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Appraisal of project scheduling in Nigeria construction industry: A case study of Ibadan, Nigeria.

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Abstract:

Project scheduling plays a vital role in successful completion of a construction project, despite the crucial role of this tool, there still exist many challenges in using it efficiently. Some projects schedules are established at the conception of the project and never evaluated for feasibility until problems arise. Besides, some constructors lack the expertise required for preparing effective project schedule. This study therefore, examines the factors affecting project scheduling and also establishes the severity of these factors. Review of extant literatures revealed the factors affecting project scheduling and these were structured into a questionnaire to get empirical data from the professionals. Statistical tools were used to analyze the empirical data collected. It was revealed that the type, complexity and the materials requirement for the work are the most important factors that determines project scheduling; Poor managerial decision on critical activity, lack of expertise in scheduling and inaccurate estimate of human resources required are the top factors hindering the performance of project scheduling. This study recommends the use of qualified and certified professional in managing project schedule and the use of scientific approach rather than rule of thumb in estimating for labor and materials requirement, as this will enhance the performance of project scheduling in Nigeria construction industry and contribute to the optimal utilization of resources in project delivery.

Keywords*; Project scheduling, Project Planning, Construction Industry, Construction project, Nigeria.*

1. Introduction

Project scheduling and planning play an important role in controlling project performance and they form core elements of management. This two integral part of management are often used interchangeably rather than two distinct stages in determining the duration of a project and the feasibility of achieving the milestones involved in bringing the project to reality. Shash and Ahcom (2006) identified the precondition of successful project scheduling as the identification of all the activities involved in achieving project objectives, arrangement of these activities in their order, allocation of resources and durations to those activities. As these two concepts are crucial in achieving project objectives, [27] affirmed that they must be carefully analyze in order to avert potential risks that may hinder the quality of project scheduling and ultimately affect project performance as a whole.

[18] opined that accurate estimation of project duration, management and control of activities during execution greatly depend on the quality of project scheduling. Therefore, the identifications of those factors that affects project scheduling at the planning and construction stage are required to achieve quality project scheduling. The awareness of these factors by managers, planners and constructors will help in achieving successful scheduling which will affect project performance positively. Nowadays, construction industry is now congested as a results of the penetration of new players into the industry, this leads to business competition, and increase in costs of resources caused by increase in demand and competition to maintain the lead. It can be observed from this perspective that mediocrity can no longer be entertained, having technical skills and experience aren't enough to maintain the lead. Thus, ability to manipulate time to ensure profit maximization and enhance reputation is the main factor available, moreover, [14] maintained that completing the project on time and without budget deficit depends on effective project scheduling.

2. Brief history of project scheduling

Historically, scheduling of a project began with human evolution, starting from cooking, sewing and making of shelter. The pyramid of Giza was not constructed in a day, Sun Tzu discussed about the strategy and interdependency in scheduling from military point of view and transcontinental railways having been built for about two centenary. It can be observed that, it is impossible to achieve any of this activities without some element of schedule i.e. the order of activities and how they relates.

The golden jubilee of scheduling' coined by critical path analysis (CPA) was celebrated in 2007. The first algorithm of activity-on-arrow was developed by Kelly and Walker for DuPont in 1956/57. This algorithm was trialed in 1957 and their work was published in 1959. The PERT system was later developed after some months that CPM (critical path method) was launched.

2.1 Importance of project scheduling

Successful project delivery cannot be achieve without project scheduling. The US department of Labour describes the scheduling of a project as the prominent duty of a construction manager [9,26]. Project scheduling can be referred to as the heartbeat of construction industry because it is the main tool that can be manipulated to increase profit

without compromising quality and to enhance the reputation of a firm in term of quality delivery. Effective communication between construction plan, project objectives and management of changes during implementation also depend on project scheduling [12].

