

Prefabrication Method of Building Construction in Lagos State, Nigeria: Prospects and Challenges

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Abstract

Though the use of prefabricated elements in construction has been considered as one of the most effective methods, the industry has found difficulties implementing it. The paper provided an overview of the challenges and factors influencing the use of prefabrication in Lagos state. A survey technique was adopted in carrying out this research. This paper studied 100 prefabricated home owners and occupants, and 25 professionals with knowledge and skill in the construction of prefabricated buildings in Lagos state. Two different questionnaires were administered, one to prefab building occupants/clients and the other was administered to professionals in the prefab industry survey based on 5-likert scale. Statistical package for social sciences (SPSS) was used to process and analyze the data obtained from the questionnaires. The use of prefabricated elements in building construction is observed to be an effective and efficient approach to improving construction processes and productivity, ensuring construction quality and reducing time and cost in the construction industry. However, many problems occur with this approach in practice, including initial high cost of construction, unawareness of the prefabricated method of construction, unavailability of prefabrication companies locally, technically and challenges in installation. The study concluded that though there are lots of factors influencing the use of this method of construction, the benefits should be put into effective use. The use of prefabricated elements in building construction in Lagos state is profitable due to the benefit of faster construction time because of the nature of the city and the increasing population of the city. Recommendations were provided to further the use of the prefabricated method of construction more effectively.

Key words: Building, Construction, Elements, Lagos state, Prefabricated

INTRODUCTION

Prefabrication is defined as the transferring stage of construction activities from the field to an off-site production facility (1). Further, factory production and can reduce waste generation and encourage recycling construction waste, leading to environmental protection and sustainability of the industry (2). Prefabrication is considered as an effective procedure in waste minimization (3). Prefabrication allows for more controlled conditions for weather, quality control, improved supervision of labour, easier access to tools and fewer material deliveries (4).

Prefabrication processes have re-emerged and led to the rise of Building Information Modeling (BIM) and green building, which in turn improves worksite productivity and overall project. labour productivity for the same activity increased by 30 percent when lighter weight materials were used. Also, labour productivity improved when construction activities

were performed using materials that were easier to install or were prefabricated (5). Prefabrication allows for increased workers safety through reduced exposures to inclement weather, temperature extremes, and ongoing or hazardous operations; better working condition. Though the use of prefabricated elements in construction has been considered as one of the most effective waste minimization methods, the industry has found difficulties implementing it. Its adoption is mainly confined to public housing projects. The main reason is because of high initial construction cost, time consuming in initial design development, limited site space in placing prefabricated building components, lack of experience, lack of demand in prefabricated components, water leakage problems and non-standardized design. These are reasons for major obstacles to private housing projects in implementing prefabrication (6). In general, some of other reasons include the following: Transportation of prefabricated sections/ elements, Delay in manufacture of

elements by the manufacturers as at when required, Error in manufacturing, in dimension or quality, Leakages at joints mostly in concrete prefabricated elements, Unavailability of most required machineries, Inexperience of laborers on this method of construction, Unawareness of clients about this method of construction. These and many other obstacles or challenges are encountered in the adoption of this method of construction. This has left some construction industry in various countries to still heavily rely on the conventional building technologies including cast-in-situ, bamboo scaffolding, timber formwork, plastering and painting. This renders labour intensive construction processes, along with poor workmanship quality and overwhelming use of multi-layered subcontractors, hampers management control and results in excessive waste generated from construction activities (7). Therefore, Identifying these challenges can promote the developments of prefabrication more effectively and to fulfill future environmental requirements. This study therefore sought to examine the challenges encountered in the use of prefabricated elements in building construction in Nigeria. The research objectives include: To examine the factors that influence the use of prefabricated elements in building construction. To evaluate the challenges encountered by stakeholders in the use of prefabricated elements in building construction. The research study and analysis was carried out on some construction firms, professionals and clients who have engaged or gained experience in the use of prefabricated building elements in building construction in Lagos state, Nigeria. The main limitation of this current study lies in the possibility of target respondents and/or firms withholding sensitive information Also, lack of awareness on the use of the prefabricated method of construction. Though, Prefabrication has been in existence for a long period of time, but with a limited number of construction firms who have knowledge and skill in this method of construction, which makes population difficult to estimate.

