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THE CONCEPT OF FLEXIBLE SPACES IN ARCHITECTURE: THE CASE OF A MULTI-PURPOSE AUDITORIUM

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ABSTRACT

One of the key issues in building construction is environmental sustainability. Conventional methods of construction do not consider the in-built capacity to adapt over time according to new technical requirements and environmental consequences. Therefore, any change or renovation of the building will result in significant cost and lost use during its lifecycle. Flexibility overtime has been known to enhance the peculiarity of a space, making spaces adaptable to multipurpose use, without altering the functional requirements. The design features and techniques that allow for changing situations in the use and operation of spaces are the focus of this paper. Components such as walls, floors and roofs are the design features that affect space in any building. Multi- purpose auditorium being hubs for cultural and social activities, attract an unpredictable population, hence the need for flexible venues for different events which are fast becoming stable and developing features of any city. The research assessed available multi-purpose auditoria and the design features used to achieve flexibility, examining their adaptation to inadequacy of auditorium spaces. Case studies, literatures, articles, and journals were used as instrument to obtain data; the data collected were then analyzed. It was observed from the study that all multi-purpose auditoria had adaptability as their flexible design approach and this is as a result of the use of large open spaces.

Keywords: multipurpose, auditorium, architecture, colleges and universities, flexibility, employment.

Introduction

Many colleges and universities have space on campus that extends beyond a traditional classroom (Michael, 2017). These areas include but are not limited to dining hall facilities, residence halls, college bookstores, and outdoor quads that serve as a focal point of the institution. Educational institutions have trouble justifying huge spaces that have only one function and sit empty most of the day. The answer is creating multipurpose spaces that can accommodate a number of functions (Gordon, 2010).

The concept of multipurpose spaces in schools is certainly not new (Gordon, 2010). Especially in elementary schools, the combination of cafeteria and auditorium (and sometimes indoor physical activity space as well) is a well-established approach to maximizing the use of school space and a school district's budget. All these aspects of our ever-changing world, along with the great speed of acceleration in the development of high technology, mean that the interest in flexible architecture is steadily increasing (Acharya, 2013).Nonetheless; they continue to be refinements in technology and design

configurations that improve the performance of these facilities, from acoustics and lighting to adaptable seating and efficient use of stage, storage, and food preparation spaces.

The term "flexibility" entered the field of architectural terminology around the early 1950s. Walter Gropius stated one of the earliest presumptions of flexibility in 1954 as cited by (Acharya, 2013) "The architects have to conceive building not as a monument, but as receptacles for the flow of the life which they are to serve, that his conception should be flexible enough to create a background fit to absorb the dynamic features of our modern life" (Acharya, 2013). According to (Slaughter, 2001), who has presented that the three major type of change(function, capacity and flow) and the interactions among systems provide a framework in which to analyse the capacity of the facility to meet the performance requirements with respect to the value-added activities performed within or through the facility

Multifunctional spaces can be transitioning spaces. But from another view, they are the spaces which are used for exhibitions, lectures, and special events (Jamal, 2016).Multi-functional space can be described as a true integration of different functions in time and space (Brandit,J, 2004). Adaptability is defined by the versatility of a building when encountering internal expected variations and/or environmental uncertainties. Adaptability is important for buildings that have longer lives than their current functions. Accordingly, design for adaptability is meant to improve the ability of a building to change and fulfil different functions during its lifetime (Dorsthorst B, et al, 2002).

The concept of flexibility is vital in the design (Babayo S,et al , 2017). Auditorium space types are areas for large meetings, presentations, and performances (Dennis J. Hall et al, 2016).Meetings, lectures, small-scale theatre plays, concerts and different types of video and picture presentations are the most commonly held in auditoriums. Auditoriums are mainly situated in culture centers, conference centers, hotels and other complex buildings such as educational centers, for example. In auditoriums, the audience is located in order to hear, watch or participate in a performance or action of some type. An auditorium is always a place in which the audience can be seated (Haapoja&Tikka,1999). Flexible building corresponds to "a building that can adapt to the changing needs of users, (Babayo S, et al, 2017).

