

The Place of Building Economics in the Nigerian Built Environment

Kolo S.A.^{1*}, Ayuba P.², Momoh O.A.³, Ogunbode E.A.⁴

Abstract

The construction industry and its activities is one that is vital to any economy and towards achieving goals for the development of the society by providing shelter, infrastructure and employment. When economics is combined with buildings, it deals with its life cycle, and the construction sector processes, with the aim of making building products economical. However, the field of building economics is not fully recognized by pure economists. In this study, attempts are made to explore the Nigerian built environment, making reference to their cost effectiveness in the use of resources. This study is qualitative, thereby obtaining data from content analysis and 68 questionnaires, yielding to a study that is descriptive. Findings reveal that design economists make certain that the development of environmentally friendly infrastructure is promoted, in a way that attention is given to design that reflects sustainability principles. The study shows that 95.6% of the respondents suggested this theme, which was the most prevalent from the research. The paper concludes that an economic understanding of building activity as a whole is a precondition for further improvement in economizing the use of building resources. The study recommends that as buildings go through continuous changes, and are adapted to different user needs, design and construction should be in a manner that is adaptive to a wide variety of conditions which may be encountered in the economic process.

Keywords: Construction industry, building, design economics, economy, sustainability principles

INTRODUCTION

Economics studies the relationship between demand and supply of goods and services, along with its production and consumption. On the other hand, design economics, a branch of general economics is based on applying principles of this main field, in addition to activities related to the construction industry. Furthermore economics in the field of design applies mainstream principles of economics to

construction activities and processes. For building economics, it centres on building and establishing ways in creating structures that are more economical and efficient, though excluding resources and accounting practices. Building economics is conventionally said to be about helping clients achieve frequently mentioned, although rarely defined value for money with their buildings. This however, is sometimes misunderstood to be cost minimization, which essentially is a major issue in the Nigerian construction industry culture [1]. In fact in both public and private sectors it may be said to be about maximizing the difference between building cost and building value. However, these two objectives could be argued as incompatible.

*Author for Correspondence

Somnath Maurya

E-mail: salome.kolo@futminna.edu.ng

^{1,2} Lecturer, Department of Architecture, Federal University of Technology Minna, Nigeria

³ Student, Department of Architecture, Federal University of Technology Minna, Nigeria

⁴ Senior Lecturer, Department of Building, Federal University of Technology Minna, Nigeria

Received Date: March 01, 2022

Accepted Date: March 10, 2022

Published Date: March 22, 2022

Citation: Kolo S.A., Ayuba P., Momoh O.A., Ogunbode E.A. The Place of Building Economics in the Nigerian Built Environment. International Journal of Environmental Planning and Development. 2022; 8(1): 26–33p.

Construction plays a vital role for development and economic growth in any nation [2]. With daily challenges this industry is plagued by, construction professionals and clients are saddled with the responsibility to proffer alternative ways in managing construction activities [3]. The construction industry when compared with others, is considered the oldest and dates back to early civilization, and is considered to be the largest in creating employment [4]. In Nigeria, adopting traditional methods in construction practices and procuring funds can bring about growth and development. This will serve as the major contributor of capital in the construction industry [5]. The large correlation between government participation and the level of construction industry was due to minimal private involvement in capital formation and formal infrastructure procurement that limits the potential of the sector. However, stakeholders have an interest which is to close the gap in using construction to implement strategies in creating an economy that is sustainable [1, 5]. This paper evaluates building economics as it pertains to the Nigerian built environment with the aim of understanding how this concept can further be incorporated into the nation's construction industry.

LITERATURE REVIEW

The Nigerian Construction Industry

The construction industry in any economy around the world exhibits similar features although in varying degrees; the industry is a paradox in many respects [6, 2]. Where human economic activity and planning are involved, the construction industry is shared, spilt or dispersed under other sub-sectors of the economy although this industry can be used as a viable tool to regulate the economy. In order to stabilise an economy, the construction industry possess certain qualities that make it serve as a regulator to an economy; it steadies an economy that is overburdened, and livens one that is not thriving [4]. According to [3, 7, 2], the construction industry differs from others; the product involves physical activity on the client's site, projects are usually one-off designs and lack archetypal models. It is an industry that cuts across all three economic sectors. The primary which deals with natural resource extraction, the secondary which is the production of building components and materials, transforming them into finished products, and tertiary which provides consultancy services.