Nevertheless, this study is significant to the construction industry, as it provides better information on the challenges faced by construction companies that have engaged in the use of prefabricated method of construction. It reveals to the industry, better ways of implementing this method of construction for executing its projects more effectively, at lower costs, better safety on site,

less workers on site and many other benefits available when this method of construction is implemented. To the clients and individuals in general, it provides knowledge on both benefits and challenges in the use of prefabricated method of construction. This would help them in making better decisions on whether or not this is worth investing on. To precast and prefabrication industries, it provides information on the challenges faced by their clients, i.e. those who purchase their products for the purpose of construction. It would help them to know the areas where improvement and correction are required while manufacturing these prefabricated components and sections. To government, it provides information on how it can be used to meet the housing needs of the nation, and also the challenges and possible solutions to some of these challenges. To research institutions, it shows areas that need to be analyzed and research needed to be made in providing solution to these construction challenges. Also, it brings to the awareness of professional bodies in the construction industry, areas of the method of construction that need to be amended and also providing rules that guide the use of this method of construction. In general, this research provides to the public the challenges and suggestions on ways to overcome and correct these challenges for better and effective use of this method of construction.

LITERATURE REVIEW

The concepts of prefabrication and simplification of tasks applied to the construction sector are not new, having been discussed extensively since the 1950's (8). Prefabrication has been used extensively and widely for many years around the world. Prefabrication is a widely used term with varying interpretations usually referring to offsite manufacturing of buildings, or buildings, or parts thereof, prior to installation or assembly onsite (9, 10). Some common terms used frequently to describe this method of construction include; pre-assembly, prefabrication, modularization, system building and industrialized buildings. (11). Prefabrication technologies deliver a better product, because building is done in a quality controlled, sheltered environment, the move to more prefabrication in construction industry is inevitable. It is seen as one of the tenets of improving construction in the 21st century (12,13), Different categories of prefabricated elements used in the construction of prefabricated building include: Complete, Modular, pods and panels

that therefore covers structural buildings panels, pods, modular units and completely prefabricated building(14,15). A structured theoretical framework prepared by (16) was examined. The framework sees prefabrication of buildings as the result of an 'open innovation system' (17). This approach provides an understanding of the broad influences which could impact the adoption of prefabrication. (16) Project based product framework provides a structure for examining an 'open innovation system'. There is a need to envisage building companies, suppliers, regulatory bodies and end-users not as individual actors working in isolation (or in 'silos'), but rather, as partners in a larger network towards achieving a common goal (18,19,20,21). There is a need to have a holistic consideration of the benefits and disadvantages of using prefabricated housing, from practical builder-level implementation issues, to 'soft' concerns such as health and safety, management and process issues (22). In this research, prefabrication is preferred with special emphasis on the building components which are made off-site in a factory. These sectors have better adoption rates compared to the permanent sector. (23).

This current research therefore systematically discussed the existing published evidence regarding the potential barriers or challenges and drivers or influences of prefabricated elements in building construction in Lagos state, with more emphasis on the challenges in order to address the reason for the limited use of this method of construction in Lagos state.

2.1 Factors Influencing the Implementation of Prefabricated Construction.

Prefabrication involves the fabrication or assembly of systems and components at off-site locations and manufacturing plants. Once completed, the systems or components are shipped to a construction job site for installation at the appropriate time. This technique offers the promise (if used appropriately) of sustainable lower project costs, shorter schedules, improved quality, and more efficient use of labour and, materials (24,25).

Construction workers typically are exposed to high levels of noise, dust and airborne particles, adverse weather conditions and other factors that can cause fatigue and injuries and thereby reduce efficiency and productivity. New types of equipment can make an activity physically easier to perform, easier to control, more precise, and safer for construction workers.

Similarly, changes in materials can reduce the weight of construction components which in turn can make them easier to handle, move, and install. Manufacturing building components off-site provides for more controlled conditions and allows for improved quality and precision in the fabrication of the component. The largest factor driving demand for prefabrication is to have improved productivity and other factors driving or influencing the demand in the use of this method, such as improving the construction schedule, bidding competitively and finding a way to make up for a shortage of skilled labor on the job site.(26).

