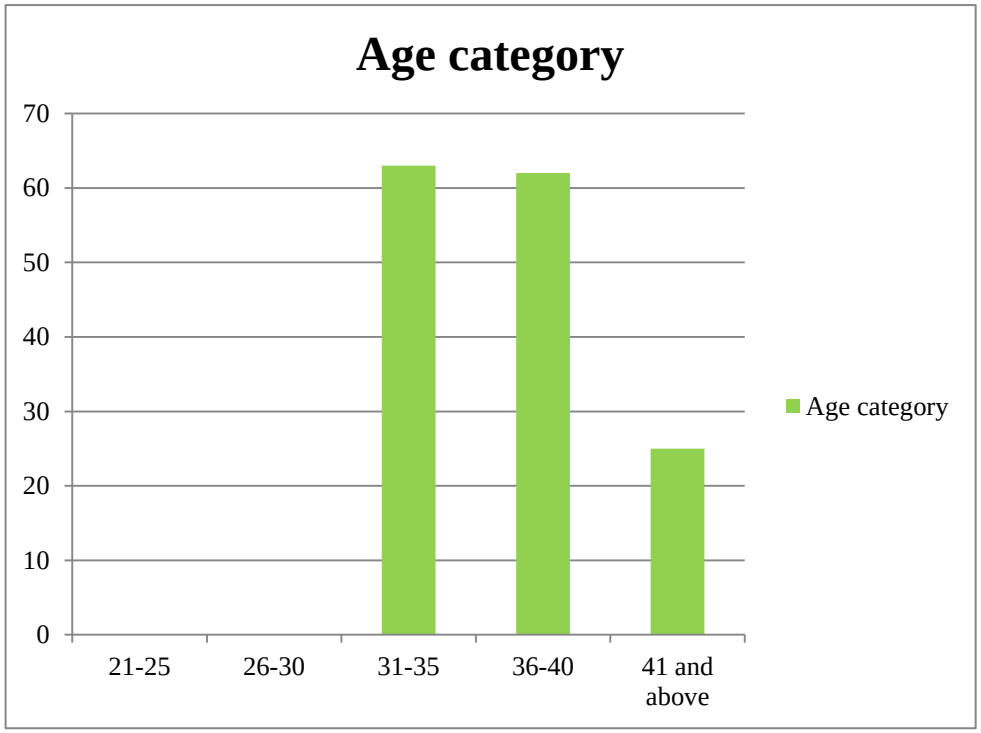


Figure 7 : Respondents' Age Category

4.5 Pearson Correlation

Pearson Correlation was used to test hypotheses 1 to 6. The analysis was done to determine whether furniture, noise, temperature, lighting and spatial arrangements have any relationship with productivity. The output is shown in table 3.

Table 3 : Correlations Between Furniture, Noise, Temperature, Lighting and Spatial Arrangement

		FURNITURE	TS_DESIGN	NOISE	TEMPERATURE	LIGHTING	SPATIAL ARRANGEMENT	PRODUCTIVITY
FURNITURE	Pearson Correlation	1	.691**	.346**	-.057	-.417**	.067	.582**
	Sig. (2-tailed)		.000	.000	.488	.000	.418	.000
	N	150	150	150	150	150	150	150
TS_DESIGN	Pearson Correlation	.691**	1	.511**	.106	-.155	.441**	.514**
	Sig. (2-tailed)	.000		.000	.198	.058	.000	.000
	N	150	150	150	150	150	150	150
NOISE	Pearson Correlation	.346**	.511**	1	-.507**	.089	-.114	.740**
	Sig. (2-tailed)	.000	.000		.000	.278	.164	.000
	N	150	150	150	150	150	150	150
TEMPERATURE	Pearson Correlation	-.057	.106	-.507**	1	-.370**	.043	-.256**
	Sig. (2-tailed)	.488	.198	.000		.000	.604	.002
	N	150	150	150	150	150	150	150
LIGHTING	Pearson Correlation	-.417**	-.155	.089	-.370**	1	-.259**	-.317**
	Sig. (2-tailed)	.000	.058	.278	.000		.001	.000
	N	150	150	150	150	150	150	150
SPATIAL_ARRANGEMENT	Pearson Correlation	.067	.441**	-.114	.043	-.259**	1	-.057
	Sig. (2-tailed)	.418	.000	.164	.604	.001		.486
	N	150	150	150	150	150	150	150
PRODUCTIVITY	Pearson Correlation	.582**	.514**	.740**	-.256**	-.317**	-.057	1
	Sig. (2-tailed)	.000	.000	.000	.002	.000	.486	
	N	150	150	150	150	150	150	150

