

## Synthesis of Ergonomics and Efficiency in Office Buildings in Nigeria

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### ABSTRACT

“Comfort is basic for optimal performance” the psychology of spatial configuration in relation to the work environment. The need to provide not just a safe but also comfortable and descriptive working environment has been a major design criterion, thus, furniture and users requires thorough scrutiny in order to achieve the desired level of optimum productivity. Ergonomics is the study of human potential and psychology in relation to the users’ working environment and equipment. Efficiency and quality delivery largely depends on everyday face-to-face interaction patterns in offices. These interaction patterns may depend on how employees move through the office space. The basis is that communication between co-workers is of vital importance for the progress and prosperity of the organization. The spatial configuration defines the *playground* for this important interaction. This potential grows or diminishes depending on the location of different generators as common functions of different kind. Office buildings and designs should evolve beyond rows of offices into a design to produce behavioural expectations in employees, hence enhance productivity. Saki, a border town in the Northern part of Oyo State which is also the first hit of many potential problems has no immigration office. The Immigration Office is a one stop shop immigration and visa solutions for residents living and working in a country. This paper explores the spatial relation in Immigration offices and its influence on interaction patterns with the view of enhancing the efficiency and productivity. Case studies were carried out on both existing local and international immigration offices to evaluate the spatial conditions of immigration offices in the country and beyond. Interviews were also granted especially in the local immigration service offices. This paper will also seek to recognize the spaces required in a standard immigration office, area of emphasis, and general failure to avoid. Various knowledge and deductions from case studies have been examined; analysed and mitigating measures suggested. Adequate recommendations in the area of behavioural architectural design were given to help the quality of employee performance.

**Keywords:** Ergonomics, Environment, Psychology, Interaction, spatial configuration, Productivity.

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### 1. INTRODUCTION

The relationship between people and the building in which they work is vital. The majority of businesses are missing a trick in ignoring the enormous opportunity this relationship presents. Ergonomics is therefore the study of human potential and psychology in relation to the worker's working environment and equipment. Ergonomics is a science focused on the study of human fit and decreased fatigue and discomfort through



product design. Ergonomic can be an integral part of design, manufacturing and use. Knowing how the study of anthropometry, posture, repetitive motion and workspace design affects the user is critical to a better understanding of ergonomics as they relate to end-user needs. (Openshaw & Taylor, 2006). A great deal has changed in office design over the past few decades as office organizations have attempted to become more customer responsive, efficient, and agile. Many office organizations are dividing into smaller, more mobile, less hierarchical units that are more autonomous in their decision making. More office work is now done simultaneously rather than sequentially. More office work is being seen as 'knowledge work', and the asset value of employees as 'intellectual capital' is more commonly recognized. Team contributions are more noticed and rewarded. Office organizations are continually seeking improvements through innovative processes and a much wider range of workers is expected to take part in these processes. (Rashid, Kampschroer, Wineman, & Zimring, 2006).

These changes mean that the patterns of communication that once served the office organization have become less predictable. On one hand, the relatively limited and hierarchical ways of communicating about work have evolved into communication patterns in which workers need to talk to a variety of people in different functional roles. At the same time, informal communication is increasingly recognized as a way to create and reinforce organizational culture (Rashid, Kampschroer, Wineman, & Zimring, 2006) Rather than being a distraction, informal communication is seen as a way to build commitment, spread ideas about how 'we do things around here', and as a way to share knowledge and skills that go beyond written job requirements. The spatial configuration is clearly significant for how office workers move and which potential is created for interaction. The placing of common functions in the spatial system can strengthen or weaken this influence. Furthermore, the density of work places affects the total extent of the interaction. If it were possible to separate the time for thought processes from the time for interaction, it would be possible to allocate particular rooms for thought processes without paying attention to the spatial context. As it appears that thought processes and interaction will to a great extent be integrated activities, the positioning of the workstation in the spatial system is of great importance for potential interaction and development of knowledge (Openshaw & Taylor, 2006).

Salaries and benefits typically account for 90% of an organisation's operating costs, far greater than energy (1%) and even rent (9%). The productivity of staff, or anything that affects their ability to be productive, should be a major concern for any employer, and therefore the building in which they operate, should be a key interest. For architects and designers, the idea that buildings influence the health, wellbeing and productivity of their occupants is not new. But this type of thinking is still not influencing most design, financing and leasing decisions (Alker, 2014).

The Nigeria immigration office is a building housing the Nigerian Immigration Service (NIS) which is a Federal Agency charged with the primary responsibility of supervising Nigeria's Immigration System. Nigeria's Immigration System involves the influx of people into and out of Nigeria and by virtue of this, the NIS executes a number of significant roles and partners with other law enforcement authorities such as the custom service, Nigeria army and Nigerian Police. NIS is saddled with a number of responsibility, some of which includes but not limited to: provision of residence permits to foreigners; issuance of visas; provision of travel documents; control of immigrants and emigrants; inspection of Nigerian borders; arrest and deportation of illegal or prohibited immigrants; investigation of aircrafts, vehicles and boats; distribution of e-passport; among others. Some of the types of Visas issued by NIS include: Transit Visa, Tourist Visa, Business Visa, Temporary Work Permit (TWP), Subject to Regularization (STR), Diplomatic Visa, and Visa on Arrival (VoA). (The Nigeria Immigration Services, 2006)



## 2. Immigration Office as an Office Type; *Historic and Cultural approach*

In exploring office architectural design and its impact on user activity, examples of the history of the workplace from ancient Egyptian, Greek and Roman palaces and administrative centres until the office of present time are presented. Office architecture has undergone many interconnected phases and have withstood both discontinuities and inconsistencies. Influences from the past can be found in contemporary office design. Prevailing political and social conditions as well as the development of technology may explain changes in the form and use of space. Human movement has been taken into consideration during most of the office layout design stages, mostly to the extent of minimizing physical activity to the benefit of productivity. Concepts for workplace design are still changing and the office space is becoming a layout set to induce interaction and face-to-face knowledge and information exchange. (Springer, 2017).

An office is generally a room or other area where an organization's employees perform administrative work in order to support and realize objects and goals of the organization. The word "office" may also denote a position within an organization with specific duties attached to it; the latter is in fact an earlier usage, office as place originally referring to the location of one's duty. When used as an adjective, the term "office" may refer to business-related tasks. In law, a company or organization has offices in any place where it has an official presence, even if that presence consists of (for example) a storage silo rather than an establishment with desk-and-chair. An office is also an architectural and design phenomenon: ranging from a small office such as a bench in the corner of a small business of extremely small size, through entire floors of buildings, up to and including massive buildings dedicated entirely to one company. In modern terms an office is usually the location where white-collar workers carry out their functions. As per James Stephenson, "Office is that part of business enterprise which is devoted to the direction and co-ordination of its various activities." (Moran, 2007).

The main purpose of an office environment is to support its occupants in performing their jobs. Work spaces in an office are typically used for conventional office activities such as reading, writing and computer work. There are nine generic types of work space, each supporting different activities. In addition to individual cubicles, one can find meeting rooms, lounges, and spaces for support activities, such as photocopying and filing. Some offices also have a kitchen area where workers can make their lunches. There are many [quantify] different ways of arranging the space in an office and whilst these vary according to function, managerial fashions and the culture of specific companies can be even more important. While offices can be built in almost any location and in almost any building, some modern requirements for offices make this more difficult, such as requirements for light, networking, and security. The major purpose of an office building is to provide a workplace and working environment - primarily for administrative and managerial workers. These workers usually occupy set areas within the office building, and usually are provided with desks, PCs and other equipment they may need within these areas. (Ghillyer, 2012).

The structure and shape of the office is impacted by both managements thought as well as construction materials and may or may not have walls or barriers. The word stems from the Latin officium, and its equivalents in various, mainly romance, languages. An officium was not necessarily a place, but rather an often mobile 'bureau' in the sense of a human staff or even the abstract notion of a formal position, such as a magistrature. The relatively elaborate Roman bureaucracy would not be equalled for centuries in the West after the fall of Rome, even partially reverting to illiteracy, while the East preserved a more sophisticated administrative culture, both under Byzantium and under Islam (Long, 2004).