The factors that influence the use of this method includes: More controlled conditions: prefabrication allows for weather, quality control, improved supervision of labour, easier access to tools, and fewer material deliveries (27). Fewer job-site environmental impacts: A financial analysis investigated by a local case study found that wastage generation can be reduced up to 100% after adopting prefabrication, in which up to 84.7 per cent can be saved on wastage reduction. (28). There is compressed project schedules: Fewer conflicts in work crew scheduling and better sequencing of crafts persons. Reduction of overwhelming complexity and need for coordination in construction projects through the encapsulation of processes in one delivery and then resulting fewer actors on the site. Reduced overall construction cost because of reduced requirements for on-site materials storage, and fewer losses or misplacements of materials. Also, low costs are incurred due to shorter periods of scaffolding required. Cost of maintenance of vehicles is reduced unlike the conventional method, because of fewer trips covered by the vehicles. Increased workers safety through relative exposures to inclement weather, temperature extremes, and outgoing or hazardous operations; better working conditions (e.g. components traditionally constructed on-site at heights or in confined spaces can be fabricated off-site and then hoisted into place using cranes). Shortened construction time because it does not require drying time. Elimination of site malpractices: The prefab method of construction eliminates this challenge, as materials have already been processed to produce the building component before being taken to site for installation (9,29,30)

2.2 The Use of Prefabricated Elements in Building Construction in Lagos State.

The Use of Prefabricated Elements in Building Construction in Lagos State has majorly been executed by LSDPC (Lagos State Development and Property Corporation). LSDPC was established as LEDB in 1928 and mandated to take charge of effective planning and development on Lagos. LSDPC has 40 residential estates comprising a total of 20,572 housing units (31,32). There are 20 estates for low income earners, 8 estates for medium income earners and 5 estates for high income earners. LSDPC worked in conjunction with firms like HFP Engineering (Nigeria) Limited in construction of Estates such as Dolphin Estate in Ikoyi and the Sura shopping complex Lagos island, using the prefabricated method of construction. Also, HFP Engineering (Nigeria) Limited have executed over 5000 prefab housing units and civil engineering projects in Nigeria using the prefabricated method of construction. It is seen that these methods (prefab systems) are cheaper when compared to conventional. HFP acquires land from the government and builds housing estates, office blocks and shopping complexes for sale or rent to the public. They include Ikota International market, Victoria Garden City Shopping Complex (VGC), Dolphin Shopping Complex, LSDPC Estate in Yaba, Dolphin Estate in Ikoyi, Danny Estate in Yaba and Victoria Garden City in Lekki.

During an interview by Lagos Executive Development board, HFP management stated that prefab system of construction helps them to reduce the need for skilled workmen on site, reduces project cost, reduces duration of time on site, increases product quality, limits design options, increases safety performance on site and reduces environmental impact on site. Until 2012, all works done by HFP were based on the use of panelized system. In Lagos HOMS Estate, Igando by Lagos State Government under NTDA (New Town Development Authority) in 2013, HFP was commissioned to build 15 blocks of 12 flats each making a total 180 flats. HFP decided to use hybrid system of prefab construction for this project. The hybrid system involves the combination of prefab columns, beams and slabs with conventional sandcrete blocks. This therefore shows that prefab systems have long been utilized in the construction of residential and commercial buildings in Lagos State. There are challenges and barriers that make the use of this system limited in Lagos state.

This paper identified and proffered solution to these challenges.

