



E-ISSN: 2707-5931  
P-ISSN: 2707-5923  
IJCCN 2022; 3(1): 12-18  
Received: 24-10-2021  
Accepted: 08-12-2021

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## Assessing the essentials of the application of constructability during the design process of real estate development

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DOI: <https://doi.org/10.33545/27075923.2022.v3.i1a.34>

### Abstract

Constructability is a technique applied to identify hindrances before a real estate development is actually developed to reduce or prevent errors, delays and cost overruns from start to finish. The study assessed the essentials of the application of constructability during design of real property development process in Port Harcourt, Nigeria. The study adopted survey research design with a total of 60 copies of questionnaire retrieved representing 78.9% response rate. Respondents were purposively selected from 76 Lecturers in Faculty of Environmental Sciences with 6 Departments: Architecture, Estate Management, Surveying and Geometrics, Urban and Regional Planning, Quantity Surveying and Environmental Management of Rivers State University in Port Harcourt. The data were analyzed using descriptive and inferential statistics. The study has shown that 74% of the respondents have high level of awareness of constructability application among practitioners, which believe that it improves designs and leads to other essentials on property development. And there are many factors hindering widespread use of the constructability, the most significant of which is practitioners' lack of property development knowledge. The findings also discovered that although most practitioners indicated that they required developers' experience in their designs, only 74% were often involved with contractors in the design process, which only developers can provide more site feedbacks. The study concluded that there exists a relationship between essentials of applying constructability principles to property development, which is significant at  $p$ -value = 82.1%. Thus, the suggested a total disassembling of the traditional compartmentalization of design and development by more widespread use of non-conventional procurement methods which give developers a greater role in design.

**Keywords:** Application, constructability, essentials, design process, estate development

### Introduction

Constructability is a real property development technique apply to review the development processes from start to finish during the pre-development stage. It is applied to identify obstacles before a real estate development is actually developed to reduce or prevent errors, delays and cost overruns. Real property development cost reduction is the primary concern for clients, designers, developers and other stakeholders in the construction industry. According to Obiegbo (2004) <sup>[11]</sup>, the input of real property development ideas during the design phase is especially necessary to achieve this goal. Bamidele and Olamoju (2017) <sup>[4]</sup> defines constructability as the optimum use of property development cost knowledge and developer's experience in the conceptual stages of: planning, design, procurement and field operation of a developed property to achieve overall project objectives in the best possible time and accuracy at the most cost effective levels (Bamidele and Olamoju, 2017) <sup>[4]</sup>. Constructability therefore is a tool for enhancing property performance (Obiegbo, 2004) <sup>[11]</sup>. The outdated procurement method commonly used in the construction industry tends to create a division between developers and designers, separating design from property development. This division prevents developers from delivering their clarifications and feedback to designers and hinders the application of the concept of constructability which involves the integration of construction knowledge and developers experience into the design process (Motsa, Oladapo and Othman, 2008) <sup>[9]</sup>. The practice of constructability in real property development is still relatively unpopular; for lack of industry awareness, or not that there is a burden or anything encumbering their success as many property developers currently do not apply constructability in their property development during design process. Moreover, the issue of flooding in the built environment is a call for concern; as it is effecting the construction industry's activities.

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The consideration for the application of constructability during the design process is essential. This ultimately prevents the real estate development delivery processes in the most cost effective manner. It is against this background that this study investigated the essential level implementation of the concept of constructability and designers' perception of its usefulness in the design process.

## Literature Review

### Concepts of Constructability

According to Obiegbu (2004) <sup>[11]</sup>, constructability is the input of property development understanding during the design phase is especially necessary to achieve this goal. Bamidele and Olamoju (2017) <sup>[4]</sup> defines constructability as the optimum use of construction knowledge and contractor experience in the conceptual planning, design, procurement and field operation of a project to achieve overall project objectives in the best possible time and accuracy at the most cost effective levels (Bamidele and Olamoju, 2017) <sup>[4]</sup>. Constructability therefore is a tool for enhancing property development performance (Obiegbu, 2004) <sup>[11]</sup>. The outdated procurement method commonly used in the construction industry tends to create a division between developers and designers, separating design from property development.