Table 3 : Correlations Between Furniture, Noise, Temperature, Lighting and Spatial Arrangement

		FURNITURE	TS_DESIGN	NOISE	TEMPERATURE	LIGHTING	SPATIAL ARRANGEMENT	PRODUCTIVITY
FURNITURE	Pearson Correlation	1	.691**	.346**	-.057	-.417**	.067	.582**
	Sig. (2-tailed)		.000	.000	.488	.000	.418	.000
	N	150	150	150	150	150	150	150
TS_DESIGN	Pearson Correlation	.691**	1	.511**	.106	-.155	.441**	.514**
	Sig. (2-tailed)	.000		.000	.198	.058	.000	.000
	N	150	150	150	150	150	150	150
NOISE	Pearson Correlation	.346**	.511**	1	-.507**	.089	-.114	.740**
	Sig. (2-tailed)	.000	.000		.000	.278	.164	.000
	N	150	150	150	150	150	150	150
TEMPERATURE	Pearson Correlation	-.057	.106	-.507**	1	-.370**	.043	-.256**
	Sig. (2-tailed)	.488	.198	.000		.000	.604	.002
	N	150	150	150	150	150	150	150
LIGHTING	Pearson Correlation	-.417**	-.155	.089	-.370**	1	-.259**	-.317**
	Sig. (2-tailed)	.000	.058	.278	.000		.001	.000
	N	150	150	150	150	150	150	150
SPATIAL_ARRANGEMENT	Pearson Correlation	.067	.441**	-.114	.043	-.259**	1	-.057
	Sig. (2-tailed)	.418	.000	.164	.604	.001		.486
	N	150	150	150	150	150	150	150
PRODUCTIVITY	Pearson Correlation	.582**	.514**	.740**	-.256**	-.317**	-.057	1
	Sig. (2-tailed)	.000	.000	.000	.002	.000	.486	
	N	150	150	150	150	150	150	150

Corelation is significant at the 0.01 level (2-tailed).

(i) Hypothesis 1:

Ha 1: There is a significant relationship between furniture and productivity.

Table 4: Correlation between Furniture and Productivity.

		Productivity
Furniture	**Pearson Correlation**	**.582**
	Sig. (2 tailed)	**.000**

Correlation is significant at the 0.05 level (2 tailed)

The result of the analysis shows that there is a significant relationship between furniture and productivity. The correlation value of the variable of r=.582 means that a positive and moderate relationship exists between the two.

(ii) Hypothesis 2

Ha2: There is a significant relationship between noise and productivity.

Table 5: Correlation between Noise and Productivity

		Productivity
Noise	**Pearson Correlation**	**.740**
	Sig (2 tailed)	**.000**

Correlation is significant at the 0.05 level (2 tailed)

The above result shows that noise has significant and positive relationship with productivity. The relationship between the two is because the r-value = .740.

(iii) Hypothesis 3

Ha3: There is a significant relationship between temperature and productivity.

Table 6: Correlation between Temperature and Productivity

		Productivity
Temperature	**Pearson Correlation**	**- .256**
	Sig (2 tailed)	**.000**

Correlation is significant at the 0.05 level (2 tailed)

The above result shows that temperature has significant and positive relationship with productivity. The relationship between the two is because the r-value = - .256 low and negatively related.

(iv) Hypothesis 4

Ha4: There is a significant relationship between Lighting and productivity.

Table 7: Correlation between Lighting and Productivity

		Productivity
Lighting	**Pearson Correlation**	**.317**
	Sig (2 tailed)	**.002**

The above result of the analysis shows that there is a negative significant Correlation between lighting and productivity. The correlation value of r = .317 indicates that the two variables are negatively and low correlated.