3. RESEARCH METHOD

The study was conducted in Lagos because it is one of the economic and commercial nerve centres of the country. Lagos has a high volume of construction activities. Most of prefabrication construction companies have their head offices or at least a branch/operation office in the city which also houses a rich collection of construction industry practitioners and experts. The targeted population comprises 50 construction firms that are specialised in offering the services of construction using prefabricated elements based on research. Also the population includes about 2000 clients who have adopted this method of construction or occupy buildings made of prefabricated elements. A collection of prefabrication construction companies based in Lagos, their phone numbers, business names and contact addresses were obtained from search engines on the internet and construction brochures. These prefabrication construction companies were administered the research instrument. Judgemental sampling method (34), a non-probabilistic sampling technique, was adopted for the study due to the non availability of current and comprehensive list of construction firms that are involved in the use of prefabricated elements in building construction. A structured questionnaire was used as the principal instrument for obtaining responses on factors contributing and the challenges encountered in the use of prefabricated elements in building construction. Also interviews were carried out to obtain more information from prefabricated building occupants. The questionnaire consists of closed ended questions (multiple choices). Questionnaires were distributed by hand to managing directors, estimators, commercial managers, construction/project managers and other key personnel involved in the use of the Prefabrication method of construction. Two sets of questionnaires were administered to professionals in prefabrication organisations based on their practical experience with real time projects and prefabricated building occupants/clients respectively. Respondents were requested to measure the challenges and level of effectiveness of factors influencing the use of this method of construction on a five-point scale (SA=Strongly Agree, A= Agree N=Neutral, D= Disagree SD= Strongly Disagree). The factors affecting the use of prefabricated elements were analysed by

Frequency Index. The frequency index (F.I) was obtained by using the formula:

$$F.I = \frac{5(1) + 4(2) + 3(3) + 2(4) + 1(5)}{5(1+2+3+4+5)}$$

Where:

1 = strongly agree,

2 = Agree,

3 = Neutral,

4 = Disagree,

5 = Strongly Disagree

The factors were ranked from the highest to the lowest based on the frequency index.

Personal visits and phone calls were made to operation offices of firms and respondents to deliver and also retrieve the questionnaires. Also site visit to

some sites where this method of construction is being used was made, and interviews were also carried out to gain more information as it applies to the research objective. Statistical package for social sciences (SPSS) was used to process and analyse the data obtained from the questionnaire survey. Statistical tool used for the data analysis of variety of data generated from the survey include Descriptive tools such as charts, frequency, percentages, Measures of location, otherwise called measures of central tendency eg the mean, median and mode.

4. DATA ANALYSIS AND PRESENTATION

Data collected from the questionnaire respondents were analysed and presented in the following tables.

Table 1: Research Questionnaires Administration

Questionnaires	Prefab building clients/ occupants	Professionals
Administered	100	40
Returned	84	23
Response rate	84%	57.5%

Forty copies of research questionnaires were distributed to professionals in the industry that are involved in the prefabricated method of construction, 23 were completed and returned representing a 57.5% response rate. Also out of 100 copies of research questionnaires distributed to prefabricated home occupants, 84 were completed and returned, representing an 84% response rate. The returned

copies were scrutinized for errors, omissions, completeness and inconsistencies. A total of 107 questionnaires were completed. This is a good response rate considering the difficulties in getting responses to questionnaires in Nigeria.

Table2. Show the summary of the demographic characteristics of the client respondents.

Table 2: General Characteristics of the respondents (Clients/Occupants)

Personal characteristics of respondents	N	Percentage (%)	
Ownership			
Owned	27	32.1	
Rented	56	66.7	
Others	1	1.2	
Total	84	100	
Age of respondents			
10-20 years	4	4.8	
21-30 years	25	29.8	
31-40 years	48	57.1	
41years and above	10	11.9	
Total	84	100.0	
Range of annual income			
N100,000-N500,000	2	2.4	
N600,000- N1,000,000	16	19.04	
N2,000,000-N10,000.000	40	47.61	
N11,000,000 and above	25	29.8	
Missing System	1	1.2	
Total	84	98.8	
Awareness on the Method of Construction			
Yes	53	63.1	
No	31	36.9	
Total	84	100.0	
Source of Information			
Media	12	14.3	
Personal Study	17	20.2	
Formal Education	11	13.1	
Construction Consultants	13	15.5	
Others	11	1.2	
No Response	20	23.8	
Total	84	100.0	
Maintenance Cost Policy			
Very Expensive	38	45.2	
Moderately expensive	46	54.8	
Not Expensive	0	0	
Total	84	100.0	

Table 2 shows the ownership state of the building, with 32.1% being owned by the occupants and 66.7% as the rate of those rented by the occupants. The age range of 31-40 years (57.1%) constituting a high number the occupants that provided information to aid this research, 29.8% and 11.9% representing the age bracket of 19-25 years and 41years and above respectively.