Constructability has been defined by Motsa, Oladapo and Othman (2008) <sup>[9]</sup>; as the optimum use of property development knowledge and experience by the owner, developer, engineer, contractor and construction manager in the conceptual planning, detailed engineering, procurement and field operations phases to achieve overall project objectives. The concept denotes the ease with which the raw materials of the property development process (land, labour, production equipment and tools, and materials and installed equipment) can be brought together by a developer to complete a project in a timely and economic manner (Abdul-Kadir and Jaafar, 2001). According to Low (2001) <sup>[8]</sup>, the concept first emerged in the late 1970's following studies into how efficiency, productivity, cost effectiveness and quality could be achieved in the real estate industry in the United Kingdom and United State of America.

Nima, Abdul-Kadir and Jaafar (2001) <sup>[10]</sup> have articulated 23 constructability concepts applied to the conceptual planning, design and procurement, and field operation phases of the project cycle. The conceptual planning phase has 7 concepts, the design and procurement phase 8 concepts and the field operations phase 8 concepts. These concepts are development principles that should be applied during the property development delivery process to stimulate thinking about constructability and how to make it work (Trigunaryyah, 2004) <sup>[14]</sup>. To assist in applying the constructability concepts; the developed application matrices are useful tools that link constructability concepts to specific activities within each phase when preparing a property development execution plan (Bamisile, 2004) <sup>[5]</sup>.

### Link Between Constructability and Property Development

Trigunaryyah (2004) <sup>[14]</sup> opine that lack of integration of property development knowledge in the design process has hindered the ability to construct and complete a developed property. This was cited as the main reason for developed properties to exceed its budgets and schedule deadlines. Constructability show how efficiency, productivity, cost

effectiveness and quality could be achieved in the real estate industry. Constructability links to property development at the design phases has an important role to play in the success of a project's lifecycle. Many of the decisions made early in the design process affecting property development and development expertise needs to be incorporated in the process to improve the design (Anderson, Fisher and Raham, 2000) <sup>[2]</sup>. Thus, according to Bamisile (2004) <sup>[5]</sup>, constructability benefits occur when individuals with property development knowledge and experience become involved in the early stages of a property life cycle.

Constructability should be applied at the early stage and considered as an important objective in all the stages of the property development process. This is because it has the ability to influence property development cost and add better value for money. Based on their property development knowledge and experience, developers can play a major role in enhancing constructability (Nima, Abdul-Kadir and Jaafar, 2001) <sup>[10]</sup>. Constructability is most effective if it is included as an integral part of the project execution plan and project procedures (Bamisile, 2004) <sup>[5]</sup>. Motsa, Oladapo and Othman, (2008) <sup>[9]</sup> state that in any property development or engineering project, improvement could be achieved through careful consideration of procurement, design, development techniques and management approach. The separation of design and construction within the property development process is responsible for the lack of consideration given to the necessary coordination and integration between project phases.

According to Motsa, Oladapo and Othman, (2008) <sup>[9]</sup>, many of the problems of inadequate design and production methods within both modern and non-modern development contracts were caused by unclear or missing project information, inadequacies in the quality of information provided or lack of complete information, and general lack of harmonization of design with property development. Effective application of the concept of constructability to overcome these problems depends on the availability of the right information at the appropriate level of detail (Pulaski and Horman, 2005) <sup>[13]</sup>. This requires that designers and developers improve the quality of information passed between the various stages, using the right people and doing so at the right time.

### Factors that Enhance Constructability in Property Development Process

According to Motsa, Oladapo and Othman (2008) <sup>[9]</sup>, many of the factors that influence the implementation of constructability are related to the property development type. This is confirmed by Arditi, Elhassan and Toklu (2002) <sup>[3]</sup> in their study of design firms, which they found out that project complexity, design practices and philosophy, and project delivery (procurement) systems were the most significant factors that enhanced constructability while project location and design standards were the least significant.