(v) Hypothesis 5

Ha5: There is a significant relationship between Spatial Arrangement and productivity.

Table 8: Correlation between Spatial Arrangement and Productivity

		Productivity
Spatial Arrangement	**Pearson Correlation**	**- .057**
	Sig (2 tailed)	**.486**

The result shows that spatial arrangement is not significantly correlated with productivity is the p-value .486 › 0.05.

(v) Hypothesis 6

Ha5: There is a significant relationship between Office Design and productivity.

Table 9: Correlation between Office Design and Productivity

		Productivity
Office Design	**Pearson Correlation**	**.514**
	Sig (2 tailed)	**.000**

The result of the analysis shows that there is a significant relationship between furniture and productivity. The correlation value of the variable of r=.514 means that a positive and moderate relationship exists between the two.

Table 10: Correlation between Furniture, Noise, Temperature, Lighting and Spatial Arrangement

Office Design		Productivity
Furniture	**Pearson Correlation**	**.582**
	Sig (2 tailed)	**.000**
Noise	**Pearson Correlation**	**.740**
	Sig (2 tailed)	**.000**
Temperature	**Pearson Correlation**	**- .256**
	Sig (2 tailed)	**.002**
Lighting	**Pearson Correlation**	**- .317**
	Sig (2 tailed)	**.000**
Spatial Arrangement	**Pearson Correlation**	**- .057**
	Sig (2 tailed)	**.486**

From the table 9 there were positive correlation between productivity and furniture (r=.582) followed by noise (r=.740), a weak negative correlation between temperature (r= -.256), lighting (r= -.317). There was no correlation between productivity and spatial arrangement (r= -.057).

In this respect, the situation could be described as good furniture such as tables and chair provided to the police will enhance their productivity. While in respect to the element of noise will also affect their productivity. Temperature and lighting never the less have a negative effect on the productivity of Police Officer working at the Logistic Department at Bukit Aman. Both temperature and lighting will not necessarily affect their productivity. Finally, spatial arrangement has no significant relationship with office design.

4.6 Summary of Chapter 4

This chapter has presented the research finding based on the SPSS output. Out of the six hypotheses tested, three are positively significant related, and two negatively related while that is spatial arrangement is not significantly related. Nevertheless office design and productivity is positively and moderately correlated.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Conclusion

"The purpose of the conclusion is to create an overview of the highlights from the analysis in order to emphasize the most important aspects found in the process..." Amerlov & Bengtsson, (2007). The purpose of this chapter will be to conclude all the information already presented and analysed in the previous chapters. It will further provide recommendations and highlight gaps that are still evident within this research area.

As a conclusion, from the overall parameters of office design, it can be said that there is a significant relationship between office design and productivity. It means that the office design will greatly affects the productivity of the employees.

If the office designs are specifically divided into 5 different parameters, it was found that two parameters (furniture, noise) positively affect productivity, two parameter (temperature and lighting) negatively affects productivity and the other one parameter (spatial arrangement) does not have significant relationship with productivity.

By comparing five age categories, it was found that there is a significant difference on the productivity between 31-35 years old respondent and 41 and above while the other categories do not differ significantly.

Moreover, it was concluded that there is no significant difference between office design and productivity with respect to gender.

Analysis of the collected data revealed that office design has a substantial impact on the employees' productivity. The overall impact of different elements showed that lighting affects the productivity of most employees. The overall mean of all the factors show that female employees are more concerned about their workplace surroundings, whereas, their male counterparts are less concerned with it. The overall response, according to gender, showed differences amongst the responses for different elements in the workplace. Male respondents' results show that they are more concerned about the lighting in their offices, followed by the spatial arrangement. There is a direct relationship between office design and productivity. The Relationship between Office design and Productivity was determined by using the Pearson's Correlation in SPSS.

From the correlations, the results indicate that there is a significant relationship between furniture and productivity of the respondents at 0.582 ($p<0.01$). The furniture factor is also significant among the other two factor which are noise and lighting. For noise factor, the result shows that there is a significance difference between noise and productivity at 0.740 ($p<0.01$).This factor differs significantly with furniture and temperature. The results also revealed that there is a significant relationship between temperatures and productivity at -0.256 ($p<0.01$). it is also significantly difference between noise factor and lighting.