Offices in classical antiquity were often part of a palace complex or a large temple. There was usually a room where scrolls were kept and scribes did their work. Ancient texts mentioning the work of scribes allude to the existence of such "offices". These rooms are sometimes called "libraries" by some archaeologists and the general press because one often associates scrolls with literature. In fact, they were true offices since the scrolls were meant for record keeping and other management functions such as treaties and edicts, and not for writing or keeping poetry or other works of fiction (Ghillyer, 2012).

Over the years, the Nigerian Immigration Services (NIS) has witnessed series of changes since it was extracted from the Nigeria Police Force (NPF) in 1958. The Immigration Department, as it was known then, was entrusted with the core immigration duties under the headship of the Chief Federal Immigration Officer (CFIO) and the first to sit on that chair was in the person of Mr. E. H Harrison. The department in its emergent stages inherited the Immigration Ordinance of 1958 for its operation. At inception, the department had a narrow operational scope and maintained a low profile and simple approach in attaining the desired goals and objectives of government. During this period, only the Visa and Business Sections were set up. (The Nigeria Immigration Services, 2006).

However, on August 1st, 1963, Immigration Department came of age when it was formally established by an Act of Parliament, Cap 171, Laws of the Federation Nigeria. The head of the department became known as the Director of Immigration. Thus, the first set of Immigration officers were former NPF Officers. It became a department under the control and supervision of the Federal Ministry of Internal Affairs (FMIA) as a Civil Service outfit. Following some structural reforms and Government white paper on October 1st, 1992, the designation of "Director of Immigration" was changed to "Comptroller General of Immigration Service", thereby granting the Service a para-military status. Thus the last Director of Immigration became the first Comptroller General of Immigration (CGI) in the person of CGI Garba Abbas. (The Nigeria Immigration Services, 2006).

Subsequently, the Service has come a long way in its march towards reformation and restructuring to be better positioned for the implementation of modern migration management. This period saw changes in the organizational and operational structure of the Service and which were inevitable towards accommodating the added responsibilities as well as emerging regional and sub-regional political alignments. These included the introduction of the ECOWAS and African Affairs division, Aliens Control and Border Patrol Management and such other added responsibilities for the Service. (The Nigeria Immigration Services, 2006).

Furthermore, in 1988, the Service was saddled with the responsibility for the issuance of all Nigerian travel documents which included the Nigeria Passports. The Service embraced the use of ICT in its operations with the introduction of the Machine Readable Passport (MRP) in June 1998 and the Combined Expatriate Residence Permit and Aliens card (CERPAC) in 2001. Since then, it has continued to take giant strides in the use of ICT in its processes and operational procedures, notably the introduction of online payment for its facilities which opened the way for the e-revenue collections in Nigeria, thereby becoming the pioneer government agency to embrace e-payments. In attempt to improve on the MRP and in line with International Civil Aviation Organization (ICAO) standards, the NIS introduced the e-Passport on May 17th, 2007 under the leadership of the then CGI CJ Udeh OFR, thereby putting the Federal Republic of Nigeria on the pages of history as the first country in Africa to introduce the e-passport and among the first countries in the world to do so. The use of the e-passport has become a major tool in the fight against trans-border criminality as it contains the biometric details of holders thus making multiple acquisition and identity theft difficult. (The Nigeria Immigration Services, 2006)





In due recognition of Nigeria Immigration Service's stride as exemplified above, ICAO, the global body that regulates standards for travel documents admitted Nigeria into its Board as the sole African representative in 2009. As a result of this development, the e-passport machines have been installed in all the states of the federation and some Nigeria Missions abroad while, the NIS has been sending its personnel for passport intervention to all regions of the world in line with the Federal Government foreign policy of citizen diplomacy. This implies taking the mobile passport issuing equipment to acquire and process passport for Nigerians in the Diaspora. (The Nigeria Immigration Services, 2006).

Another significant achievement in the realm of ICT development is the establishment of a well-equipped forensic laboratory for the examination of travel and other documents. It is also to be noted that NIS personnel manning this laboratory are highly skilled as they have been exposed to a lot of trainings locally and internationally on document fraud detection and techniques. (The Nigeria Immigration Services, 2006). To further strengthen the legal framework for the NIS, the National Assembly passed the Immigration Act into law in May 25th, 2015. The Act thus repealed the hitherto obsolete 1963 Immigration Act and created an additional Directorate to be known as Migration Directorate for the Service. (The Nigeria Immigration Services, 2006).

From the inception of the NIS in 1963 till date, the Service has had three (3) Chief Federal Immigration Officers (CFIO), three (3) Directors of Immigration, Two (2) Acting Comptrollers General and Eight (8) substantive Comptrollers General with the current Comptroller General in the person of CGI Muhammad Babandede MFR. He is taking giant steps and breaking grounds with a view to upgrading and standardizing the operations of the Service while ensuring that prompt and efficient service delivery to its numerous public is not compromised. (The Nigeria Immigration Services, 2006).

### **3. WHY OFFICE DESIGN MATTERS**

#### **3.1 Establishes a Sense of Community**

Office renovations are the perfect time to take a step back and think about the company culture you want to emulate through office design. Employees who say they have a space that helps them connect with co-workers are 1.5 times more likely\* to be engaged throughout the day. Communal spaces are an easy way for employees to get together throughout the day — whether it's a central kitchen to gather for lunch, or couches for an afternoon brainstorm. Self-improvement spaces are also another way to increase a sense of community — think a wellness room for meditation or an in-office gym for convenient workouts. (Rom, 2017)

#### **3.2 Impacts Employee Productivity**

All employees work differently, so it's important for office design to reflect multiple work styles. While an open-office allows for employees to easily collaborate, quiet workspaces can be beneficial for those employees who value a little more silence. Employees who have privacy when they need it are 1.7 times more likely\* to take an active approach to their job. These can come via phone booths for quick calls or larger conference rooms for group meetings. (Rom, 2017)

#### **3.3 Affects Employee Health**

Typically, employees exposed to natural light and plants tend to be healthier, leading to a decreased number of sick days taken. 70 percent of employees\* have office spaces with comfortable temperatures, windows and good lighting. Ergonomic furniture solutions such as sit-to-stand and treadmill desks, exercise balls and adjustable chairs can foster a healthy and more comfortable office environment. (Rom, 2017)



### 3.4 Boosts Company Morale

According to Gallup's 2016 State of the American Workplace report, the benefits and perks that employees truly care about are those that offer them greater flexibility, autonomy and the ability to lead a better life. You want your employees to be excited to come into work, and what better way to do that than making the space they spend 40+ hours in a week, aesthetically pleasing? The more an employee is excited about showcasing his/her office to others, the better. (Rom, 2017).

Research on the relationship between office design and business productivity has generally started from design variables and then has sought to establish some organisational or business consequence. We have come to believe that one of the reasons for the relatively small amount of progress that has been made by such endeavours in this field is that this may well be the wrong starting point. An alternative perspective, tantalising but fugitive, has been expressed occasionally by business writers such as Tom Peters, who have looked at office design through the business end of the same telescope. They are far less curious about the consequences of design variables on business, and much more interested in the office design implications of business drivers and priorities. (Duffy, 2003).

No single perspective can provide a complete set of answers to such a wide range of inherently interdisciplinary questions. An integrated research approach is essential because research in this complex and changing field cannot be conventionally academic. The experience and judgement of all of the key constituencies involved are vitally important to the success of any research programme. As one illustration of this, the economic dimension of the results of design initiatives is obviously critical. Developers need to make investment decisions that are more likely to lead to greater profit and are less susceptible to risk; and corporate real estate managers need to demonstrate to senior management the contribution that workspace can make to stimulating and supporting business success. (Duffy, 2003).

## 4. ACHIEVING COMFORT IN OFFICE BUILDINGS

In the last 20 years, the modern office has gone through a number of evolutions. The early 2000s saw the death of cubicle farms and the rise of open floor plans, and 2015 brought waves of ping pong and foosball tables to offices everywhere. While office trends come and go, one thing that does not change is the impact that the office environment has on employee health and wellbeing. A quality workspace design leads to a less stressful and more productive atmosphere. It's essential that employers take the physical work environment of their employees into consideration. Employees need to feel comfortable and calm in their physical work settings to produce their best work. (Kohll, 2019).