### Factors that Obstruct Constructability in Property Development Process

Jergeas and Van der Put (2001) <sup>[7]</sup> identified barriers to constructability as significant inhibitors that prevent effective implementation of a constructability programme. According to Jergeas and Van der Put (2001) <sup>[7]</sup>, barriers to

implementing constructability still exist and must be identified during the project. Bamisile, 2004) [5] has classified the barriers into general, owner, designer and contractor barriers detailed as general barriers, owner barriers, designer barriers and developer barriers. Arditi *et al.* (2002) [3] reported that faulty, ambiguous, or defective working drawings, incomplete specifications, and confrontational relationships were found to be the three major factors that obstruct constructability. Budgetary limitations, resistance of the owner to formal constructability programmes, and non-standardisation of design were found to be the least dominant constraints that hinder constructability (Anderson, Fisher and Raham, 2000) [2]. This finding challenges the common misunderstanding that clients are a barrier to formal constructability programmes because constructability programmes constitute extra project cost. According to Arditi *et al.* (2002) [3], this suggests that there is no tendency on the part of project owners to prevent constructability programmes, probably because of their proven cost savings.

### Essential of Implementing Constructability in Property Development Process

Although, according to Arditi *et al.* (2002) [3], a constructability programme introduces a cost that is usually added to the design fee and might harm the competitiveness of the firm, there are some benefits to the design firms in return for their investment in more buildable designs. Thus constructability leads to important direct and indirect benefit, which according to Akintoye (2000) [1], are measurable not only in cost and time but also in terms of the physiological and psychological gains for the people involved in the construction process. Construction clients demand a high quality of service and value for money by expecting their projects to be completed on time, within the anticipated budget and as specified, trouble-free and relatively inexpensive to use and maintain. The clients' requirement can be achieved through the implementation of constructability (Anderson, Fisher and Raham, 2000) [2]. Constructability also enhances the reputation of the designer and contractor, minimises the waste of resources and produces a finished product with better quality and less defects (Odeyinka, 2003) [12]. The implementation of constructability programmes helps to develop better relationships with clients and developers; being involved in fewer lawsuits, and to the developed property a good reputation that can reduce antagonism and disputes between designer and developer (Idrus and Newman, 2002; Arditi *et al.*, 2002) [6, 3].

### Research Methodology

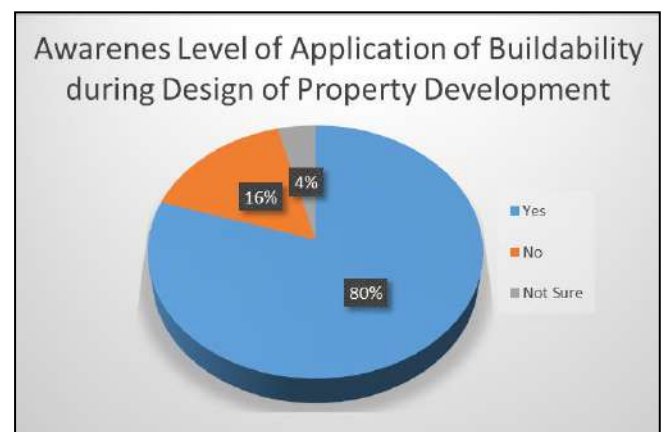
This study utilized a survey research design. And was conducted to investigate the perception of Lecturers of Faculty of Environmental Sciences, Rivers State University, Port Harcourt on the essential of the application constructability on real property development process. The choice of Lecturers in Faculty of Environmental Sciences with six (6) Departments: Architecture, Estate Management, Surveying and Geometrics, Urban and Regional Planning, Quantity Surveying and Environmental Management were based on the fact that they are lecturers and also experts in their various professions of the built environment; knowledgeable of constructability and property development process in Port Harcourt and its environs. Data

were collected through the application of questionnaire designed and interview to extract information of the lecturers about the various aspects of the essential of constructability application to real property development. Hence, the study population consisted of 76 lecturers Faculty of Environmental Sciences of the Rivers State University, and out of the 76 copies of the questionnaire distributed, 60 copies were returned by the respondents, with necessary questions raised relating to the indicators of essential of the application constructability to real property development on the respondents. Of the 60 copies of questionnaires returned only 57 were found to be properly answered and suitable for analysis that represents a response rate of 78.9%. The study utilizes a 5-point Likert scale to asked the respondents to rank the essentials of relevant indicators on a scale ranging from 1=Very unimportant/insignificant to 5=Very important/significant. The data were analysed using descriptive statistics (percentile method and mean score analysis) and inferential statistics (regression analysis) to test their relationship. The analysed data was presented in tables, percentage, chart and mean score aided by SPSS.