Other than that, for lighting factor, it is revealed that there is a significant relationship between lighting with respect to productivity at –o.317 ($p<0.01$). However, the results obtained shows that there is no significant relationship between spatial arrangement with respect to productivity at -0.0.57 ($p<0.02$).

Worker productivity and comfort increase with good lighting and the ability to control the visual environment. Productivity can be increased by giving building occupants control over their visual environment. Increases in productivity can easily pay for a total light control system in seven months or less.

The finding shows that a quality lighting programme will boost productivity and performance reduce fatigue and eyestrain (assurance of good health for worker), thereby increasing organizational productivity. A better lighting at the workplace will help prevent accidents, help workers improve eye-hand coordination and thereby improve productivity and lower rejection/defective rates. The company also realizes intangible benefits that are associated with better employee morale, reduction in accident rates because workers can see what they are doing better.

This is in line with the finding of Hameed and Amjeed (2009) that accomplishing daily task with dim light by employees causes eyestrain, headaches and irritability. Due to these discomforts employees performance are greatly reduced. Absence of noise increased workers productivity due to less distractions and reduction in job-related stress. Similarly, good ventilation and room temperature increased productivity and reduces stress in workers. Moloney (2012) confirmed this when it was established that controllability of system for thermal comfort and lighting improved productivity of workers. Though workers are dissatisfied with "open plan" office because of distractions that prevent workers from concentrating on their tasks.

Poor and unsafe workplace environment, result in significant losses for workers, their families, and national economy. A conducive workplace environment that aid the performance of work automatically improves productivity improved or adequate lighting improves productivity, fewer rejects, enhanced safety, lower insurance premiums, better

morale and increased customer satisfaction. A good workplace communication will involve employees in the development and implementation of healthy workplace practices, virile employees, enthusiastic employers and sustenance of the organization. These includes poorly designed workstations, unsuitable furniture, lack of ventilation, inappropriate lighting, excessive noise, insufficient safety measures in fire emergencies and lack of personal protective equipment.

People working in such environment are prone to occupational disease and it impacts on employee's performance. Thus productivity is decreased due to the workplace environment. It is the quality of the employee's workplace environment that most impacts on their level of motivation and subsequent performance. How well they engage with the organization, especially with their immediate environment, influences to a great extent their error rate, level of innovation and collaboration with other employees, absenteeism and ultimately, how long they stay in the job.

Analysis of the collected data revealed that the interior design of the workplace had a substantial influence on the employees' performance. The overall impact of different elements showed that furniture affects the productivity of most employees; therefore, it is recommended that we have to consider ergonomic furniture while buying office furniture. The data also revealed that the majority of respondents lent weight to the presence of plants and owners.

The overall mean of all the factors showed that female employees are more concerned about their workplace interior design. Also male respondents' results showed that they were more affected by the temperature; however, female more affected by privacy. The response, according to age showed differences, the baby boom employees are more satisfied with their workplace environment; however, generation.

Majority of respondents believe that good workplace interior design can make a difference in their performance, and consequently have a positive impact on the corporations' productivity. So office design professionals must expand their knowledge beyond real estate issues (efficiency) to understand what makes people perform and happy at work (Effectiveness and desirability). Results showed that not all physical factors affected participant's productivity. Office furniture, noise, lighting, temperature and spatial arrangement had no effect on participant's productivity.

It was found that participants spend on average 40 hours of the week at work. When worked out over months and then years, the amount of time employees spend within their work environment becomes considerable. Therefore it becomes important to study the effects that office environments have on employees. It is researcher hope that this research paper has provided new information about work environments but also raised more questions and provided new areas for further research.

Workspace quality affects the attitude of employees and increases their productivity. Employees in different organizations have different office designs. Every office has unique furniture and spatial arrangements, lighting and heating arrangements and different levels of noise. The purpose of this study is to analyze the impact of the office design factors on employees' productivity. The study reveals that good office design has a positive effect on employees' productivity .This study finds out the effects of office design on employees' productivity.