### 4.1 Reposition the Stairwells

Taking stairs help burn excess calories which promotes heart health and also prevents chronic diseases such as diabetes and cardiovascular diseases which contribute to employee absenteeism and "presenteeism". Many offices, traditionally, have lifts positioned centrally, where it is easily accessible and used. However, to incorporate the culture of taking stairs among employees, the staircase could be moved into a central position and the lifts to a more obscure position, so it serves as the easiest route in moving between floors. There are other ways of incentivizing stair taking and these include the use of aesthetic components such as timber walls, beautiful sights of nature, artworks and designs, and calm music playing along the stairs to appeal to the emotions of employees and ultimately encourage the use of stairs. (Corporate Wellness Magazine, 2018).

## 4.2 Natural Light

Humans have a deep psychological response to light naturally, and workplace designs that allow ample inflow of natural light will typically find staff healthier and working at high energy levels. While not every office in a building can be located close to a window, smart window designs and large open spaces promote more penetration of sunlight into the office spaces. Studies have revealed that a good exposure to natural light and outdoor views of nature reduces stress and boosts employee mental well-being and productivity. (Corporate Wellness Magazine, 2018).

Neuroscientists say that workers who work in offices with windows receive 173% more exposure to natural light during office hours and enjoy an average extra of 46 minutes sleep every night. Poor lighting, in general, can cause eye strains, headaches, and increased stress levels which could hamper on employee performance. A design framework that could prevent lighting problems includes the use of circadian lighting which supplies light with the pattern of the normal natural light. Circadian lighting provides bright light during the day which peaks during mid-day and tapers as the day goes. Such pattern keeps employees active and awake at daytime when energy levels are expected to be up. This is essential, for example, for employees who might feel sleepy on resuming work in the morning. The circadian light also triggers the body's release of melatonin in the evening to allow workers rest while also improving sleep quality. (Corporate Wellness Magazine, 2018).

## 4.3 Air Quality

Availability of clean and fresh air promotes employee health. Office design should be made to promote employee adequate ventilation and access to fresh air and this, in no small measure, improves workplace productivity. Poor ventilation and elevated levels of carbon dioxide and air irritants impede on one's attention span and ability to focus. In a double-blind study by researchers at the Center for Health and Global Environment at the Harvard T. H. Chan School of Public Health, SUNY Upstate Medical University, and Syracuse University, it was found that poor quality of air in the workplace was associated with a decline in employee productivity. "People who work in well-ventilated offices with below-average levels of indoor pollutants and CO<sub>2</sub> have significantly higher cognitive functioning scores - in crucial areas such as responding to a crisis or developing strategy - than those who work in offices with typical levels," the study team noted. "We have been ignoring the 90 percent. We spend 90 percent of our time indoors, and 90 percent of the cost of a building are the occupants, yet indoor environmental quality and its impact on health and productivity are often an afterthought," said Joseph Allen, lead study author and director of the Healthy Buildings Program at the Harvard Centre for Health and the Global Environment (Corporate Wellness Magazine, 2018).

## 4.4 Collaboration Spaces

Employees will benefit from quiet office spaces which enable them to concentrate and get work done without distractions. However, the problem that comes with isolated office spaces is reduced movement and a tendency to always want to use the intercom to communicate with colleagues whose offices are a few meters away. Collaboration offices allow workers to move around and work as a team, preventing sedentary tendencies. Office design patterns should include breakout spaces, large office benches, and plush chairs to create collaboration spaces (Corporate Wellness Magazine, 2018).

## 4.5 Ergonomic Workstations

Use of supportive chairs, good desk layout, and standing desks are good ergonomic strategies to promote employee health at the work site. Workstations should be designed to allow for employee movements in order to perform their jobs optimally. Setting up a good computer workstation involves putting the neutral body position into consideration. The neutral body position is a comfortable posture in which the joints are properly and



naturally aligned. Working in the neutral body position prevents strains and stress which may result in neck and low back pain, which constitute one of the commonest causes of employees taking sick days off work (Corporate Wellness Magazine, 2018).

According to the report, the neutral body position consists of straight hands, wrists, and forearms while working, head facing forwards, balanced, and in-line with the torso, the back well supported with a good lumbar support while sitting, and the feet fully supported on the floor or footrest. In conclusion, office design has a huge impact on the physical and mental wellbeing of workers, and a beautiful but poorly designed worksite may have negative health effects on workers. Office design, therefore, should shift from being job-centred to being employee-centred. Designs should be made around the physical and mental wellbeing of employees, to keep them healthy enough to get the job done (Corporate Wellness Magazine, 2018).

There has been an increasing focus on employee productivity, which has led to a corresponding increase in employee stress. Miles (2000) notes that employee stress in the workplace manifests itself in poor physical and mental health and is associated with organizational symptoms such as low productivity, low job satisfaction, absenteeism, and high employee turn-over. 23% of today's workforce has actually been driven to tears as a result of workplace anxiety. One of eight workers (12%) has called in sick because of workplace stress, and one of five American workers (19%) has left a company in the past because of stress (Gilhooley, 2002).

At the end of the 19th century, workers were treated as if they were machines. The office model was a business that manufactured a product. Offices were planned for hundreds of unskilled clerks, each performing specialized and highly routine tasks. Their desks were aligned in a grid structure on open office floors and were seen as a model for efficiency and control (Asirvatham, 1999). Later on, the concept of office organization developed; filing systems were introduced, the presence of office machinery increased, and women entered the workforce. At this time, employers started to look for ways to humanize the workplace to increase employee satisfaction and morale, which in turn was viewed as important for increasing their productivity (Klein, 1982).

Creating an inviting workspace was one of the ideas behind the design of the Larkin Building in Ohio in 1906, designed by Frank Lloyd Wright. The building had amenities such as air conditioning, an employee library, a music lounge, and a fitness center. Today these amenities are widely recognized as mechanisms that reduce employee stress and increase both morale and productivity (Cole, 2001). However, at the time, they were quite revolutionary.

When Frank Lloyd Wright designed the S. C. Johnson & Son company building in Racine, Wisconsin, in 1936, he was thinking about the employees (Pelegri-Genel, 1996). Everything in the building was designed for the comfort of the user. For example, the desk had three different heights for ergonomic reasons. Only later did the mood and morale of employees become factors again, and the influence of these factors on productivity was noted. For example, in the 1960s it was discovered that well-designed lighting had the effect of putting employees into a good mood, which in turn increased their productivity (Pelegri-Genel, 1996).

The following factors will reveal the way in which the physical, technological, and logical systems work together to promote work process and increase employee productivity while decreasing their stress:





## 5. OPEN SPACE AND PRODUCTIVITY.

Nowadays, there is a blurring of the hierarchy in the organization, and people are working in amore collaborative environment. Evidence abounds that a more open environment can facilitate team members' contributions to productivity. Work spaces are designed to increase informal interaction, not just to save cost and space (Wah, 1998).

One of the ways to enhance an open environment and increase interaction between employees is by using the cubicle, which was introduced in the 1970s. However, one problem with using a cubicle is that employees may feel some level of stress due to lack of privacy (Bencivenga, 1998).Wallace (2001) indicated that the cubicle will not disappear and that employers, together with designers, are increasingly looking for ways to use the cubicle concept to increase productivity.

Open and flexible spaces are key concepts according to Asirvatham (1999). Asirvatham also adds that openness has at least two advantages: it allows management to oversee their employees, and it allows for encounters in public spaces.Managers who previously might have discouraged water cooler chats find themselves encouraging such casual interactions, because they recognize the built-in opportunities in such encounters for quick and easy problem-solving.At the same time, the need for occasional privacy can be accommodated in a variety of ways: separate telephone rooms, conference rooms, and glass walls that can be shaded if necessary (Asirvatham, 1999).

### 5.1 Teamwork.

The competitive pressures on today's business are tremendous, and employees can no longer just work together; they must think together (Monroe, 1999). Since teamwork has become a major component in today's work environment, creating a workspace that will support it is very important. Monroe (1999) emphasizes that a physical environment that fosters interaction, whether in formal conference areas or in casual "collisions" in corridors or break areas, is important for communication.