### Results and Discussion

#### Awareness Level of the Application of Constructability during Design Phase of Property Development

As shown in Figure 1, most of the respondents were aware of the concept of constructability, with 80% indicating that they had used it before in the design process of property development, while 16% disagree and 4% not sure of the process. The level of awareness of the essential application of constructability during design phase of property development is important. In extreme cases, direct claims are made against the design principal for poor plans, specifications or estimates, or schedules at initial stages of property development. The study revealed that difficulties in terms of constructability has been experienced of more expensive or time consuming than anticipated. Schedule and deviation from quality and poor safety procedures amongst others has plagued property development into fragmented nature of poor coordination and communication between practitioners.



**Fig 1:** Level of Awareness and Use of Constructability Concept in Design

Also, as shown in Figure 2; 73% of the respondents indicated that they required developers' experience in their designs, while 18% do not apply and 9% not sure of any required developers' experience in their designs. The

reasons given for this included “the contractor would know better about the terrain of the site, availability of materials and time delays associated with obtaining them” and “help in the use of appropriate technology which affects design and cost”. The reasons why some practitioners did not require contractors’ experience included “if there are any changes to be made in the design, a variation will be issued to the contractor, therefore there is no need for the contractor to be part of the design team” and” they have the experience necessary for the type of work they do”. The integration of property development knowledge and

experience should be applied early, because the influence of decisions is high at the early phase. Detailed integration of developers’ experience in the designs will require the developer or client have the ability to influenced the cost that occurs at the conceptual phase, where the decisions at that time could greatly affect property development plans, site layout and accessibility as well as the choice of construction methods. Thus the choice of developers’ experience approach can be critical in determining early construction involvement in a property development.

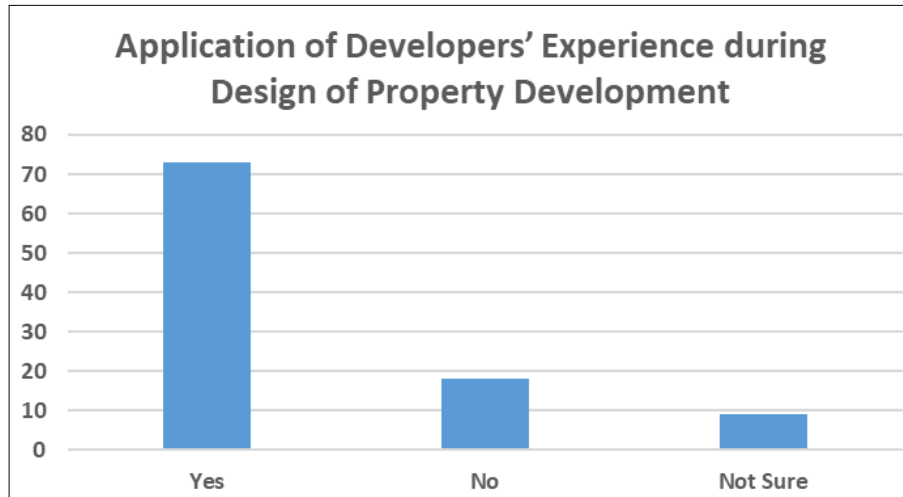


Fig 2: Application of Developers’ Experience during Design

**Determinants of the Essential Application of Constructability during Design of Property Development**

The respondents that had used the concept before were asked to rank in importance (ranging from 1 = very unimportant to 5 = very important) the factors they considered in applying constructability in their designs as an essential component of property development. Using the mean score, the factors are ranked in Table 1, which shows that client satisfaction is the most important and ease of construction the least. Table 1 shows that ‘client’s brief’, ‘reducing costs’, ‘environmental impact’, ‘ease of development’ have mean scores of 3.62, 3.28, and 3.24 respectively; while ‘adding value for money’, and ‘functionality and aesthetics’ have mean scores of 3.19, 3.09, 3.05 and 3.00 respectively. From Table 2, this tends to

