



**EFFECTS OF POOR MAINTENANCE OF
ELEVATORS IN HIGHRISE BUILDINGS IN KWARA
STATE, NIGERIA CASE STUDY FEDERAL
SECRETARIAT COMPLEX ILORIN NIGERIA.**

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ABSTRACT

One of the features of a developed country is the presence of cosmopolitan cities. The landmark of cosmopolitan cities all over the world is the prevalence of high-rise buildings and these help to overcome the challenges of urban over population, as status symbol and to make optimal use of the scarce land resources. As Nigeria prepares to be amongst the developed nations, the development of high-rise buildings in Nigeria has been experiencing setbacks. The data used in this research was obtained through physical inspection and careful observations of the elevators (lifts) in the Federal Secretariat Complex, Ilorin, Kwara State. The building is an 8-storery government building within the area of study which contains 16 Government ministries and agencies and numerous civil servants. Questionnaires were administered within the building. The sampling procedure used includes; purposive sampling to ensure that all ministries and agencies are covered, and random sampling technique in selecting the civil servants and visitors alike. Result shows that all the elevators studied have one problem or the other which rendered it not convenient for the passengers use. It was recommended that all elevators problems should be properly and effectively attended to as soon as the sign of failure is noticed before it causes further damages that will increase costs. There is a need for the property managers to consider periodic inspection and system diagnosis of the elevators by professionals to verify its conditions and advice on the way forward. It was concluded that with adequate maintenance policy, adhering to manufacturer's instructions, use of skilled and highly trained manpower in the

maintenance of elevators and by ensuring only standard and approved spare parts are used majority of the problems hindering effective use of elevators in high-rise commercial buildings in Nigeria will be overcome.

Keywords: *Property manager, Elevator, High-rise Buildings, Civil servants, Government ministries and Agencies*

INTRODUCTION

The need for vertical transportation is as old as man. Over the centuries, mankind has employed indigenous forms of lifting. The earliest lifts used man, animal and water power to raise load. The design of high-rise commercial buildings both for single or multiple occupants requires the incorporation of services necessary to support the buildings business activities and its inhabitants (Pearson and Wittels, 2008).

A current trend in modern cities all over the world is the development of high-rise buildings mainly to overcome the challenges of urban overpopulation, ensure optimal use of scarce land resources, to serve as status symbol, to serve as tourist attractions and for beautiful skylines. Regardless of these advantages, the development of high-rise buildings in Nigeria has been experiencing drawbacks. The retarding growth translates to the very fewness of high-rise buildings in existence in Nigerian cities just as even most of the few in existence are poorly utilized due to some persistent factors as a matter of fact (Ede, 2014). A high-rise building is a building where the floor of an occupiable storey is greater than 75 feet (23m) above the lowest level of the fire department vehicle access (National Fire Protection Association, 2011). High -rise commercial buildings are more expensive to construct per square meter, they produce less usable space and their operation costs are more expensive than conventional office buildings. Most of these buildings suffered void for a long period at the initial stage of occupation that is after all aspects of construction has been completed especially the upper floors resulted to huge losses on the part of the overall investments (Pearson and Wittels, 2008). It was also established that tenants of high-rise buildings are more interested in occupying the lower floors than upper floors at a long run, that is, after some years of putting the building in to use (Alhassan, 2014). The reasons for such void period vary from one

building to another, however, investigations have shown that problems that are connected to the elevators system play a vital role and cannot be underestimated.

Daniel Levinson Wilk, a Professor of History at the Fashion Institute of Technology in New York and a board member of the Elevator Museum in Queens, explains in an article, 2014, titled “How the Elevator Transformed America” that the elevator is responsible for shaping modern life in ways that most people simply don’t appreciate and that he would like people to be more conscious of the elevators in their lives (Wilk, 2006).

Professor Wilk is particularly “disappointed with his fellow academics’ people who are supposed to be studying how the world works for failing to consider just how much elevators matter” (Wilk, 2006).

Similarly, Andreas Bernard’s (2014) research shows how elevators have been responsible for changing modern cities by concentrating large masses of people and activities in smaller areas, creating vibrant communities.

The elevator’s importance can be related to that of automobiles in transforming modern cities. While cars have facilitated horizontal spread of cities and regions, elevators have enabled concentrating a large number of people and human activities in a smaller footprint. New advances in elevator technologies are likely to change cities further by enabling even taller buildings (Wood, 2014 and Neyfakh, 2015).