According to Hower (1995), an employee's comfort level corresponds to the amount of space that surrounds him or her.Excessively large spaces can often be disorienting and can make the employee feel vulnerable.It is therefore important to have a variety of spaces that take into account the individuals' work styles and personalities and offer possibilities for promoting individual and group interaction. Asirvatham (1999) and Umlauf-Garneau (2001) describe the future office as a place with few fixed wall systems, a great deal of furniture on wheels, more laptops, and a generously distributed array of electronics and telephone outlets.It is not just the open environment that is important, but also giving employees recreational areas to talk about projects and learn more from each other.This feature may enhance learning and support team concepts that enhance employees' productivity (Arend, 2000).

### 5.2 Lighting

According to Frank (2000), lighting is a critical element in creating a comfortable work environment.Depending on the situation, the lighting around individuals and groups can either help or hinder productivity. Frank adds that employees are more comfortable working in lower light levels.In instances where companies do lower lighting levels, experts recommend providing employees with individual task lighting with adjustable controls for greater comfort and flexibility. According to the Steelcase Workplace Index survey (released Dec. 1, 1999), 56% of the office workers responding said that poor lighting in the workplace caused them tired or watery eyes, while another 30% said it caused headaches.



Furthermore, improved lighting in the workplace could reduce eyestrain and headaches for 86% for those surveyed. According to the survey, improved lighting would increase efficiency and productivity for three out of four office workers. Hower (1995) emphasized that light influences the endocrine system, the cardiac rhythm, Seasonal Affective Disorder and the “body clock,” and regulates fatigue and stress. He determined that it is important to pay attention to the quantity as well as the quality of the illumination in the workplace:

- Lighting level: high levels of light enhance the employee’s attention. Lower levels of light can enhance memory and focus and are thus more suitable for tasks that require concentration and decision-making.
- Source of daylight: daylight from windows, atriums, or ceilings brings natural light indoors and provides improved comfort levels. Welch (1996) noted that sunlight-deprivation syndrome, caused by lack of adequate natural light, is becoming recognized as a form of depression among employees.
- Placement of lights: workers tend to perform best in well-lit areas. Yet it is important to have a balance of direct, task-oriented light, and indirect light. The key is providing light that appears natural and is consistent with the workspace.
- Surface reflection: interior colours and work surfaces should be chosen to minimize the incidence of reflective light from VDT screen glare and other surface reflections.

In addition, there are problems with indirect glare - VDT screen reflections and surface reflections can cause visual problems and increase the risk of stress and fatigue. Barton (1998) adds that in the modern working environment, electric lighting is essential, but that significant exposure to electrical lighting can be a cause for stress. Indirect, softer lighting sources avoid glare and create an environment of comfort in the workplace, which in turn can increase employees’ task performance (Luparello, 2004). Indirect, softer lighting sources create an environment of comfort in the workplace, which in turn can increase employees’ task performance (Luparello, 2004).

Knisley (2005) found that in today’s dynamic workplace, employees are shifting among a variety of tasks during a typical day. A high light level is needed for reading documents with small text, a medium light is more appropriate for meetings, and an even lower level is required for keyboard tasks on a computer. In addition, each employee’s personal light requirements may differ based on age, vision, or preference. Windows have also been found to play an important role in employee stress. There is a relationship between lack of windows in the workplace and employees’ feelings of job dissatisfaction, depression, and tension. A view of natural elements such as trees, vegetation, plants, and foliage was found to buffer the negative impact of job stress (Leather & Di Beals, 1998).

### 5.3 Colour

Colour plays an important role in employees’ emotional and physiological responses. Colour can be soothing, invigorating, jarring, or stress-inducing. Red, for example, has been shown to stimulate a sympathetic response. On the other hand, red has also been shown to increase stress when compared to blue, which is more relaxing and tends to reduce stress (Pelegriin-Genel, 1996). Rooms that are painted in cool hues tend to look large, and time is often underestimated in these rooms. People may also feel cooler. In today’s offices it is important to select colors based on the activity or activities that will take place in a given room (Hower, 1995).



#### 5.4 Noise and Acoustics

Cooper, Dewe, and O'Driscoll (2001) suggest that poor noise conditions can have a severe impact on a worker's physical health and psychological well-being. This statement confirms Hower's (1995) findings that high noise levels can cause irritation, increase stress, and reduce productivity, especially in an open space. Therefore, it is important to select interior finishes and furnishings that do not reflect sound waves. Another effective solution is to scatter sound waves by creating wall surfaces with niches and ceilings with irregularly recessed sections (Hower, 1995). Smith (2001) found that a worker who sits near enough to other co-workers to hear them typing may need few extra sick days. In addition, employees working in a noisy office have shown increased levels of adrenaline while working in the noisy office that might reduced their productivity.

#### 5.5 Aroma

According to Welch (1996), unpleasant odours increase the heart rate and that, in turn, might increase stress levels and result in a loss of productivity. One solution is to install a good HVAC system that exudes a lavender aroma, which has been shown to promote relaxation (Welch, 1996). Some Japanese companies are beginning to manipulate smells in the workplace, arguing that greater alertness is as much a function of olfactory factors as it is of visual ones. As an example, the Kajima Corporation in Tokyo has applied the ancient tenets of aromatherapy to the workplace. Studies that analysed how the brain coped with prolonged periods of concentration helped explain the process by which aromas can be used in the workplace. Termed the "curve of arousal," the first phase was marked by initial interest, followed by a period of clear concentration. After a while, brain activity tapered off into a phase of less productive thoughts (Welch, 1996). Companies can exploit these findings by pumping various fragrances through the air conditioning systems. Refreshing citrus aromas, for instance, are useful at the beginning of the concentration cycle, followed by another fragrance to aid concentration. Woody scents are then introduced to encourage a short period of mental relaxation, before the process starts again (Welch, 1996). Although it sounds very tempting to apply the aforementioned mechanism, it is important to note that this might be a problem due to employees' allergies and indoor air quality sustainable design guidelines.

#### 5.6 Additional Luxuries to Increase Productivity

In today's companies there are often additional facilities to increase employees' productivity: exercise rooms, video game rooms, recreational areas, meditation rooms, and libraries with armchairs. Break rooms are less utilitarian and instead feature a variety of colours and more comfortable furniture. In some facilities, employees have access to outdoor space and break areas as well (Umalauf-Garneau, 2001). The ability to control the workplace environment. Vangen (1999) points out that workplace stress is affected by a person's inability to control his/her office environment. Clinical research has shown that ordinary office activities, such as ringing telephones, voice levels, temperature, and so on, lead to a chemical reaction that increases stress. Therefore, greater attention to workplace design elements that provide the employees with a certain degree of control over their environment may help reduce the stress.

#### 5.7 Privacy

Allie (1996) found that lack of privacy can be a major cause of stress among employees. Not only do many tasks require a total absence of distraction, each individual has a different level of tolerance when it comes to privacy. Therefore, there should be a variety of design solutions to address the privacy issue. In summary, a well-designed office space establishes a kind of working environment that offers a host of benefits to your employees. If you skip out on designing your office space strategically, your employees are likely to fall behind in completing tasks on time. (Tanedo, 2018)



Tanedo (2018) goes on to highlight three basic factors to consider to improve productivity:

1. **Lighting and Ventilation:** Employees will be spending a huge chunk of their day inside the office, so an adequately lit and well-ventilated working area is a great motivator for them to go to work every day. A well-lit and well-ventilated work space are found to decrease the number of absences and increase satisfaction by 24%. In turn, productivity goes up by 16%. Truly, being comfortable while working decreases absences and boosts satisfaction, which, in turn, increases productivity.
2. **Furniture:** Comfort is crucial in the workplace, so providing ergonomic furniture is key to reducing injuries. This results in higher efficiency, employee satisfaction, and fewer absences. A workplace survey conducted by HOK reported that 82% of the respondents have experienced some physical pain at work mostly on their necks, backs, and shoulders due to sitting for extended periods of time. Indeed, most employees will be sitting for hours during their shift, so a comfortable chair can keep them healthier. There will be reduced aches and pains in parts of their body from sitting for extended periods.
3. **Visuals:** What the eyes can see can either have a positive or negative effect on a person's brain activity, so adding a bit of colour to your office can benefit your employees. The right combination reduces stress, boosts creativity, and raises morale. A study done by the University of Massachusetts found that adding colour to your office can help employees, as it reduces stress, increases creativity, enhances morale, broadens their appreciation of diversity, and encourages discussions and expressions of opinions. You can choose the colour theme for your office based on your industry's need. Specific hues improve certain brain functions that can help boost productivity at work. You can also mix in artistic pieces for added enthusiasm and inspiration. (Tanedo, 2018)

## 6. STUDIED CASES

### 6.1.0 Nigeria Immigration Service, Oyo State Command, Agodi-gate, Ibadan, Oyo State.

#### 6.1.1 Location

NIS, Oyo state command is located at Agodi, opposite Government house, Ibadan.