suggest that designers do not consider ease of construction as high priority in their designs. In as much as the performance of the property development process with regards to cost, quality and schedule objectives has been impressive among practitioners; the factor determining the application of constructability are client satisfaction, ‘client’s brief’, ‘reducing costs’, ‘environmental impact’, ‘ease of development, ‘adding value for money’, ‘functionality and aesthetics. It implies that considering the essentials of these factors of constructability will reduce the reported cases of development projects delays, abandonment, cost overrun and failures as it has been attributed to a large extent, to lack of adequate knowledge and non-application of constructability principles during property development delivery processes.

Table 1: Determinants for the Essential Application of Constructability during Design Phase of Property Development

Determinants of Constructability	Weight: N = 60					Σfx	Σfx / Σf	RII	Rank
	1	2	3	4	5				
Client’s brief	45	43	43	43	43	217	3.62	0.72	1 <sup>st</sup>
Reducing costs	40	38	38	38	38	191	3.19	0.64	4 <sup>th</sup>
Functionality	37	37	37	37	37	185	3.09	0.62	5 <sup>th</sup>
Aesthetics	39	36	36	36	36	183	3.05	0.61	6 <sup>th</sup>
Ease of development	41	39	39	39	39	197	3.24	0.65	3 <sup>rd</sup>
Environmental impact	41	39	39	39	39	197	3.28	0.66	2 <sup>nd</sup>
Adding value for money	36	36	36	36	36	180	3.00	0.60	7 <sup>th</sup>
Client satisfaction	41	39	39	39	39	197	3.28	0.66	2 <sup>nd</sup>

Source: Author’s Investigation, 2021.

Legend: 1=Very unimportant/insignificant, 2= unimportant/insignificant, 3= Undecided, 4 = important/significant and 5=Very important/significant.

Decision: <3.00 = Insignificant, > 3.00 = Significant.

**Essentials of Constructability in Design Process of Property Development**

The respondents’ perceptions of some of the essentials of applying constructability in design process of property development are shown in Table 2. Table 2 shows that ‘reduces development duration’, ‘better communication’, ‘increased job satisfaction’, ‘minimizes contract variation orders and disputes’ have mean scores of 3.62, 3.28, and 3.24 respectively; while ‘increases owner satisfaction’ and ‘enhances partnering and trust among development team’ have mean scores of 3.19 and 3.09 respectively; and ‘fewer delays and disruptions’, and ‘more effective construction planning’ have mean scores of 3.00 respectively. From Table 2, only ‘earlier client occupation’ (2.90), ‘efficient management of problems’ (2.81), ‘Increased property performance’ (2.76) and ‘improved site management’ (2.67) produced mean values that are lesser than three (<3). This implies that the essential factors of applying constructability in design of property development process include ‘reduces

development duration’, ‘better communication’, ‘increased job satisfaction’, ‘minimizes contract variation orders and disputes, increases owner satisfaction, ’enhances partnering and trust among development team, ‘fewer delays and disruptions’, and ‘more effective construction planning’, earlier client occupation’, ‘efficient management of problems, increased property performance’ and ‘improved site management’ It is not surprising that the fact that constructability gives “reduces development duration” is ranked 1<sup>st</sup> as a better design no doubt produces all the other essentials. The improvement of constructability during planning and design stages of property development is the key to achieving efficient management on site and increased property performance, which is normally through an effective feedback property development knowledge system to the advancement of development knowledge in terms methods, materials, equipment and coordination of site development.