Noordermeer (2010) stated that vertical transportation of people and goods is the major focus in high-rise buildings, as the average pedestrian doesn’t traverse more than six floors. A building’s lift system is the backbone of a high-rise building. During an emergency situation, the traditional way of exit is through the emergency stairwells, regardless of building height. Everywhere in the world, buildings are growing in height. Arguably the greatest challenge while designing ever-taller buildings, is the aspect of vertical transportation. Travelling times for building occupants need to be acceptable while maintaining the economic feasibility of the building by preserving as much valuable floor space as possible. These interests clash with one other, essential requirement: the safety of the building, and in particular the ability to evacuate the building occupants safely and within an acceptable time frame.

The quality of elevator service is a very important factor in tenant's choice of space in competing buildings. Therefore, a designer of a multi-storey building must be concerned with the proper selection of the vertical transportation equipment. Specifically, these equipment include passenger elevators, freight elevators, and escalators. The cost of purchase and installation of these equipment is not only representing a major building expense, but could be as high as 10% of the cost of construction in a storey building, (Aliyu, 2015).

THEORETICAL BACKGROUND

The history of elevators began with the ancient Egyptians, who are generally credited with the first lifts for elevating while building the pyramids. The Great Pyramids Cheops, built in the year 2569 BC, stands at 481 feet, it is taller than most 40 storey high-rise buildings and was the tallest structure on earth for 43 centuries (Mcgrail, 2007). The first written report of an elevator came in 1st century BC when Roman architect Vitruvius mentioned that Greek mathematician and inventor Archimedes has built his first elevator around 235 BC. According to Otis (2015) the first elevator, or was made in ancient Greece. According to Siikonen (1997), elevators have been built throughout history but the first modern passenger elevators were developed no more than about 150 years ago. Steam and hydraulic elevators already been introduced by 1852 when Elisha Otis made one of the most important elevator inventions, the clutch, which prevented the elevator from falling. Following 1857, the first passenger elevator was installed in the store of Haughwout and Company in New York, elevator history. The development of elevator technology was fast. With the advent of modern high-rise buildings more elevator history than in any other single location was made in 1889, when the 321-meter high Eiffel Tower was built for the Universal Exposition in Paris (Siikonen, 1997). In the Eiffel Tower, hydraulic double-deck elevators operated between ground level and the second platform. Between the second and the third platforms two cars counterbalancing each other handled the traffic. The early hydraulic and steam-driven elevators functioned with pressurized water, which was either taken from city water pipes or provided by steam engines. The elevator was connected to a long piston that moved up when water was pumped into a cylinder, and came down when water was released by a hydraulic valve. In 1880, Werner von Siemens introduced the

utilization of electric power. Soon after, the geared or gearless traction electric elevators started to replace the hydraulic elevators. The development of electric elevators added impetus to high-rise buildings as the average pedestrian doesn't traverse more than six floors, a building's lift system is the backbone of a high-rise building.

RESEARCH METHODOLOGY

Instruments of Data Collection

The data used in this research was obtained through physical inspection and careful observation of the elevators in the federal Secretariat Complex Ilorin. The property managers and visitors/civil servants patronizing the building were interviewed in addition to the structured questionnaire that was administered simultaneously

Samples of 250 respondents were randomly selected. The sampling procedure used includes purposive sampling method to ensure that all ministries and agencies are covered and random sampling technique in selecting the civil servants and visitors alike. Special consideration was given to the civil servants, especially those that spend five and above years in the buildings which experienced a lot on the functionality or otherwise of the elevators and visitors or other users of the building.

Interview, Questionnaire Designed and Techniques of Data Analysis

The interview conducted and the questionnaires designed give more consideration to the physical aspects which includes the dwell time, capacity of the elevators, maximum available elevators, maintenance condition, usage especially at up peak time of demand, energy sources and the occupancy rate of the buildings particularly at the upper floors were studied. No mechanical (engineering) or/or scientific test of any kind was conducted. The data collected was analyzed in percentile form, chart and narrative description.