The income rate of the occupants with N600,000 -N 1,000,000 constituting (2) 2.4% and N2,000,000 - N10,000,000 constituting (40) 47.61% , N11,000,000 and above rating 29.8% while N100,000 - N500,000

rating 2.4. Thus indicating the financial capacity of the occupants as being able to afford to acquire or rent this type of building.

The study shows the rates at with individuals are conversant with this method of construction. 63.1% of the occupants chose yes, meaning that they are aware of this method of construction and also are aware that this method was used in the construction of the house they occupy. While 36.9% are not aware of this method of construction. The respondents were asked about how they came to know about the prefabricated method of construction in order to

know the source of their knowledge on the prefabricated method of construction. 14.3 % chose the Media as source of knowledge, 20.2% chose personal study, 13.1 chose formal education, and 15.5% chose construction consultants. This shows that a good amount of individuals came to know about this method of construction via their personal study. Construction consultants were ranked one of the lowest sources of knowledge of this method of construction. This also shows that construction consultants which include the professionals in the industry do not provide alternatives like the prefabricated method to the conventional method of construction, when proffering methodology for construction to clients.

Finally, the choice of the occupants on how expensive it is to occupy a building made using prefabricated elements. 45.2% agree that it is very expensive to occupy this type of building, while 54.8% agree that it is moderately expensive to occupy this type of building, thereby constituting a higher percentage of the response to the fact that it is moderately expensive to maintain the buildings.

4.3 Challenges encountered by occupants of Prefabricated Buildings.

Table 3 shows the challenges encountered by prefabricated building occupants with the mean scores including the ranking of the challenges.

Table 3 Challenges encountered by occupants of Prefabricated Buildings.

S/N	Challenges Encountered By Prefabricated Building Occupants	Mean	Ranking
1	Initial high cost of financing projects using this method	4.27	1
2	High cost of repair or maintenance	4.05	2
3	Limited flexibility in design	4.05	3
4	Inability to make changes to building after it has been installed	4.00	4
5	leakages at joints	3.92	5
6	Services challenges e.g. electrical and plumbing	3.85	6
7	Inadequate ventilation system	3.23	7
8	Limited availability of agencies to repair damages	3.18	8
9	Poor sound control in the building	2.94	9
10	Presence of cracks on wall	2.54	10

Table3 shows that the major challenge affecting the building occupants is the initial high cost of financing projects using the prefabricated method of construction (4.25). This method of construction requires a huge sum of capital to commence its fabrication and installation, as all the materials needed to produce the various elements have to be purchased first before the elements can then be made available for assembling. Which is unlike the conventional method, where payments could be done in bits, and progress is made on the

construction based on the flow of finance. While the least of the challenges encountered by the occupants, is the presence of cracks on the wall surface (2.54). This means that prefabricated method of construction, has an advantage of not possessing cracks before and after assembling the elements on site.

4.4 Perception of the clients on the Prefab Method of Construction

Table 4.Perception of the clients

S/N	Perceptions	Mean	Ranking
1	I think this method is faster to construct	4.35	1
2	More awareness should be made on this method of construction	4.33	2
3	I think this method should be adopted more by the government	4.14	3
4	I prefer this method of construction to the conventional method	3.84	4
5	I think this method should be adopted more by individuals	3.71	5
6	I think it is expensive to maintain my house	3.52	6
7	The challenges faced would be lesser with the conventional method	3.501	7
8	I prefer other lighter wall panel e.g. timber or plaster boards	3.47	8
9	This building is not worth its expense	2.95	9

Table 4 shows that it is faster to construct when using prefabricated elements for building construction ranked 1st as it has the highest mean (4.35). Also the fact that more awareness should be made on this method of construction was agreed by the occupants to be very important.

4.5: Professionals in the Industry.

Professionals in the industry were involved in this research; they also provided quality information in order to achieve the aim of the research as shown in table 5.