**Table 2:** Essentials of Constructability in Design Process of Property Development

Essentials of Constructability	Weight: N = 60					Σfx	Σfx/Σf	RII	Rank
	1	2	3	4	5				
Reduces development duration	45	43	43	43	43	217	3.62	0.72	1 <sup>st</sup>
Reduces development cost	39	36	36	36	36	183	3.05	0.61	6 <sup>th</sup>
Enhances partnering and trust among development team	37	37	37	37	37	185	3.09	0.62	5 <sup>th</sup>
Increases owner satisfaction	40	38	38	38	38	191	3.19	0.64	4 <sup>th</sup>
Minimizes contract variation orders and disputes	40	40	38	38	38	194	3.24	0.65	3 <sup>rd</sup>
Better communication	41	39	39	39	39	197	3.28	0.66	2 <sup>nd</sup>
Fewer delays and disruptions	36	36	36	36	36	180	3.00	0.60	7 <sup>th</sup>
More effective construction planning	36	36	36	36	36	180	3.00	0.60	7 <sup>th</sup>
Increased property performance	34	33	33	33	33	166	2.76	0.55	10 <sup>th</sup>
Improved site management	32	32	32	32	32	160	2.67	0.53	11 <sup>th</sup>
Efficient management of problems	36	34	33	33	33	169	2.81	0.56	9 <sup>th</sup>
Earlier client occupation	36	36	34	34	34	174	2.90	0.58	8 <sup>th</sup>
Provision of feedback for future projects	32	32	32	32	32	160	2.67	0.53	11 <sup>th</sup>
Increased job satisfaction	41	39	39	39	39	197	3.28	0.66	2 <sup>nd</sup>

Source: Author’s Investigation, 2021.

Legend: 1=Very unimportant/insignificant, 2= unimportant/insignificant, 3= Undecided, 4 = important/significant and 5=Very important/significant.

Decision: <3.00 = Insignificant, > 3.00 = Significant

**Hindrances to the Application of Constructability in Design Process of Property Development**

Hindrances to the essential application of constructability in design process of property development real property development were presented Table 3. The result of the analysis is presented in Table 3. The result shows that the respondents ranked traditional property development delivery methods (RII=0.72), as the most important factor hindering the essential of the application constructability to real property development. On the other hand, respondents perceived high cost of system (RII= 0.66) as the second most important factor similar with the ranking from the respondents. Subsequently, as shown in Table 3 other factor hindering the essential of the application constructability to real property development ranked include reluctance to adopt a new system (RII 0.65), design teams’ lack of adequate construction experience (RII 0.64), not enough resources (RII 0.62), property development type (RII 0.61), prolongation of the development period and inconsistent terminologies (RII 0.60) respectively, (RII 0.60), poor timeliness of contractor input (RII 0.58), lack of awareness of benefits (RII 0.56), lack of open communication between

designers and developers (RII 0.55) and difficulty in coordinating different disciplines.

In Table 3 the evidence abounds that it is usually a means for identifying the means hindrances before real property development is actually developed to help reduce or prevent incidences of error, delays and cost overruns. It implies that factors hindering the essential application of constructability are traditional property development delivery methods, high cost of system, reluctance to adopt a new system, design teams’ lack of adequate construction experience, not enough resources, property development type, prolongation of the development period, inconsistent terminologies, poor timeliness of contractor input, lack of awareness of benefits, lack of open communication between designers and developers and difficulty in coordinating different disciplines. While constructability, no doubt, improves property development delivery, there are hindrances preventing its wholesale application and it use by design teams. In Table 3 the evidence abounds that the essential application of respondents indicated that “design teams’ lack of adequate construction experience” is the most significant hindrance and the perceived “high cost of the system” the least.

**Table 3:** Hindrances of Implementing Constructability

Hindrances of Implementing Constructability	Weight: N = 60					$\sum fx$	$\frac{\sum fx}{\sum f}$	RII	Rank
	1	2	3	4	5				
Traditional property development delivery methods	45	43	43	43	43	217	3.62	0.72	1 <sup>st</sup>
Property development type	39	36	36	36	36	183	3.05	0.61	6 <sup>th</sup>
Not enough resources	37	37	37	37	37	185	3.09	0.62	5 <sup>th</sup>
Design teams' lack of adequate construction experience	40	38	38	38	38	191	3.19	0.64	4 <sup>th</sup>
Reluctance to adopt a new system	40	40	38	38	38	194	3.24	0.65	3 <sup>rd</sup>
High cost of system	41	39	39	39	39	197	3.28	0.66	2 <sup>nd</sup>
Prolongation of the development period	36	36	36	36	36	180	3.00	0.60	7 <sup>th</sup>
Inconsistent terminologies	36	36	36	36	36	180	3.00	0.60	7 <sup>th</sup>
Lack of open communication between designers and developers	34	33	33	33	33	166	2.76	0.55	10 <sup>th</sup>
Difficulty in coordinating different disciplines	32	32	32	32	32	160	2.67	0.53	11 <sup>th</sup>
Lack of awareness of benefits	36	34	33	33	33	169	2.81	0.56	9 <sup>th</sup>
Poor timeliness of contractor input	36	36	34	34	34	174	2.90	0.58	8 <sup>th</sup>

Source: Author's Investigation, 2021.