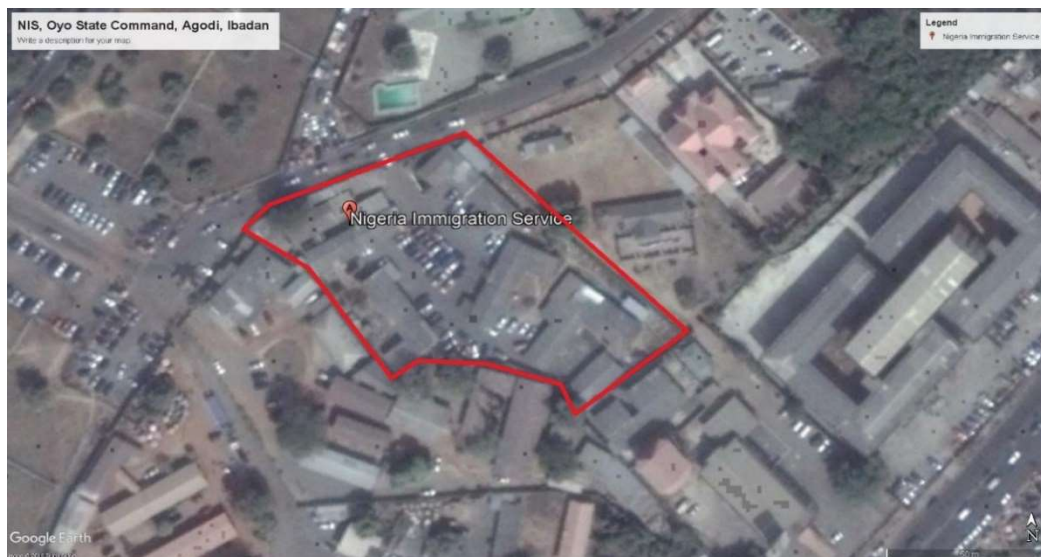


Plate 6.1: Showing Satellite Image for NIS Ibadan. e (Source: Google Maps, 2019)



### 6.1.2 Brief Description

The facility was formerly used by the Military before their movement to their permanent site at Odogbo, Ojoo, Ibadan. It is a major point of traffic in Ibadan as citizens' troop in from both far and wide of the city and other neighbouring towns to access the facilities provided by this command. The compound houses the gate house, the quarter guard, passport building, directorates (admin), chapel, mosque, servicom, waiting hall, migration department, visa & residency department, and human resource department.



Plate 6.2: Showing Entrance.(Source: Researchers field work, 2019)



Plate 6.3: Waiting Hall. (Source: Researchers field work, 2019)





**Plate 6.4: Servicom Building. (Source: Researchers field work, 2019)**

### 6.1.3 Appraisal

*Merits includes;* controlled environment, adequately planned for security, visual privacy, site nearness to the seat of power and hub of economic activity, good day-lighting and ventilation. While the demerits included; office plan morphology not 'open plan' thereby reducing efficiency, lack of flexibility, no provision for future expansion, restriction of one-on-one and group interaction, provision was not made for green area hence thermal discomfort.

## 6.2 Nigeria Immigration Service, Ondo State Command, Igbatoro Road, Akure, Ondo State.

### 6.2.1 Location

NIS, Ondo State Command (Headquarter) is located at Igbatoro Road, Akure.



**Plate 6.1: Showing Satellite Image of NIS Akure.(Source: Researchers field work, 2019)**



**Plate 6.2: Showing Passport Office (Source: Researchers field work, 2019)**

### 6.2.2 Brief Description

It is a purposed built facility but lacks proper planning. The compound houses the gate house, the quarter guard, passport building, directorates (admin), chapel, mosque, shopping complex. Power building, and servicom. There is football field for morning parades and training of officers located in the heart of the site. A lawn tennis court is also newly constructed for officers' relaxation and recreation.



**Plate 6.3: Showing Servicom Main Office. (Source: Researchers field work, 2019)**



Plate 6.4: Quarter Guard (Source: Researchers field work, 2019)



Plate 6.5: Showing Admin Office. (Source: Researchers field work, 2019)





### 6.2.3 Appraisal

*Merits* are generous availability of green area, well controlled environment, visual privacy and availability of recreation area for officers. The demerits on the other hand are; less efficient than open plan office, lack of flexibility, provisions not made for future expansion. Also, restriction of one-on-one and group interaction, inadequate car parking and poor day lighting in offices.

### 6.3.0 Nigeria Immigration Service, Headquarter, Shehu-Shagari Complex, Sauka, Abuja, FCT Nigeria.

#### 6.3.1 Location

NIS, National Headquarter is located at Shehu Shagari Complex, Airport Road, Sauka, Abuja, F.C.T. Nigeria.



Plate 6.6: NIS Headquarter Abuja Satellite Image. (Google Maps, 2019)

#### 6.3.2 Brief Description

It is a mega complex that houses all the eight directorates in the Nigeria Immigration Service and seats the comptroller general of Nigeria Immigration Services. There is a site opposite the complex that serves as the parking space for the complex. Though the national headquarter, it has no recreation area for officers and some other obvious facilities in other case studies.



Plate 6.7: Showing Abuja Complex  
(Source: Researchers field work, 2019)



**Plate 6.8: Showing waiting Corridor.**  
(Source: Researchers field work, 2019)



**Plate 6.9: Showing other views of the Complex.**  
(Source: Researchers field work, 2019)





### 6.3.3 Appraisal

*Merits includes* strategic siting of the building, symbolic theme of the building, entrance vignette is well defined, and well organized zoning system. However, the exterior part of the building is not properly landscaped, making obvious the insufficient car parking lots. Indefinite pedestrian access *and* poor day lighting on corridors are other shortcomings of the design

### 6.4.0 United States Citizenship and Immigration Service Office, Detroit, Michigan

#### 6.4.1 Location

US Citizenship and Immigration Office is located at 11411 E Jefferson Ave, Detroit, MI 48214, USA.



Plate 6.10: Showing the USCIS Detroit Michigan (Google Images)

#### 6.4.2 Brief Description

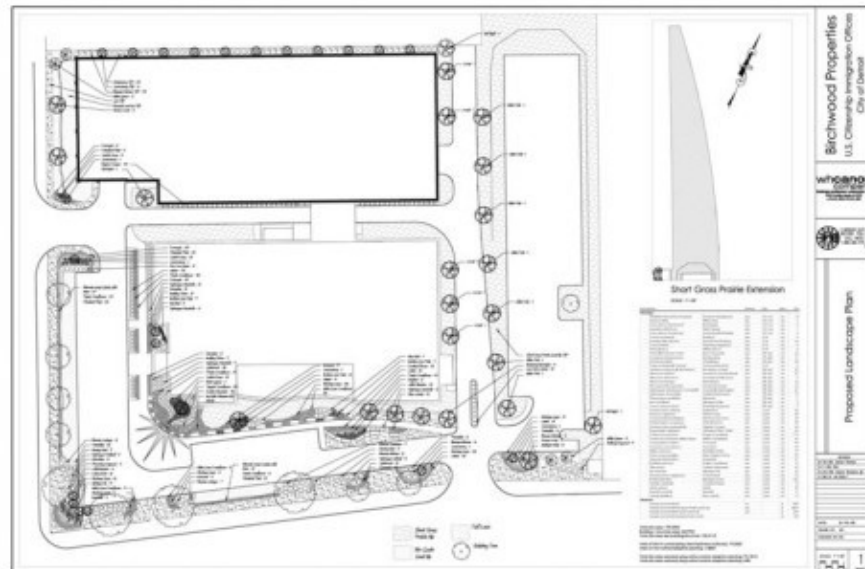


Plate 6.11: Showing the site plan of the USCIS Detroit Michigan (Google Images)



U.S. Citizenship and Immigration Services (USCIS) is the federal agency that oversees lawful immigration to the United States. We are a component of the Department of Homeland Security. This office serves the state of Michigan.