RESULT AND DISCUSSION

From the research conducted, it was confirmed that the building has eight (8) floors. The building contains mainly federal government agencies. These agencies include Ministry of Works and Housing, Federal Information Services,

Bio-resources Development Centre, Nigeria Immigration Service, National Bureau of Statistics, Federal Ministry of Commerce, Federal Fire Service among others.

It was also disclosed that some agencies have moved out of the building as a result of non-functioning of the elevator system. Some of these agencies are Nigerian Civil Defense Corp, Federal Character Commission and Federal Ministry of Agriculture among others. Despite the fact that some of the agencies have moved out of the building, the survey made shows that there are many people working at the upper floors.

POPULATION OF PEOPLE ACROSS THE FLOOR

It was observed that (27%) of the respondents work in the first and second floor, (8%) of the respondents work in the second and third floor while (65%) of them work in the fifth floor and above.

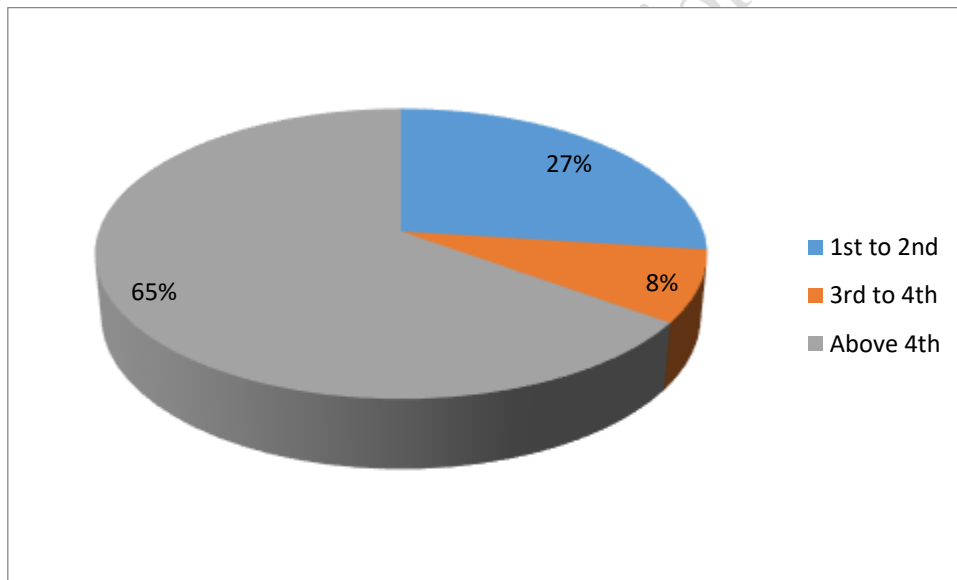


Figure 4.1: Population of people across the floors

From the research, it was observed that there are two elevator system in the building of which none is working which has made the movement of people in and out of the building to be stressful. Most of the people in the upper floors made it known that they hardly go down once they enter their office in the morning as a result of the elevator failure. It was also confirmed that there has been power failure for many years. Only the immigration department is making

use of small generator for their daily activities. During the research, it was noted that many offices in the seventh and eight floors has been closed down due to the non-functioning of the elevator system. Some important factors that have contributed to the prevailing situation are discussed below:

MAINTENANCE

During this research work, it was discovered that the elevator systems have stop working for more than 15 years. This, we were informed, was as a result of improper maintenance, lack of professional manpower and non-availability of spare parts.

Improper maintenance

It was revealed that when the elevator systems were still working, there is no adequate maintenance for the lift system. It was also confirmed that in many cases, there won't be elevator checkup until the system breakdown.

Lack of Professional Manpower

During the research, it was discovered that lack of professional manpower to maintain and repair the elevator system cut-short the lifespan of the elevator system. Whenever there is system breakdown, there will be needs to go to Lagos to look for professional experts on the lift system or even outside the countries before the elevator system can be repaired.

Non-availability of Spare Parts

Elevator system is made up of different parts and components which have separate life cycle, some of the parts worn out before others. During the research, it was discovered that in most cases, the elevator system used to be kept out of use for a longer period due to the failure of its parts that needs to be transported from far distance or imported from abroad. At this period, the workers in the buildings are left with no other option than to use the stairs.

Responses regarding the maintenance of the elevator system

According to the survey, it was observed that (16%) of the respondents agreed that the maintenance engineers come for maintenance very often, (31%) of them

agreed that they only come slightly often, (39%) of them agreed that the maintenance engineers don't come to carry out the maintenance at all while (16%) of them could not give any response.