A flexible structure has a built-in capacity to adapt in a predefined way. Flexibility can be everything from automated sun screening to a clever layout in users to expand or diminish according to changing needs. For building flexibility to be encouraged, technical, and economic and policy issues must be addressed. Technical issues include the deconstruct ability of the components and developing tools to evaluate deconstruction. Since, design for flexibility involves adaptable and durable building construction with deconstruct-able and reusable components, measuring flexibility requires the ability to investigate and track applicable information about building materials and components from design through deconstruction (Nasibeh S, et al, 2014). Flexibility is the third concept of how to deal with change

Flexible buildings are intended to respond to the changing situations in their use,

operation or location." "A broad definition of flexible building is building that can adjust to changing needs and patterns, both social and technological (Jamal, 2016). The answer is creating multipurpose spaces that can accommodate a number of functions (Gordon, 2010). Adaptability in architecture is defined as an ability to recognize that the future is not finite, and that change is inevitable, but a framework is an important element in allowing Change to happen." Adaptable buildings are designed to adjust to the different functions, defined by users' activities (Babayo S,et al , 2017).

Adaptable architecture also makes room for all the technological innovations that can improve the previous installations of the building, such flexible updating in communication, security and other service systems allow changing layouts and functional specifications of the Building (Babayo S,et al , 2017). At the same time the technological advancement allows for the creation of self-optimizing buildings, rather than merely best-fit compromises.

From the history of architecture, it has been observed that architects and planners of ancient cities made out spaces for meetings, both formal and informal. In ancient Greece, the meeting places were the Agoras and Stoas. The Agora was the Public Square or marketplace of any ancient Greek city. It was originally the site of the popular assembly, but as time went by it was used increasingly for commercial purposes. Large, open and easily accessible, it was regarded as the center of political, commercial, religious, and social life in the city. Public buildings and temples surrounded the agora, frequently with colonnades (stoa) on the side facing the square. In Athens, the Assembly of all the thousands of citizens met in the agora until 500bc, when the Pynx was constructed for the purpose, in a form afterwards universally adopted for theatres. The most famous agora is the Athenian, located northwest of the Acropolis. The function of Stoas, which were indispensable adjuncts of the Agora, was primarily to offer shelter from the sun and rain, but they were also regularly used as a meeting place for business purposes in a building of such length, several groups of people could discuss their affairs in comparative privacy, even when there were no partitions across it.

Eventually it became customary to divide the interior into a large number of market stalls, shops and offices by means of partitions of wood. In Rome, the Romans built the forum (latin for "marketplace or "out-of-doors place); the term applied to a large, open and rectangular space in the central part of a city that was the common place of assembly of people, originally an enclosed space, without buildings, in which the people gathered on market days and for religious festivals, elections, and other public events, it became the political center where civic and administrative buildings and the more important temples were located. The Roman Forum was originally an open section of Rome for public gatherings. Shops and Temples were eventually built there, and it became the center of government. In the center is the speaker's "platform"; to the right is the Arch of Septimius Severus. The Temple of concord can be seen in the background (Encarta Dictionary, 2014).

Aim of the Study

This paper aims to bring to the attention of people the need of the design a befitting multipurpose auditorium in educational institutions. "A broad definition of flexible building is building that can adjust to

changing needs and patterns, both social and technological (Jamal, 2016).The concept of flexibility is vital in the design of auditoria.

Research Method

The research method used by the author for the project is the qualitative and descriptive method owing to the fact that the research involves collecting and analyzing non-numerical data (e.g., text, video, or audio) to understand concepts, opinions, or experiences and; usually involves surveys and studies that aim to identify the facts.

In others words, descriptive research mainly deals with the "description of the state of affairs as it is present", and there is no control over variables in descriptive research. These methods were used to generate essential data to achieve a functional design. As a result of this, qualitative research method was adopted for this paper.

Findings of the Study

The facility will be a notable facility in that it will be a center of convergence for communication between the staff, students and external bodies. The significance of this study is as follows; Successful execution of the study will serve as a template for multiplication in other centers across the federation. The facility will serve as a useful material to research on multipurpose auditorium and flexibility design of auditorium. It will provide recommendations based on its research findings that would benefit future research and general knowledge on similar and related topics.

This study will assist architects in analyzing in detail on the methods of evaluating the acoustic and flexible quality of spaces for speech and musical programs.



Plate 1. South view of Nnamdi Azikiwe University Theatre Arts Auditorium, Awka..
Source; Anaukwu (Retrieved April 16th,2021)

In other Universities visited like the University of Benin located at Ugbowo campus of the prestigious university Benin, Edo state and was built in 1974, the Abia State University, Federal University of Owerri, Imo State which has several auditoria situated in them, were visited for the course of this study.