2.2Project scheduling techniques

The techniques to be adopted in creating project scheduling depends on nature and cost involved in the project delivery [27]. The bar-chart is the simplest form of project scheduling techniques, easy to use and usually used for smaller project, its main constraint is that it doesn't indicate how activities in a project affect each other. As the intricacy of project increases in terms of technical skills required, number of activities and cost involved, bar chart seems to be ineffective and this lead to the use of more complex technique which is referred to as critical path method (CPM). This technique indicates how activities affect each other in term of dependency and independency i.e. logical sequence. The critical path is also referred to as network analysis.

2.3 Application of software in project scheduling

According to [7] the purpose of a software is to enhance the quality of output with minimal effort which cannot be achieved through manual means. A project is made up of many tasks which has different requirements and the intended goal of the chosen software is to perform the requirements effectively in terms of time and cost. The problems of scheduling, tracking and physical elements must be taken into consideration while adopting the project management software. Some of the software available for project scheduling are; Microsoft project, primavera P6, Microsoft excel, Microsoft office note, statuswiz, Basecamp, FasTrack Schedule 9, workfront, Microsoft office Access, ZOHO Projects, etc.

2.4 Project scheduling determinant factors

Factors that affects project scheduling which consequently affect the preparation of project schedule include the type of project which is undertaken, the nature of the project, project intricacy, task dependencies, resource availability, the climatic condition at size, financial strength of the company, technology advancement, procurement strategy adopted and contractual agreement [24].

2.5 Factors affecting the performance of project scheduling

[6] opined that project management activities is paramount to a successful project completion, the factors which affect the performance of project scheduling are divided into two categories, which are those that preclude the performance of project scheduling and those that boost project scheduling performance. By using relevant management tools, the planning, coordination and execution of said project can be carried out by project managers to maximize the chances of success. A number of factors which will determine the performance of project scheduling includes; system of communication, safety, organization structure, quality assurance and management experience.

The factors that hinder the performance of project scheduling are as follow;

2.5.1 Poor decision making regarding critical activities

Insufficient involvement and support of stakeholders may hinder the performance of decision making that are critical [25]. [17] maintained that one of the factors that serve as barrier to project scheduling is the lack of technical know-how by the project managers to criticize project plans in term of resources criticality and dependencies.

2.5.2 Lack of effective leadership

The effect of good leadership is pertinent in facilitating and integrating new and improved approaches for the project. The absence of an informed project leader has been found to be critical in affecting the performance of project scheduling [15, 18, 22].

*2.5.*3 Inadequate exposure to new technology and software for planning and scheduling

As most construction projects are complex in nature, this should facilitate the use of new computer technologies and optimization tools for efficiency and accuracy. Thus, the lack of basic understanding and exposure to these new technological tools can result to erroneous interpretation of inputs required for project scheduling [28].

2.5.4 Lack of education and training of construction workers to construction workers

According to [14], technical skills and ability to use planning tools are not adequate for effective project scheduling. In regards to this, [15] concluded that the lack of education and training by construction workers who engage in planning leads to inefficient planning and implementation of project scheduling.

2.5.5 Inefficient support from project stakeholders

[5] maintained that coherence support among project stakeholders in development of schedule is important in

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delivery the project base on the specified quality, time and within budget. [15] in their research work conducted in India, concluded that inadequate flow of communication as a result of lack of support among project stakeholders will hinder the performance of project scheduling.

2.5.6 Incompatibility of planning techniques and nature of project

[1] maintained that complexity and size of project are the main factors that determines the nature of construction project, and concluded that the nature of construction project will determine the type of planning method to be adopted for the project. [19] in their own researched work concluded that lack of evaluating the complexity and size of project at the pre-planning stage will lead to adoption of inadequate planning techniques which will affect the implementation of the plan and schedule during construction.

2.5.7 Absence of schedule contingency

In other to make preparation for the unknown events that may occur during construction, [20] suggested the incorporation of schedule contingency during the planning of project scheduling to make provision for the unknown events. [13] concluded that absence of this, will definitely leads to delay of construction project when the unkown events surface.