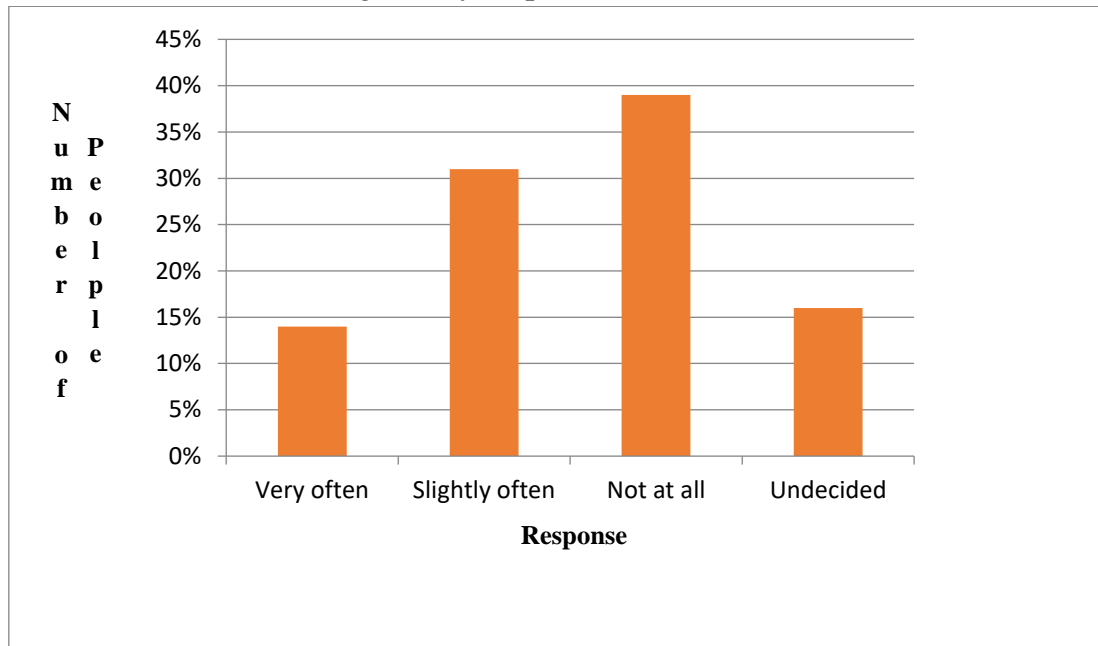


Figure 4.2: People's response regarding how often the maintenance engineers worked on the elevator system before breakdown.

USAGE OF ELEVATOR

During this research work, it was confirmed that people find the use of elevator easier than the use of the stairway, so many of them pleaded for the elevator system to be repaired. It was also made known that since the breakdown occurred, there has not been any noticeable effort towards the repair of the elevator system.

Presently, the federal government secretariat is experiencing power outage. So, if the elevator system is to be repaired, there must be an effort to restore the power supply as we know that the elevator system cannot function without a source of power. Furthermore, an elevator system cannot just rely on the use of national grid. There must be an alternative source of power to complement the power supply from national grid. This is owing to the fact that the power supply in the country has been known to be in an epileptic condition. So, the need for the restoration of power supply and provision of a standby generator cannot be

underestimated. With all these on ground, people will be able to make use of the elevator system without any fear of been trapped inside the elevator system as a result of power failure.

Elevator and stairway comparison

(45%) of the respondents said moving from one floor to another using stairway will take them one to three minutes, (38%) of them said it will take them four to six minutes, (12%) of them said it will take them more than six minutes while (5%) of them did not give any response.