5.1 Office Design and Productivity

The final outcome of the survey suggested that department can enhance their productivity by improving their workplace designs. To more fully understand the degree to which the "people make the place," this study examined the relationship between individual personality, work environment preferences, and performance and commitment in organizations.

The results suggest that a specific "place" variable--an employee's work environment preference for goal orientation, plays a predominant role in performance and commitment outcomes. The results suggest that agreeableness, extraversion, and conscientiousness may combine to form a preference for work environments that offer high levels of goal orientation.

Thus, the effect of personality on performance and commitment has a situational context; it does not occur in a vacuum. Challenging goals may communicate high levels of confidence in the abilities of employees and increase self-efficacy (and performance), and these positive feelings may also manifest themselves in enhanced employee commitment (Whittington et al., 2004).

If managers provide goal-oriented work environments to individuals with these desirable personality characteristics, they should reap the benefits of enhanced performance and commitment. The ability to attract, keep, and motivate high-performers is becoming increasingly important in today's competitive organizational environments.

The results of this study indicate that an over-reliance on employee selection processes may be misguided, and the development of goal-oriented work environments may be a more effective means of improving employee performance and commitment.

This may be particularly relevant in work environments where managers have very large spans of control which restrict them from frequent and direct contact with employees. Strickland and Galimba (2001) found that goals provide structure to ambiguous situations, reducing the effects of cognitive interference on task performance.

Work environments can provide social cues to organizational members on how to act appropriately, and employees tend to conform to such expectations to receive social approval from their peers (Salancik and Pfeffer, 1978; Schneider, 1975). Thus, if a work environment develops a strong goal orientation, employees are more likely to align their individual goal orientations with the norms of the work environment to maintain harmony with their surroundings (Neal et al., 2000). As climate scholars generally identify managers as the primary architects of group member climate perceptions (e.g., Naumann and Bennett, 2000), the results of our research indicate the potential importance of leaders in focusing on the development of goal-oriented work environments to achieve enhanced performance and commitment.

5.2 Recommendation

From the current study, it was found that there is a significant relationship between the overall parameters of office design with respect to productivity. Therefore, few recommendations are highlighted in order to improve the organization. Since the three parameters of office design which are furniture, noise affecting productivity while lighting and temperature were negatively affect productivity of the employees, therefore, it is recommended that the organization should improve the furniture in terms of its quality and the comfort ability.

This is because, the better the furniture quality, the higher the productivity while, improvement in lighting will not necessarily enhance the productivity of the employee. In terms of noise factor, for this particular group of respondent, it is found that quiet environment will improve the Police productive.

Therefore it is recommended that the organization could provide them some calming music or strengthen the bonding between the employees in the department to ensure there are good communications among them. As temperature is negatively affects the productivity, therefore, it is recommended that the organization should avoid hot condition or high temperature workplace as it can reduce ones productivity.

Lastly, since there is no significant difference between office design and productivity, therefore it is recommended that the organization can make improvements to ensure that the productivity of the Police of the Logistic Department in Bukit Aman can be enhance.

5.3 Future research

In summary, the primary contribution of this research was the examination of the unique variance contributed by personality and work environment preferences in determining employee performance.

The results of this study indicate that the relationship between personality, work environment, and employee outcomes is interrelated and in need of further examination.

The significance of employee goal-orientation preferences in fully mediating the relationship between personality and workplace outcomes provides further evidence to support the contention that the relationship between personality and performance may not be divaricates, and that intervening variables play a substantial role.

Future research should examine the dimensionality of both personality and outcomes in the workplace to understand the complexities of the relationship. Future research could examine the specific influence of leaders in the form of behavioral modeling and leader-member exchange on the personality--work environment performance relationship. As employers have a duty to make provision for emergencies that may affect the health and welfare of their employees it is essential to recognize the needs of all disabled employees, irrespective of the disability.

There should be a procedure in place to ensure managers are confident as to the action to take place in seeking such advice. Advice should only be sought on specific issues directly related to the person's employment. Decisions affecting the employee should only be based on medical advice as it applies to the specific work environment. As with physical disability, there will be occasions when specialist advice is needed to assist someone with a mental health problem.