Table 5: Personal characteristics of respondents (Professionals)

Personal characteristics of respondents	N	Percentage (%)
Engineer	9	39.13
Quantity Surveyor	5	21.7
Builder	1	4.3
Architect	7	30.4
Others	1	4.3
Total	23	100.0
Academic qualification		
HND/B.Sc	5	21.7
PGD	6	26.1
MSc/MBA/Ph.D	10	43.48
OTHERS	2	8.7
Total	23	100
Working experience		
1-10 years	4	17.39
11-20 years	6	26.08
21-30 years	8	34.78
31years and above	5	21.73
Level of involvement in the use of prefabricated elements		
Yes	21	91.3
No	2	8.7
Total	23	100
The purpose of the buildings		
Commercial	2	8.7
Hospital	3	13.0
Educational	3	13.0
Residential	13	56.5
No response	2	8.7
Total	23	100.0

Table 5 is on the involvement of Professionals. It is observed that 39.13% of the respondents are Engineers, 30.4% of the respondents are Architects. 21.7% of the respondents are Quantity Surveyors, 4.3% are builders and another 4.3% constitute other professionals like specialists in related fields etc. It is also observed that, 91.3 % of the respondents, that is the professionals, have been involved in the construction of buildings using prefabricated elements. This indicates that there is a surety that the responses given are sincere responses due to the

experience of the respondents. On the types of buildings constructed, 8.7% were engaged in the construction of prefabricated commercial buildings, 13.0% were engaged in the construction of prefabricated hospital buildings; another 13% constructed prefabricated educational buildings, while 56.5% were engaged in the construction of prefabricated residential buildings.

4.6. Types of Systems or Components of Prefabrication was used by the Professional

Table 6: Systems or Components of Prefabrication used by the professionals

S/N	Elements	Frequency	Percent
1	wall panels, roofs and building sections	2	8.7
2	wall panels, slabs, beams and columns, and roofs and building sections	5	21.7
3	wall panels and slabs, beams and columns and roofs	1	4.3
4	wall panels and building sections	1	4.3
5	wall panels and roofs	2	8.7
6	wall panels and slabs, beams and columns	3	13.0
7	Roofs	1	4.3
8	slabs, beams and columns	2	8.7
9	wall panels	4	17.4
10	No response	2	8.7
	Total	23	100.0

Table 6 shows that a good number of professionals have engaged in construction projects that involved the use of various prefabricated elements. 21.7% of the professionals have used prefabricated elements like wall panels, slabs, columns and beams, roofs, building sections etc.

4.7 Factors influencing the use of prefabricated elements in building construction in Lagos state.

Table 7 shows the various factors that influence the use of prefabricated elements in building construction. These factors have also been ranked according to its relevance with respect to the choices made by the professionals.

Table 7: Factors influencing the use of prefabricated elements in building construction

S/N	Factors	Mean	Ranking
1	Shorter duration of assembling than the conventional method	4.65	1
2	Fewer conflicts in work crew scheduling	4.39	2
3	Waste reduction	4.35	3
4	Compressed project schedules	4.26	4
5	Improved productivity	4.26	5
6	High quality product	4.22	6
7	Reduced cost in a long-run	3.87	7
8	Environmental benefits associated with its use	3.87	8
9	Improved site safety	3.83	9
10	Elimination of site malpractices	3.65	10
11	Adverse weather conditions	3.48	11
12	Profitability for clients	3.39	12

The major factor of influence is the shorter duration of assembling than the conventional method (4.65). The use of prefabricated elements is known for its short period of time of construction it offers. The need to commence and complete construction projects in a short period is the driving factor to the use of prefabricated elements in building construction in Lagos state.

Based on the challenges encountered by the professionals, high cost of acquiring machineries was the major challenge faced by them (3.87). The challenge of unawareness of the public about the prefabricated method of construction (3.78) was ranked 2nd, while error by manufactures, in dimension or deformations e.g. crack was ranked least.

4.8 Challenges encountered by the professionals in the use of prefabricated elements in building construction in Lagos.

Table 8: Challenges Encountered By Professionals

S/N	Challenges	N	Mean
1	High cost of acquiring machineries	1	3.87
2	Unawareness of the public about this method of construction	2	3.78
3	Time consuming in its initial design development	3	3.70
4	Limited availability of prefab manufacturers locally	4	3.43
5	High initial construction cost	5	3.43
6	Unavailability of required machineries	6	3.43
7	Limited availability of experienced installers	7	3.39
8	More time allocated to production of prefab elements	8	3.30
9	More demanding planning and management inputs	9	3.26
10	Presence of risk when installing heavy precast members	10	3.17
11	Policies and cost of transportation of units/ elements	11	3.04
12	Limitation in design flexibility	12	2.83
13	Difficulty in project funding	13	2.61
14	Complication in assembling and installation	14	2.35
15	Difficulty in handling method, due to limited workspace	15	2.22
16	Delay in manufacture of elements by the manufacturer	16	2.17
17	lack of inspection of quality during manufacturing	17	2.13
18	error by manufactures, in dimension or deformations e.g. cracks	18	2.09