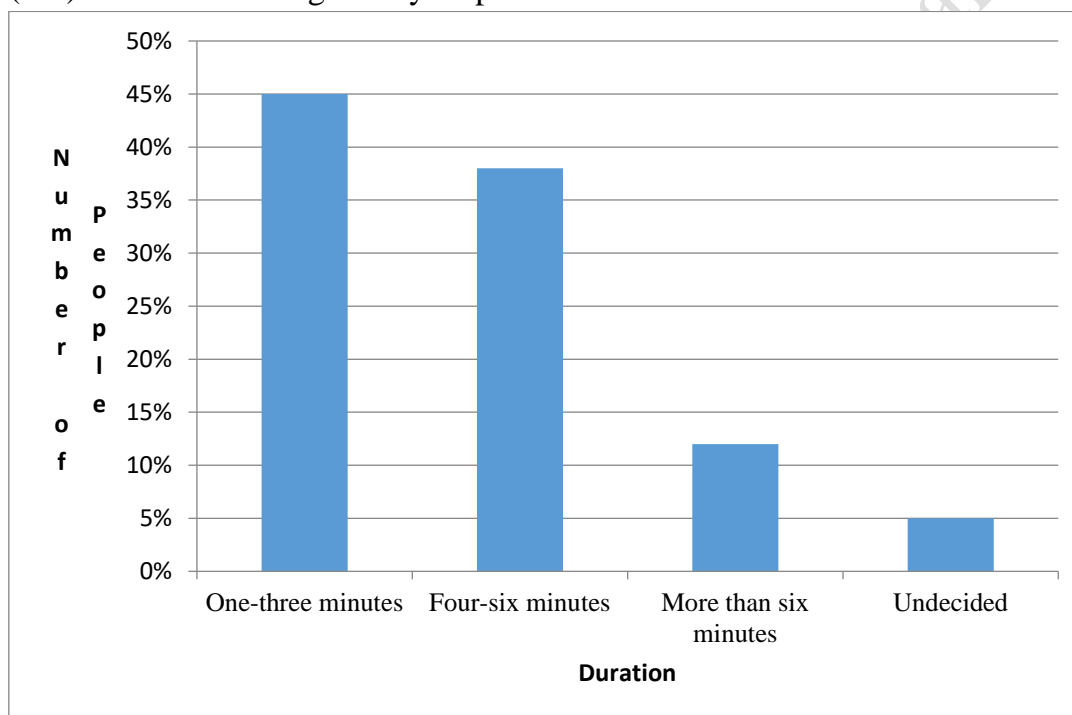


Figure 4.3: Time spent using stairway

(64%) of the respondents said it will take them one to three minutes to move from one floor to another using the elevator system, (14%) of them said it will take them four to six minutes, (2%) of them said it will take them more than six minutes while (20%) of them did not give any response. From the responses given in the use of elevator system and stairway, it was noted that moving from one floor to another using elevator system is faster than using stairway but the higher number of people not given responses on the use of elevator system was due to the fact that the elevator system has broken down before some of them were employed.

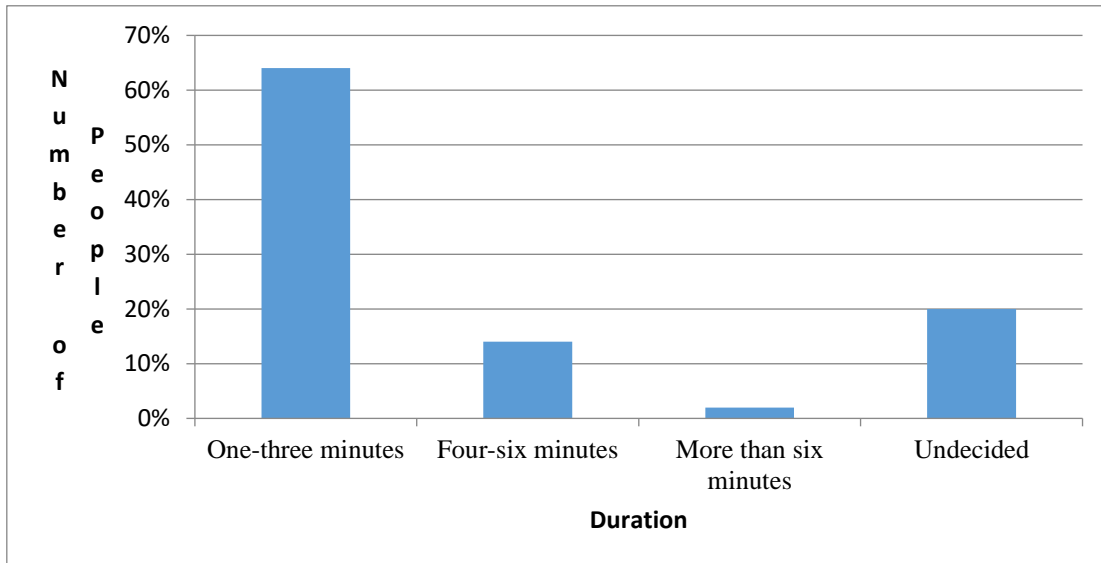


Figure 4.4: Time spent using elevator system

Elevator comfort

(82%) of the respondents agree that using elevator is more comfortable than using stairway, (14%) of them did not give any response while (4%) of them only disagree that using elevator is more comfortable than using stairway.