Plate 2. East view of the school auditorim
Source; Anaukwu (Retrieved March 12th, 2021)



Plate 3. Interior view of the school auditorium
Source; Anaukwu (Retrieved March 12th, 2021)



Plate 4. Exterior view of the school auditorium Source; Anaukwu (Retrieved March 13th, 2021)



It was discovered by the writer that most of the auditoria are so static and not dynamic, which according to (Gordon,2010) that educational institutions have trouble justifying huge spaces that have only one function and sit empty most of the day, in which the solution to such problem is to create a multi-purpose space that can accommodate a number of functions.

The ever-changing world, along with the great speed of acceleration in the development of high technology, means that the interest in flexible architecture is steadily increasing (Acharya, 2013). Flexible building corresponds to "building that can adapt to the changing needs of users (Babayo S, et al, 2017).

Walter Gropius stated one of the earliest presumptions of flexibility in 1954 as cited by (Acharya, 2013). The Architects have to conceive building not as a monument but receptacles for the flow of life which they are to serve, that his conception should be flexible enough to create a background fit to absorb the dynamic features of our modern life. Modern life can no longer be defined in the long term and consequently cannot be contained within a static order of symbolic buildings and spaces. Buildings no longer symbolize static hierarchical order instead they have become flexible container for use by a dynamic society. Babayo S, et al who classified flexibility into two groups (functional and structural).

The objective of flexibility in the architecture is to provide spaces with simply changing Structures in respect to changes in required performance and application. Though Architectural spaces could be identified and restricted through physical elements such as Floor, ceiling, and walls and so on, it should be designed in a way that changes flexibly (Aghil, 2011).

Flexibility in Vertical Partitions -The (Figure 1) below indicate some designed of vertical partitions that are movable and are used in reshaping space for aesthetic, Functional and economical uses in the same time in order to make best and maximum use of plot area that responds to people needs (Abdulpader Q, et al, 2015).

Flexibility in Horizontal Planes and Levels - Flexibility in horizontal planes and levels is used for getting appropriate interior spaces that responds to people demands, so that it makes it possible to control space levels and the economic efficiency that reached from responding multiple needs in the same space, as it reduces demanded plot area. The use of vertical partitions, horizontal planes levels flexibilities together to change the vertical partition to horizontal one and to reach maximum flexibility at minimum space. Using this building material technology and

architecture, it would respond to various conditions by changing the relation to large and some relates functional spaces (Abdulpader Q, et al, 2015).

Fig 2**:** wooden folded partitionable system, Source: www.buildingaddittion.co.uk multifold,

Flexibility in Furniture -Flexibility in furniture is to describe furniture as a physical property of furniture itself, that chair can be converted to a bed or table etc. However, there is another design idea that depends on the relationship between furniture and space so that (as an example) the bed can be hidden into a wall or ground, or raises it to the ceiling to be part of design. The furniture can have some shape properties that add another type of flexibility which gained from repeating the furniture piece with changing the arrangement or adding other pieces with-out decreasing the aesthetic and functional efficiency of space the (Figure 3) below is one of the types of flexible furniture design use for functional efficiency of space (Aghil, 2011).



Fig 3: Flexibility in furniture design.



Fig 4: Flexibility in furniture design.
Source: (Aghil, 2011).

Conclusion

There is clearly a need of multi-purpose auditorium which is a facility that will attract different categories of persons together and should be flexible enough to accommodate the needs of the different users. From the case studies carried out locally by the researcher, it shows that the auditoria do not have flexible design features that create or modify a space for change requirement. Most of the auditoria made use of racked concrete platforms level with fixed seating making the space unable to adapt to changing activities of the auditorium space. From literatures, journals, articles and foreign case studies, carefully studied by the researcher, they proffer solutions to the flexibility of design features for flexibility such as movable walls, retractable seating and roofs which will be used to achieve an effective flexible design. Multi-purpose auditorium attracts an unpredictable population, so space flexibility should be considered at all times and adopting all flexible design approach so that as the user's need or activity change, the facility also changes to meet their needs.

Recommendation

This study recommends the slaughter concept about flexibility of spaces by ensuring the facility correspond to (functions, capacity and flow), which is the main problem that prompts this study of non-flexibility characteristics of auditoria in schools, which was stated in the introduction, and is a serious detriment to multi-functional use of the space mostly in Higher Institutions. The need that auditoria in schools will adapt to the Slaughter concept of flexibility in order to eliminate larger numbers of buildings that serve only one function in its life-time, thereby saving cost for schools too.

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