4.9 The contribution of stakeholders to the use of prefabricated elements in building construction in Lagos state

Table 4.9:

S/N	Contributions	Mean	Ranking
1	Quality control should be carried out by professionals to ensure that the end-product is of a high quality.	4.65	1
2	There is the need for the government to be involved in making use of this method of construction, due to the benefits it offers.	4.61	2
3	There is the need to create awareness to the public about this method, by the manufacturers and industry at large	4.57	3
4	There is the need to create awareness of this method of construction to students in the construction field, on this method of construction by their educational institutes	4.39	4
5	There is the need for provision of rules guiding the use of prefabrication method by professional bodies in the industry, in order to maintain safety in the practice of construction.	4.30	5
6	Government policies have adverse effect on prefabrication method especially in the aspect of transportation of elements to site for assembling	2.65	6

5.0 SUMMARY OF FINDINGS

The research has shown so far that a good number of persons know about the prefabricated method of construction, this is because they occupy buildings made using the method and also they knew about the methods from personal studies, construction consultants, media and formal education. Many of the building occupants agreed that it is moderately expensive to acquire this type of building and that the cost is worth the benefits (9). It was observed that the major factor influencing the use of prefabricated elements in building construction in Lagos state is the shorter duration of assembling than the conventional method in agreement with (28,24) Professionals and occupants both agree that this method is faster to construct in line with (32,33)/ It was observed that using this method allows for safety on site, as very minor accidents occurred based on the response of the professionals to the amount of safety that this method offers in line with (27). The professionals agreed to the fact their clients were satisfied with outcome of the project when they used the prefab method of construction (26).

Based on the challenges faced, some occupants believe that it is very expensive and that the initial cost of acquiring or constructing is a major challenge to the use of this method in Lagos state

in agreement with (6) While the professionals believe that the high cost of acquiring machineries and the unawareness of individuals about the prefabricated

method of construction are the major challenges that affect the use of the method in Lagos state in line with (22). The professionals gave a high response to the fact that there should be quality control to ensure that the products are of appropriate quality in line with (2, 34, 26)

6.0 CONCLUSION

It can be concluded that there are lots of factors that influence the use of this method of construction and the benefits should be put into effective use. The use of prefabricated elements in building construction in Lagos state is profitable due to the benefit of faster construction time because of the nature of the city and the population of the city. The city is increasing in population, and there is need to provide accommodation for the mass, therefore, prefabrication is one of the best ways to meet the accommodation needs faster.

7.0 RECOMMENDATION

It is recommended that to minimize the difficulties in the use of prefabricated elements in building construction, more awareness should be made, in order to increase the number of individuals who know of this method. This would also lead to the reduced initial cost of acquiring or constructing buildings made with prefabricated elements. Lagos state government should engage more in the use of the prefabricated method of construction, due to the increasing population in the state. Prefab is faster to construct, thereby leading to faster accommodation

provision and increased revenue for the state government. Also, with government getting more involved, it would encourage private individuals to partake in using this method of construction. Professionals in the industry should also patronize the use of this method, as it reduces site malpractices, guarantees improved site safety, labour productivity, and provides the solution to adverse weather conditions. They should proffer this method to their clients by exposing them to the benefits that they provide. Proper supervision and adequate quality control would lead to the satisfaction of the client. Educational Institutions should provide platforms in their construction programs, seminars and workshops to enlighten and educate students and masses on this method of construction. For instance, programs known as “The Town and Gown Lecture Series” done in Covenant University Ota, where professionals of different specialization from the construction industry, come and have special lectures with students on newer and better methods of executing construction projects effectively. Moreover, the regulatory bodies of the industry should provide regulation governing the use of this method so as to make its implementation easier.

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