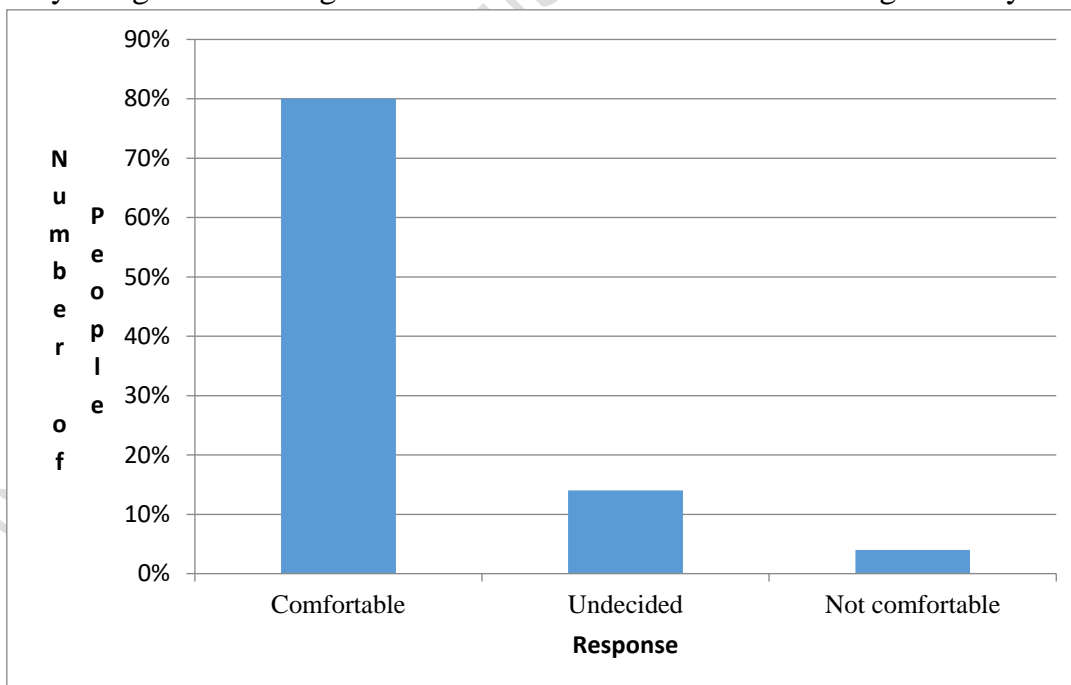


Figure 4.5: How comfortable people are using elevator system

Stairway comfort

(71%) of the respondents disagree that they were comfortable with the use of stairway, (20%) of them agree that they are comfortable while (9%) of them did not give any response.