Within the indoor environment, lighting and thermal environment have the biggest influence on employees' productivity. It would therefore make sense to develop, in the near future, a validated human model in which at least the thermal environment in combination with the lighting conditions can be evaluated in terms of comfort and loss of productivity.

Further in this area could possibly look at the addition of natural lighting and its effects on workers, perhaps in conjunction with the new correlated colour temperature lighting. One can conclude that not only the lack of lighting but also the type of lighting used in an organisation has an effect on employees. Perhaps future could include affects of natural lighting on productivity.

Organisations could also look at ways to incorporate natural lighting elements into the design process. This would bring in more natural light and perhaps save on energy costs and other beneficial effects of lighting such as having positive effect on depressive symptoms.

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QUESTIONNAIRES

Questionnaire for Research study on

"Impact of Office Design on Work Environment"

INSTRUCTIONS:

Please READ each question carefully.

A. Demographic Information

A1. Age : 1. 21 - 25

2. 26 - 30

3. 31 - 35

4. 36 - 40

5. 41 and above

A2. Gender : 1. Male 2. Female

A3. How long have you worked at this department (Logistics)?

1. **Less than 6 months**
2. **6 months - 2 year**
3. **3 year - 5 year**
4. **6 year - 8 year**
5. **9 year and above**

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	2	3	4	5

Please indicate your answer below that you think is related to Impact of Office Design on Work Environment.

B. Furniture

B1	My furniture is flexible to adjust, rearrange or reorganize my workspace.	1	2	3	4	5
B2	My furniture is comfortable enough so that I can work without getting tired till 5pm.	1	2	3	4	5
B3	The physical conditions at work influence my productivity.	1	2	3	4	5
B4	Adequate and comfortable furniture will affect my productivity positively.	1	2	3	4	5

C. Noise

C1	My work environment is quiet.	1	2	3	4	5
C2	I am able to have quiet and undisturbed time alone.	1	2	3	4	5
C3	My workspace has many noise distractions.	1	2	3	4	5
C4	Noise free environment will increase my productivity.	1	2	3	4	5

D. Temperature

D1	To what extent your room temperature affects your normal level of productivity.	1	2	3	4	5
D2	The overall temperature of my workspace in hot weather.	1	2	3	4	5
D3	The overall temperature of my workspace in cold weather.	1	2	3	4	5
D4	I am able to control temperature or airflow in my office.	1	2	3	4	5

E. Lighting

E1	**My workspace is provided with efficient lighting so that I can work easily without strain on my eyes.**	**1**	**2**	**3**	**4**	**5**
E2	**Do you have control over the lighting on your desk (i-e adjustable desk light on desk)?**	**1**	**2**	**3**	**4**	**5**
E3	**Ample amount of natural light comes into my office.**	**1**	**2**	**3**	**4**	**5**
E4	**Number of windows in my work area complete my fresh air and light need.**	**1**	**2**	**3**	**4**	**5**

F. Spatial Arrangement

F1	**My office/branch is open enough to see my colleagues working.**	**1**	**2**	**3**	**4**	**5**
F2	**My work area is sufficiently equipped for my typical needs (normal storage, movements, etc).**	**1**	**2**	**3**	**4**	**5**
F3	**I am satisfied with the amount of space for storage and displaying important materials.**	**1**	**2**	**3**	**4**	**5**
F4	**My workspace serves multipurpose functions for Informal and instant meetings.**	**1**	**2**	**3**	**4**	**5**

G. Productivity

G1	**Favorable environmental conditions (less noise, suitable temperature etc) in the office building will increase my productivity at work.**	**1**	**2**	**3**	**4**	**5**
G2	**Unfavorable environmental conditions (noise distractions, unsuitable temperature etc) in the office building will decrease my productivity at work.**	**1**	**2**	**3**	**4**	**5**
G3	**Due to overall office environment I can complete my daily tasks easily?**	**1**	**2**	**3**	**4**	**5**
G4	**Do you agree the overall productivity would increase if the related office environment problems solved.**	**1**	**2**	**3**	**4**	**5**