Since 1960, after Nigeria's Independence, activities in agriculture, mining and quarrying have been the primary contributors to the economy with over 80% contributions made to the government revenue and about 60% of the Gross Domestic Product (GDP). In addition to this, they also account for 75% of employment and over 90% of foreign income. Consequently, construction, manufacturing etc. which are considered as secondary activities, makes up 4.14% to 2.0% of the GDP respectively [8]. [5] Stated, the construction industry is vital to the satisfaction for needs such as physical, economic and social, which contributes significantly to fulfilling different national goals. Nigeria is not left out. In 2006 and 2007, the construction industry in Nigeria had a growth rate of about 20%. However, this growth was not proportional to the growth of the total GDP of the country as in 2008 the construction industry contributed 1.83% to the national GDP [9]. Although in Nigeria, it is said that this industry does not contribute more to the economy than the manufacturing industry, the construction industry however continues to play an important role in the nation's economy.

As this industry grows daily, it is evident that the progress being made in its construction industry, overall, has an effect on the nation's economy [10, 1]. With possibilities for this sector to provide employment, broaden the production base of the country and create foreign income and government revenue that is more sustainable. Furthermore, with the growth of the Nigerian construction industry, there tends to be an increase in protecting the rights of those involved in the construction process, building components, and in use of modern construction products. This also brings about the exportation of these finished goods to neighbouring countries [10].

The Economics of Buildings

For the built environment to be developed and sustained, it uses up a large amount of resources, where these activities considerably influence the economy functioning at optimum. When it comes to

built facilities, efficiency level in production of goods and services are affected by scale, quality and distribution, and further, by the quality of the environment we live in. For developers, it is necessary to have knowledge of how their development is able to make contributions to changes in the built environment, or the economic or social effects these changes will have in the long run. According to [11], building economics experiments to amend this knowledge deficit by the incorporation and analysis of interests that are economic and social over the life-cycle of the facilities concerned.

In the mid-70s, the concept of building economics emerged, only then as a defined field, in response to the energy crisis. Nearly two decades later, this concept still lies in its infancy. However, the economics profession does not recognize it as a field in its own right, even though building is one of the most important activities in any economy [12]. The objectives of practicing economists and building economists are different. Simply put, mainstream orthodox economics deals with the study of people and their society, and the manner in which they choose to employ scarce resources such that goods and services are produced and distributed. Building economics on the other hand deals with the efficient use of resources that are scarce all through the building life cycle. When a building is considered economic in nature, it provides value at the lowest cost possible. In this discipline, three key words come to play; life-cycle, value and cost.

Furthermore, building economics is that cohesive relationship between these three keywords that creates a distinction between building economics and other related disciplines [5, 11]. Building economics is therefore concerned with the identification of resources and their optimal allocation for building owners and developers [5]. With regards however to decisions on how to achieve economics in the built environment, these should be taken with care as there is an array of complex factors involved with, and that make up this environment [3]. Challenges that arise when it comes to making building decisions that involve its economics are heterogeneous and subjective; as no two buildings are the same and the needs of people in buildings vary one from another [11].

With this in mind, it clearly presents problems with attempting to develop general techniques for all building types in order to achieve economy across buildings. In the study of building economics, investment is a subject that is paramount, as they are considered as investment goods with a constituent of real capital [6, 11]. However, it is opined that, professionals in the construction industry are of the belief that building economics solely encompasses the initial cost of the building only. This is to say that building economics practiced in developed countries is more advanced, where some form of discounted cash flow for cost-of-living benefit appraisal is required for all public sector building decisions [13]. It can therefore be said that in developing countries, life cost analyses are usually not carried out due to lack of data on running costs; failure rates and replacement cycles. In addition, building life cost analysis becomes difficult to carry out as future predictions are an impossible feat, predictions on interest, discount and inflation rates, and the overestimation of the present by policy makers. However, by employing the use of proper training, collaborations with entrepreneurs, a stable economy and improved government policies, life cost analysis can be improved [5].