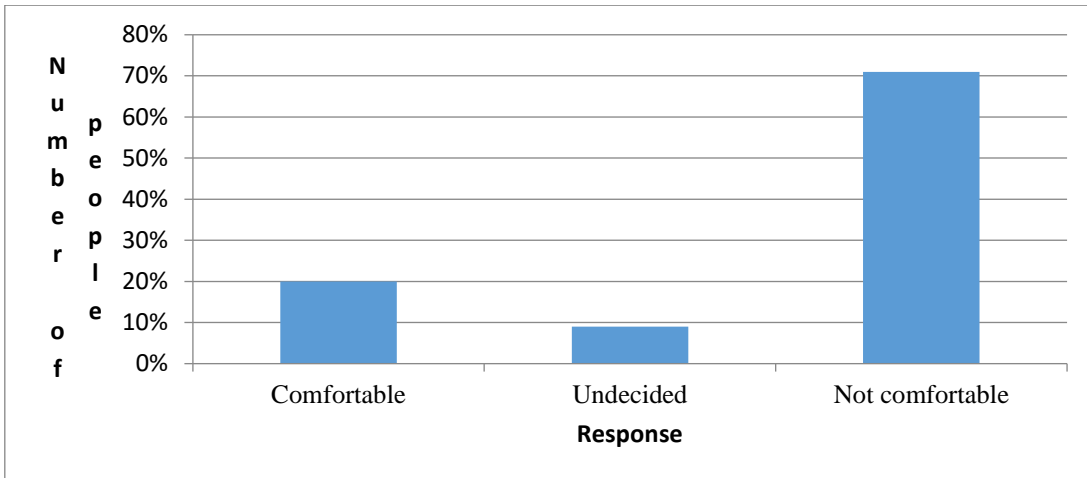


Figure 4.6: How comfortable people are using stairway

MOVEMENT OF PEOPLE AROUND THE BUILDING

(35%) of the respondents move up and down very often in a day, (51%) of them rarely move up and down while (14%) of them only remained in their floor throughout the day.

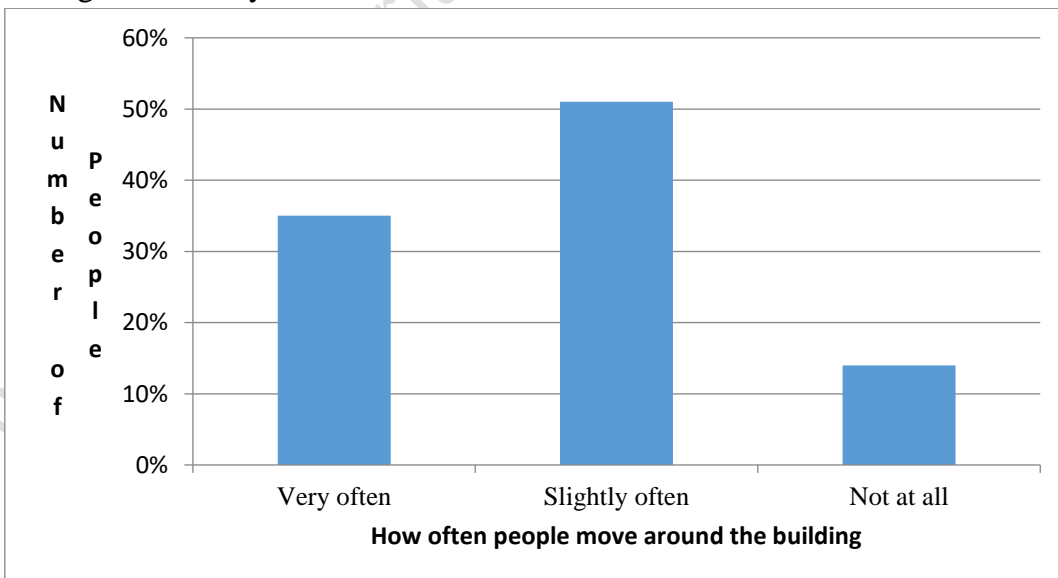


Figure 4.7: Movement of people around the building

CONCLUSION

Conclusion

As the needs for high rise building continue to increase, it is not a proper thing to discover that there can be a place as big as the federal government secretariat experiencing elevator breakdown for going to two decades. So, proper measures should be put in place to ensure normal operation and maintenance of elevator system to ease vertical transportation of people in high rise buildings.

Also, the elevator system should not be left for a long time without due and schedule inspection to know the condition of wear in its parts, so as to take necessary steps to replace the worn-out part so as to prevent the system from breakdown.

As regards the statutory regulations, elevator installation is made compulsory for certain number of floors in either medium or high rise building by the government. In Britain at least one elevator system must be installed in a building with four or more floors while those with more than six floors should have at least two elevator system installed in them. So having a building of eight floors without a working elevator system should be unacceptable. Possible impact should be made to ensured proper restoration of elevator system to such a building and other possible government and private buildings.

Recommendation

In the use of elevator system, there is need for proper maintenance. It shouldn't be until the elevator system stop working that minor fault will be attended to. Preventive maintenance should be taken seriously as this helps to prevent the breakdown of the system and at the same time reduce the severity of damages that might occur when breakdown occurred. To achieve this, proper inspection and servicing should be put in place. Inspection will help to detect wear in any part of the system and this will bring about change in that worn out part while servicing is a schedule cleaning, lubricating and adjustment of part.

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