Legend: 1= Very unimportant/insignificant, 2= unimportant/insignificant, 3= Undecided, 4 = important/significant and 5=Very important/significant.

Decision: <3.00 = Insignificant, > 3.00 = Significant

**Relationship between Perception of Essentials of Constructability and Property Development**

The regression coefficient between the dependent variable and each of the independent variables is detailed Table 4. From the table, fourteen variables are significant; while constructability and property development are absolutely significant at 5% level. Property development in this

regression show that for every application of constructability in the design phase there is a corresponding improvement in property development. The sign of the coefficient for constructability application is positive. Therefore, as the essential of applying constructability improves the essential of property development.

**Table 4:** Regression Coefficients in Application of Constructability on Property Development

Coefficients <sup>a</sup>						
Model	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta			
1	(Constant)	2006.184	.491		4083.574	.000
	CEAC	9.456E-005	.000	.928	16.733	.004
	CPD	2.246E-005	.000	.080	1.449	.284

Source: Author's Investigation, 2021.

Application = 2006.184 + 9.456e-005 Ceac + 2.246e-005 Cpd

**Table 5:** Zero-Order, Partial and Part Correlation Coefficients in Essential of Applying Constructability on Property Development

Coefficients <sup>a</sup>				
Variables	Correlations			
	Zero-order	Partial	Part	
1	(Constant)			
	CEAC	.999	.996	.446
	CPD	.894	.716	.039

Source: Author's Investigation, 2021.

a. Dependent Variable: Constructability

The Pearson's coefficient of correlation shows that the top position is taken by the application of constructability and followed by property development. This relatively higher values indicate a relative stronger linear relationship between property development and these constructability variables. The study shows that the R<sup>2</sup> of 90.6% of the sample essentials of applying constructability in the property development are attributable to the independent variables. The computed F statistics (F=4.834) falls in the rejection region signifying that at least one of the model coefficient is not zero. Therefore, it is accepted that perception of essentials of applying constructability principles are essential on property development in the study area.

Tables 6 and 7 gives model summary and analysis of variance in the essentials of the application of

constructability to property development. The R<sup>2</sup> shows 82.1% of the sample variation of constructability application is attributable to the independent variables. The computed F statistics (F = 289,000) falls in the rejection region signifying that at least one of the model coefficient is not zero.

**Table 6:** Model Summary of Property Development

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849 <sup>a</sup>	.821	.728	.96410

Source: Author's Investigation, 2021.

**Table 7:** Analysis of Variance (ANOVA) of Property Development

ANOVA <sup>a</sup>						
Model	Sum of Squares	Df	Mean Square	F	Sig.	
1	Regression	9.897	4	9.897	289.000	.000 <sup>b</sup>
	Residual	.103	24	.034		
	Total	10.000	28			

Source: Author's Investigation, 2021.

**Conclusion**

The study examined the essentials of the application of constructability in design phase of property development in

Port Harcourt metropolis, Rivers State, Nigeria. Based on the empirical findings; the study has shown that there is a high level of awareness of the concept of constructability among practitioners, which believe that it improves designs and leads to other benefits on property development. However, the widespread use of the constructability is hindered by many factors, the most significant of which is designers' lack of property development knowledge. The findings also discovered that although most practitioners indicated that they required developers' experience in their designs, only 74% were often involved with contractors in the design process. To gain more property development knowledge to improve the constructability of their designs, designers need more feedback from the site which only developers can provide. The study concluded that there is a relationship between essentials of applying constructability principles and property development significant at 82.1%. This demands for a total disassembling of the traditional compartmentalization of design and development by more widespread use of non-conventional procurement methods which give developers a greater role in design.

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