Role of Building Economics in the Construction Industry

One way economists avail themselves to the economic situation in construction is by advising clients on building investments and diverse ways value for money is maintained. For design economists, there have been early accounts where they focused mainly on maximising the value of a project with a reduction in capital cost. However, for the clients of buildings, they were more concerned with reducing the initial capital costs of construction and minimising operating cost of built assets with the sole aim of maximising the return on investment. Therefore, design economists face challenges involved with minimising capital and operational cost (whole life costs), and the development of new expertise areas that enable the reduction of environmental costs [6, 12]. Despite these challenges, building industry economists are tasked with the responsibility to advice on ways of

enhancing value of design, carbon management, taxation, productivity and efficiency of construction processes and built assets.

The central theme around design economics is the understanding of building cost, essential to the success of construction activities. Buildings contribute majorly to production processes and to the productivity of a nation by affecting the cost of goods and services. Buildings that are both poorly designed and maintained tend to increase the whole life costs, which in turn have the tendency to render production processes expensive [12]. The need therefore arises for buildings to be well planned and designed and properly maintained so they are energy efficient. Providing reliable infrastructural services such as power, roads, water, and communication, will increase input of productivity, and significantly reduce all costs involved in production [7]. However, what is responsible for determining capital and operational costs, and end product performance is the nature of design as well as efficiency in construction processes [6]. Construction and its activities are therefore pivotal in production and foster socio-economic growth in the society.

METHODOLOGY

This research adopts the qualitative method as this approach best suit the characteristics of the subject matter under study. Taylor et al, (2015) describes this method as one that involves research where data obtained is either descriptive, words written or spoken or through behaviour which is observed. 100 questionnaires were administered to construction industry professionals (target population), 84 were returned, and 68 deemed fit for analyses. Suggestions were proffered in the form of statements, which were analysed using content analysis. According to [14] content analysis involves a careful and detailed examination, and interpretation of a body of material which aims to identify patterns, themes and meanings. Secondary data collection was based mainly on the review of related literature on the Nigerian economy and the construction industry.

To analyse and categorise the qualitative data, adapted from [15], themes were analytically developed and triangulated against previous research to determine trends and disparities. These themes pertain to specific suggestions, which recur within the text relating to modalities for the effective ways of design economics in the Nigerian Construction industry. The data was analysed and sorted according to the number of times a theme appears. The themes were based on specific suggestions made that were repeated, which pertain to effective ways of design economics in the Nigerian Construction industry. The data was further grouped, examined and categorised according to frequency based on the theme's appearance, and were represented as frequency and percentages; (N) and (%) respectively. Furthermore, the findings derived from themes served as a guide in recommending best possible design economics practice in the Nigerian built environment.

RESULTS and DISCUSSIONS

Five themes were developed from the respondents of 68 questionnaires fit for analyses and presented in Table 1. A significant portion of the respondents (N65, 95.6%) suggested that

Table 1. Themes from the content analysis of responses for design economics factors.

Theme	No. of respondents (N)	Percentage (%)
Cost effective designs	61	89.7
Principles for value enhancement	59	86.8
Productivity and new technology.	52	76.5
Education and training in building economics	63	92.6
Sustainability	65	95.6

sustainability should be the reason for building economics to be employed. This is closely followed by education and training in the field of economics of building at N63, (92.6%); that is, carrying out

effect building life cost analyses. Cost effective designs amounted to 89.7% at N61 respondents, subsequently N59 (86.8%) opined employing principles for value enhancement, would yield more economical buildings. A slight difference was seen in N52 (76.5%) of the respondents, who suggested that improving productivity and technology would improve design economics in the Nigerian built environment.

Sustainability

Sustainability issues are diverse however, in responding to these issues, design economics plays a critical role as it creates diverse new ways in approaching design, development and the application of ways in which cost of energy consumption in buildings are reduced. However, alternative means of design can be achieved if carbon is well managed as this will reduce the environmental cost as a result of the energy emitted from building materials, processes involved with construction, and recycling materials. By introducing new innovate materials that lower environmental impact, these tend to provide endless opportunities that aid the development of other building materials.

However, for the design economist, there are several implications which include the knowledge of these materials, their relationship to the environment and their cost implications. Consequently, in the Nigerian built environment, professionals are faced with this challenge as the construction industry suffers from availability of a wide range of environmentally-friendly building materials. Clients at large are also majorly unaware about the embodied carbon of materials, and the carbon footprint of alternative designs to achieve optimum solutions. Design economics allows for a deeper understanding of the relationship between capital and operational costs and the carbon performance of different materials; the environment is our responsibility to take care of.