**Plate 6.12: Showing the right side view of the USCIS Detroit, Michigan  
(Source: Google Images)**

#### **6.4.3 Appraisal**

The building merits include sufficient parking space, good landscaping, good aesthetic consideration, and compliance with important universal building standards. A few shortcomings noticed includes the absence of relaxation area for staffs, and total reliance on active energy source for day-lighting and ventilation.

#### **6.5.0 CIC do Imigrante, Brazil**

##### **6.5.1 Location**

CIC Do Imigrante is located at Barra Funda, São Paulo - State of São Paulo, Brazil

##### **6.5.2 Brief Description**

The new Citizenship's Centre for Immigrants in Barra Funda, São Paulo, came up from of a partnership between São Paulo's State Department of Justice and Defense of Citizenship and the architecture school Escola da Cidade with the financial support of Inditex and the State Labour Prosecutor's Office.



Plate 6.17: Showing the approach view of the CIC du Imigrante.  
(Source: [www.archdaily.com](http://www.archdaily.com))

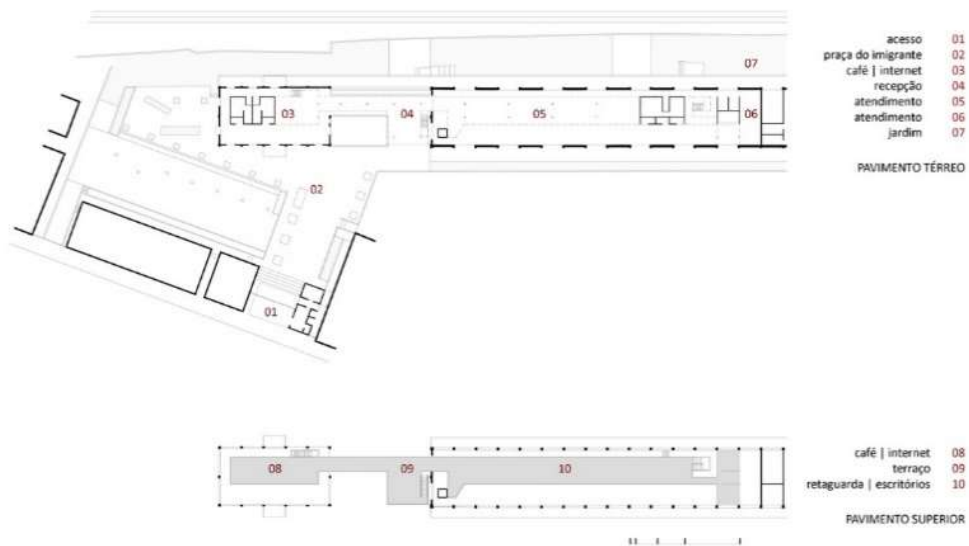


Plate 6.18: Showing the layout plan of the CIC du Imigrante





Plate 6.19: Showing the entrance of the CIC  
(Source: [www.archdaily.com/](http://www.archdaily.com/))



Plate 6.20: Showing the external landscaping of the CIC du Imigrante



The main idea was to provide a nice welcome place with a large reception square along the street, accessible by some steps or ramps. This open space is not only an arrival, but also the connection to the two occupied buildings and is able to define the using spaces of the complex, separating cars and pedestrians' zones. The square extends to the existing garden by boundaries of the railroad, and becomes a public space suitable for the frequent celebrations, assemblies and meetings of organized entities of immigrants.

### 6.5.3 Appraisal

*Merits* includes sufficient parking space, compliance with important disability standards, good wall and floor finishes, adequate day lighting and natural ventilation. However, the demerits are, Absence of relaxation area for staffs, little landscape, upper floor levels are not designed to be accessed by wheel chair users as there are no ramps and no lift

### 6.6 Graphical Comparative Analysis of Case Studies

Eight factors are considered required to achieve ergonomics in office building design. These factors will be used to compare and analyse the description of the five case studies. These factors include: daylight, furniture, noise and acoustics, colour, personalization, relaxation centres, fitness centre and landscape.

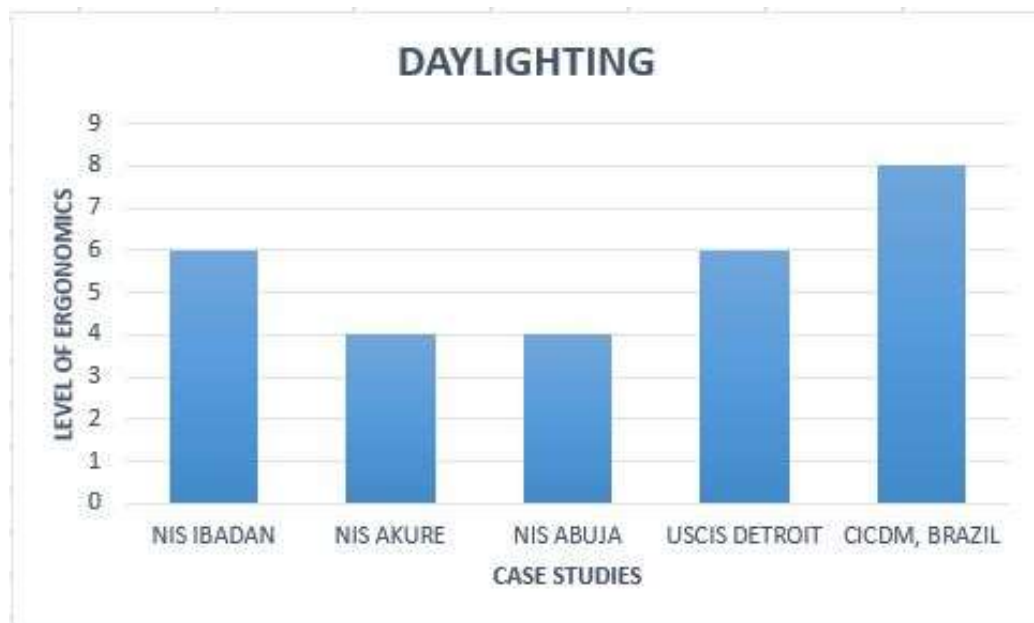


Figure 6.1: Bar Chart showing daylight comparison Between Case Studies



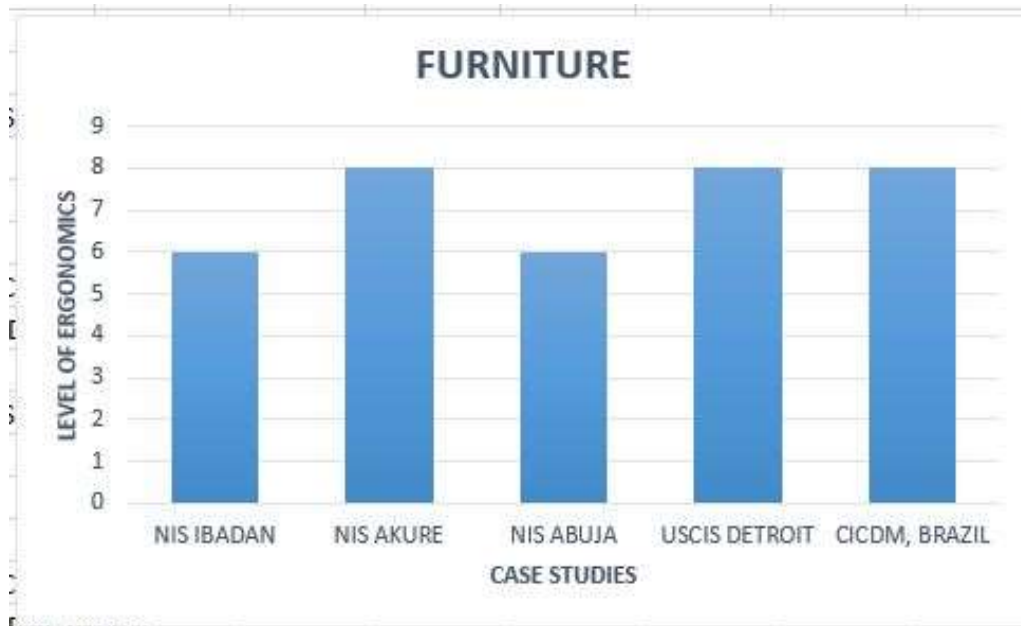


Figure 6.2: Bar Chart showing Furniture comparison Between Case Studies

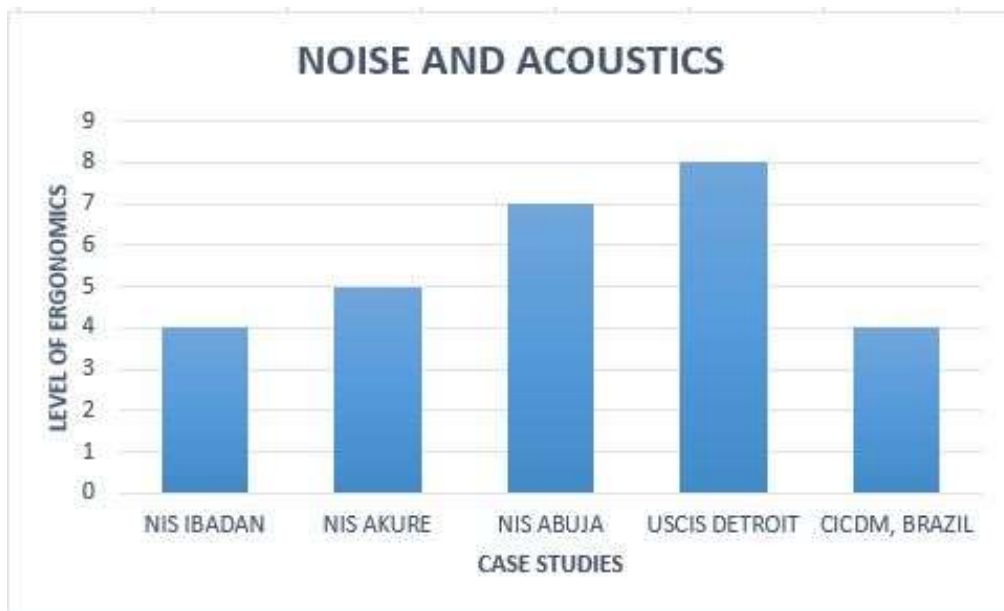


Figure 6.3: Bar Chart showing Noise and Accoustics comparison Between Case Studies