Education and Training in Building Economics

In the future, profound changes are expected as a result of the need for design solutions that are carbon-friendly, lower life costs, enhance value and take advantage of technology for maximum efficiency and productivity. Educating and professionally training economists in the construction industry will be of great benefit as this will be a necessary step to make sure that these professionals take the leading role when it comes to construction processes involving cost, as they work together with other professionals. This in turn will enhance effective and efficient design solutions. Furthermore, in Nigerian education, the curriculum will need to be further developed in order to capture the knowledge, skills and competencies of the economics of building. A clear distinction should be made between main stream quantity surveyors and design economists. This is an urgent response to emerging new challenges and complexities involved in the building life-cycle.

Cost Effective Designs

It is evident that for every building, the need is for a building that is effective especially where cost is concerned. The client expects that projects will be managed effectively such that they are completed on time, are of a certain standard or quality and be of value in the market. Various stages of building activities, from design to construction, its use, and demolition have the ability to directly/indirectly influence cost and the built environment. When buildings are efficiently planned, designed, constructed and used, cost and energy are reduced. Buildings can therefore be planned and designed with the aim of reducing construction costs, promoting economic growth, and efficient and effective use resources and energy. In a bid to reduce building cost in terms of electricity/water, respondents suggested the adoption of optimum design solutions, such as green buildings to generate its own energy. When building economics is properly employed, it allows for cost-effective buildings, which is achievable by making reference to certain key factors that do not in turn affect the end product. Achieving this in the Nigerian built environment will prove difficult as a result of the nature of its economy. The use of low-maintenance materials, indigenous materials, or recycled materials, will also influence designs that are cost effective; practices with state of the art technology in construction, will also prevent loss and wastage of time, labour and materials. Furthermore,

construction processes are to be managed in an effective and timely manner for completion, where builders and contractor margins are kept low, and the reduction in government levies and fees.

Principles for Value Enhancement

From literature, design economists make use of the necessary principles and theories (capital and whole life cost, value management, and resources) to achieve optimum efficiency with construction processes. An understanding of these helps to reduce whole life building costs necessary in achieving design solutions through value enhancement and resource efficiency. Building costs are determined on the cost of resources such as land, materials, and labour. To address the ongoing problem of land in Nigeria, design economists are saddled with the responsibility to provide a range of solutions and techniques for appraisal that optimises the value of land. Activity based design is also a medium that can be used to assess necessary land requirements and that minimises the use of land based on different activities. Resources that are key such as cost of construction materials and the cost associated with them will depend on process of production which is partially influenced by economic, monetary or fiscal policies. Therefore, to efficiently and effectively have knowledge of the resource market, cost planning of resources plays a vital role.

In making design decisions there should be an understanding of building life, capital cost, and the relationship between these two phenomena. When theories of whole life cost are employed, it minimises the total cost of construction over the entire building lifespan, and also maximises built assets. The government influences interest rates and inflation through certain policies, which affect building whole life costs that design economists carry out. With this in mind, future predictions on cost involved with construction (capital and operational) that deal with decision making of capital investments that are key in buildings for the long-term, are made possible. The application of value management theory emphasizes on identification of key cost drivers that enable building value to be facilitated and eliminates cost in design that are unnecessary. However, for the building economist, parameters such as modelling, monitoring resources, and management of costs should be based on information that is accurate. Monetary policies influence changes in inflation and interest rates, which in turn affect construction cost and predictability of any project. This is a daily challenge Nigeria faces.

Productivity and New Technology

Central to productivity and efficiency in building is reduction in cost and waste in construction projects, which in Nigeria occurs more often than normal. Productivity and efficiency are determined and examined using a method to analyse relationships between people and technology as an approach towards management. This approach makes it possible to technically influence productivity with practices involving proper planning and allocation of resources. It also recognises that the creation of work environments that motivate people in a manner that is effective, establishing the right communication channels, properly coordinating design and construction processes can affect level of productivity. Economists in the construction industry are able to proffer clients with expert advice on alternative ways to procurement that rely on the relationship between construction firms. This improves management of risk in these firms and betters efficiency and the prediction of building costs. Design outcomes are also improved by efficiency in space planning, which in turn improves organisation and productivity of built assets.