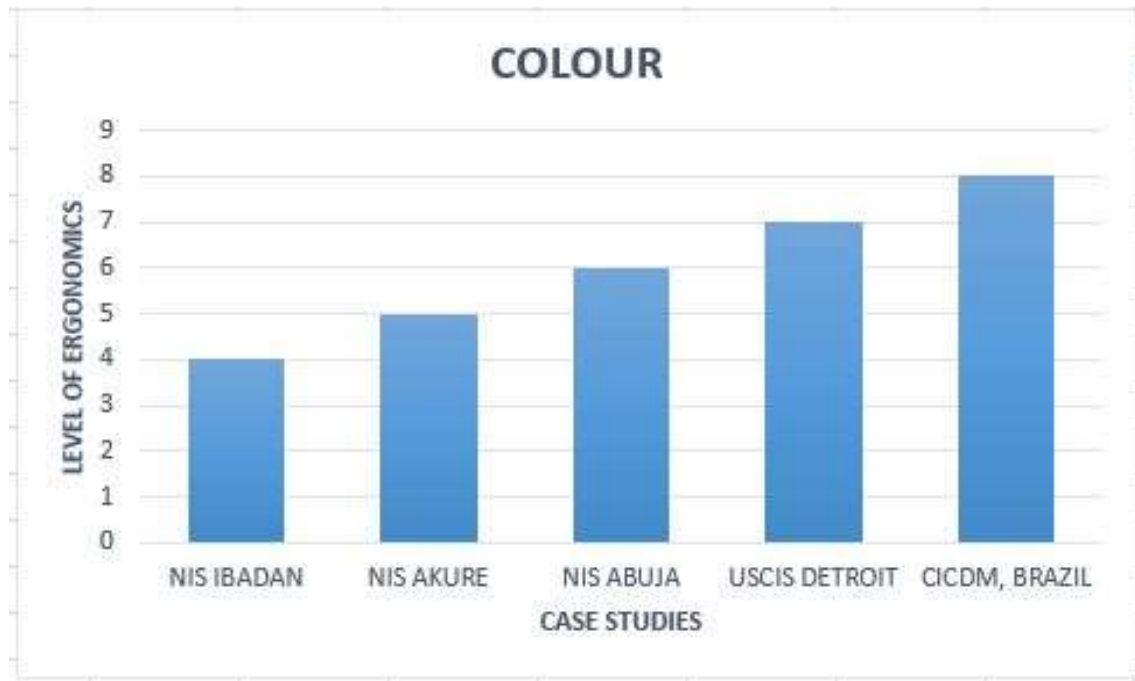


Figure 6.4: Bar Chart showing Light comparison Between Case Studies

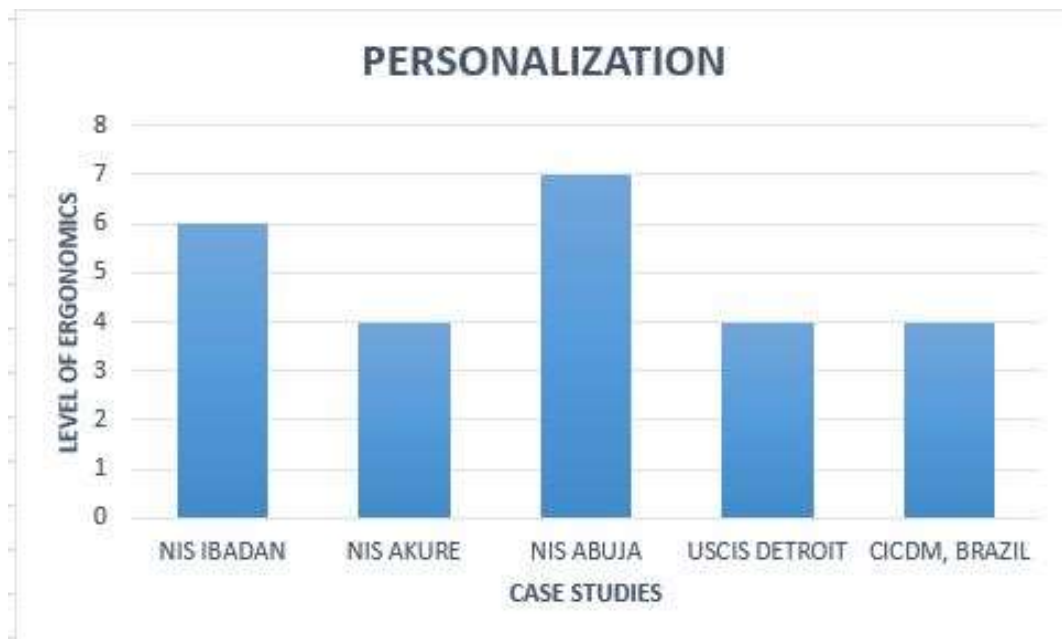


Figure 6.5: Bar Chart showing Personalization comparison between Case Studies

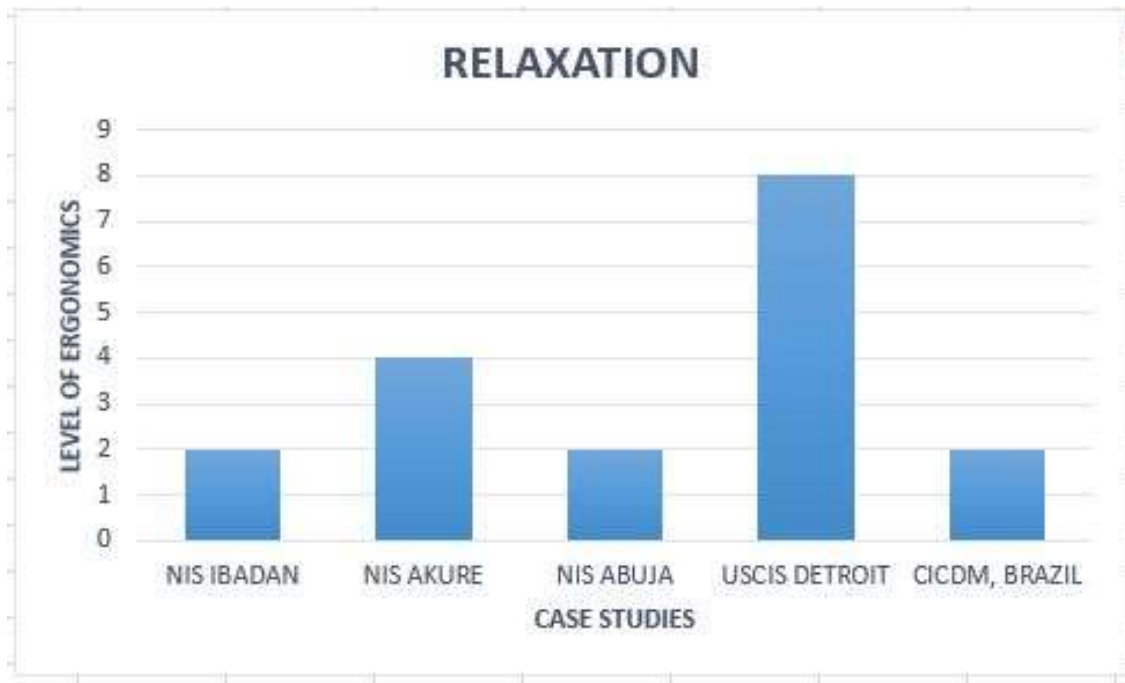


Figure 6.6: Bar Chart showing Relaxation Centre comparison Between Case Studies

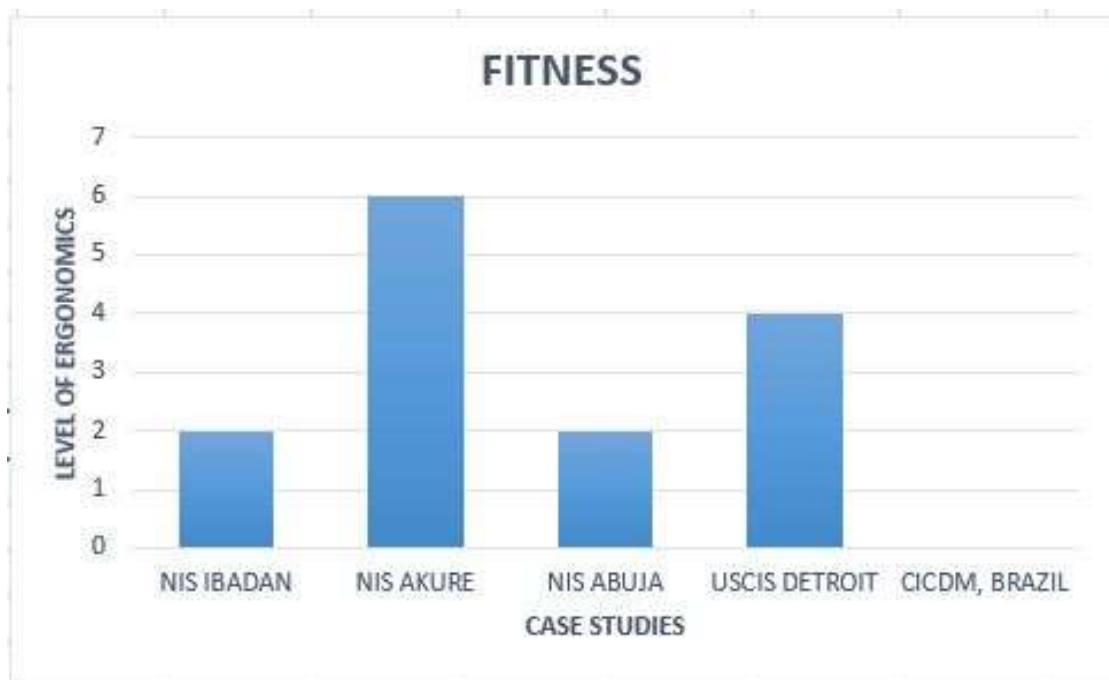


Figure 6.7: Bar Chart showing presence of Fitness Centre comparison Between Case Studies

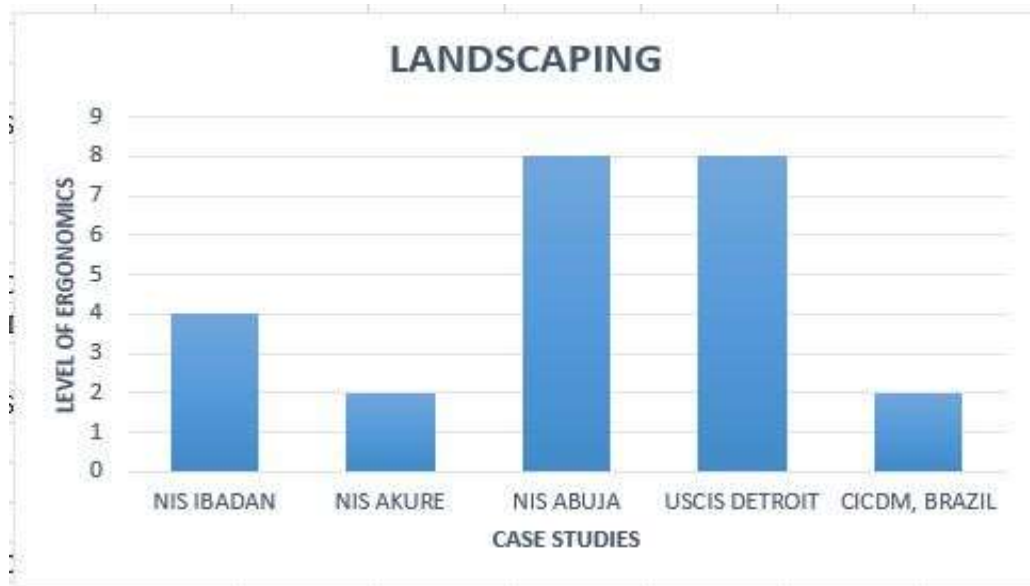


Figure 6.8: Bar Chart showing Landscaping comparison Between Case Studies

## 7.SUMMARY OF FINDING AND CONCLUSION

The design of The Saki Command of the NIS office offers the opportunity for unique solutions, which systematize complex programs within one site. Unlike other commands, it must organize multiple specialized spaces in a way that allows the building to be coherent, as it unifies many diverse factors under one design. The following points of note have been found to be most important:

### 7.1 Space

Rather than focusing only on how offices affects specific spatial environments, it is always beneficial for designers to also consider how spatial conditions can influence office ergonomics. Spaces can take on many different forms, giving off many different feelings to its users. This has been considered in the design of the Immigration Office, ensuring that spatial experience is satisfactory.

### 7.2 Flexibility

The design of an Immigration Office must be sustainable enough to accommodate both current and evolving users. Flexibility is generally delivered by having column free space, service pits or trenches, operable walls, air conditioning, high floor loadings and rigging capability. Other items include; operable ceilings, operable floors and operable seating. Future expansion is also necessary for possible future flexibility.

### 7.3 Security

The security of officers, applicants and documents are priority. The office must be protected from undue access of civilians. Being a collection point for people from all works of life, civilians must be protected from any form of attack. Security operatives are mounted in strategic areas. Four ingress and egress are provided in case escape is required. The use of Close Circuit Television (CCTV) also plays an important role in 21<sup>st</sup> Century security.



#### 7.4 Conclusion

Nigerian Immigration Service operation requires a more user friendly built environment. The environment should be designed not to function as a rigid machine but with huge consideration of the health, wellness and productivity of the users (officers and applicants alike). Office Interior (2019) stated that “Office workers spend as much as one-third of every day seated at their desk. If that workstation isn’t designed ergonomically, there is a significant risk of developing a chronic injury such as neck or back pain, carpal tunnel, and joint pain”. When people are uncomfortable or in pain, they cannot be productive, and they are more likely to take sick or injury leave. Fortunately, there is a cure for this epidemic; ergonomically designed spaces, furniture and accessories. Based on the local case studies, the health, wellbeing, and productivity of the users of the NIS facilities are not put into consideration. Hence this thesis recommends best practices to be imbibed when designing and furnishing the Nigeria Immigration Service office and its built environment.





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