Technology is very vital in any construction process as this allows for the improvement of practices that are interdisciplinary. With professionals in the Nigerian construction industry, there is a need for this to be further explored. Modern technology such as the application of Building Information Modelling (BIM), challenges the traditional construction roles of team members, thereby changing the relationship between main parties such as architects, engineers and quantity surveyors that double as design economists. Using BIM and other management tools will bring about designs that are more cohesive, reducing cost and time, thereby resulting in more efficient construction projects in Nigeria.

CONCLUSION

The fragmentation of the building professions, the building process, and the built environment is one of the fundamental problems affecting the building industry today. Building economics may not cover the lapses and solve these issues in the building industry; however, it may be used in order to make predictions on construction activities and the built environment. An economic understanding of building activity as a whole is a precondition for further improvement in economizing the use of building resources. One of the main tasks of design economics is to explain the economic causes and consequences of human actions, as manifested in the built environment. The economics of building therefore, provides an all-encompassing framework that studies building as a rational and purposeful human activity.

It is a natural occurrence for buildings to continually go through stages of modifications or alterations, as needs change over time, so also does their response evolve with the economic conditions of the environment. Change in needs are unforeseen occurrences, and as a result, buildings should be designed and built in a manner that they could be adapted to varying conditions in relation to diverse economic processes. The contribution of economists to construction industry processes has been minute although this little contribution has been towards the overall economy of the construction industry. Other areas of interest for the design economist should include the economics of planning, design, and maintenance of buildings. Economists have barely touched the realm of the built environment, despite it being an area where their expertise would be of great benefit. This field possesses a lot of potential such as scarce resources, which make economic analysis useful.

REFERENCES

1. Anyanwu CI. Project Cost Control in the Nigerian Construction Industry. *International Journal of Engineering Science Invention*. 2013; 2(12): 65–71.
2. Pheng LS, Hou LS. The economy and the construction industry. *Construction quality and the economy*. 2019; 21–54.
3. Oke A, Ogungbile A, Oyewobi, L, Tengan, C. Economic development as a function of construction project performance. *Journal of Construction Project Management and Innovation*. 2016; 6(2): 1447–1459
4. Falemu AJ. Human Resource Management in Construction [unpublished lecture note], Federal University of Technology, Akure. 2013.
5. Isa RB, Jimoh RA, Achuenu E. An overview of the contribution of construction sector to sustainable development in Nigeria. *Net Journal of Business Management*. 2013; 1(1): 1–6.
6. Best R. International Comparisons of Cost and Productivity in Construction: A bad example. *Australasian Journal of Construction Economics and Building*. 2012; 12(3): 82–88.
7. Ofori G. (2015). Nature of the construction industry, its needs and its developments: A review of four decades of research. *Journal of construction in developing countries*, 2015; 20(2): 115–135
8. National Bureau of Statistics. Annual Abstract of Statistics [internet]. Nigeria: 2012. Available from <https://www.nigerianstat.gov.ng>. (Accessed 3 June 2021)
9. Oke A, Falemu A. Relationship between building collapse and poor quality of materials and workmanship in Nigeria. *Proceedings of the Royal Institution of Chartered Surveyors Construction and Building Research Conference (COBRA)*; 2009 Sept 10-11; University of Cape Town, South Africa. 2009.
10. Aibinu A.A, Jagboro G.O. (2002). The Effects of Construction Delays on Project Delivery in Nigeria Construction Industry. *International Journal of Project Management*, 2002; 20: 593–599.
11. Mulligan G. *Building Economics: The Use of Economics in the Built Environment*. Student Economic Review. 1993; 7: 67–72
12. Robinson H, Symonds B. Economic context, policy environment and the changing role of design economists. In: Robinson H, Symonds B, Gilbertson B, Ilozor B. *Design economics for the built environment: impact of sustainability on project evaluation*. John Wiley & Sons, Ltd; 2015. p 3–15.

13. Mbamali I, Okotie A. J. An assessment of the threats and opportunities of globalization on building practice in Nigeria. *American International Journal of Contemporary Research*. 2012; 2(4): 143–150.
14. Taylor SJ, Bogdan R, DeVault M. *Introduction to Qualitative Research Methods: A guidebook and Resource*. John Wiley & Sons; 2015.
15. Lune H, Berg BL. *Qualitative Research Methods for the Social Sciences* 9th ed. Harlow, Essex, UK: Pearson; 2017.