2.5.8 Inaccurate estimate of labour and materials requirement

[17] concluded in his research that, inaccurate estimate of labour and material requirement will leads to re-planning and delay of construction project. This is very common in Nigeria construction industry according to [17]. Since one the major goal of project scheduling is to complete the project within budget, time and quality specified, therefore, inaccurate estimate of labour and material requirement will lead to ineffective project scheduling.

3.0 Research Methodology

Questionnaire survey was used to obtain data from the respondents. The questionnaire type adopted for this research was closed ended format and it was prepared in referenced to data obtained from literature. Since, the target population of this research are professionals involve in project scheduling, the developed questionnaire was distributed to construction professionals in Ibadan based on the data of registered professionals obtained from Oyo state ministry of works.

Table 1. Sample frame

S/N	Professionals	Number
1.	Quantity surveyors	86
2.	Architects	75
3.	Engineers	106
4.	Builders	55
	Total	**322**

Source: field survey 2017

3.1 Sampling Size

The sample size is a principal feature of any empirical or statistical study in which a number of observations in a sample from a population is used to make an inference. The sample size for the number of respondents will be determined using the Yamane formula.

$$n = \frac{N}{1 + N(e)^2}$$

Where n = Sample size

N = Number of respondent

e = level of precision which is +_ 10% (Yamane 1967)

$$n = \frac{322}{1 + 322(0.1)^2}$$

$$n = \frac{322}{1 + 3.22}$$

$$n = 76$$

n =80

From the above calculated sample size, the researcher used the Bowley's proportional allocation formula [16] to determine the number of questionnaires that were distributed to each construction professional.

Table 2. Sample size

S/N	Professionals	Sampling frame	Sampling size
	Quantity surveyors	86	(86*80)/ 322 = 21
	Architects	75	(75*80)/ 322 = 19
	Engineers	106	(106*80)/ 322 = 26
	Builders	55	(55*80)/ 322 = 14
	Total	**322**	**80**

Source: field survey 2017

3.2 Analysis Method

The data obtained from the survey was initially analyzed using SPSS for descriptive statistical analysis of the respondents, and the results observed from this analysis showed that most of the variables tested veered towards skewed distribution. As a result of this, a non-parametric test is adopted.

3.2.1 Relative Impact Index (RII)

Relative impact index was adopted in this study because the primary aim was to measure the degree to which the factors considered are significant to the practice of project scheduling. The RII is a statistical method of analysis which has been used in previous construction related problems by various researchers [2-3]. The factors were ranked using the formula below:

Relative Impact Index (RII) = $\Sigma (5*n_5+4*n_4+3*n_3+2*n_2+n_1) \div 5*N$ [18]

Where, n = the constant responding weighting given to each factor by the respondents (on a 5- point scale) for example, n_5 = the number of respondents given the highest rank on a 5-point Likert scale to each factor (i.e. 5= strongly agree) and n1= the number of respondents given the lowest rank on a 5-point Likert scale to each factor (i.e. 1= strongly disagree).

N= is total number of respondents used in the analysis

RII ranges from 0.143 to 1 (i.e. a higher value of RII indicates a higher impact of the factor).

The level of significance of each individual factor is measured using the following scale;

Where, $0.143 \leq RII \leq 0.286$ (not significant), $0.286 < RII \leq 0.428$ (somewhat significant), $0.428 < RII \leq 0.571$ (moderately significant) $0.571 < RII \leq 0.714$ (significant), $0.714 < RII \leq 0.857$ (very significant), $0.857 < RII \leq 1.0$ (extremely significant) [20].

3.2.2 Kendall's concordance

This is a non-parametric statistic test that is used to examine the association between several raters by assessing a set of test variables [10]. The test was carried out to indicate the degree of agreement of ordinal assessment made by respondents when rating the same standard.

3.2.3 Reliability test

Cronbach's Alpha coefficient is used as indicators of internal consistency of the scale adopted. [16] affirmed that the coefficient should be above 0.7 to indicate the reliability of scale adopted.

3.3 Background Information of the Respondents

The demographic profile of respondents through the questionnaire shows that majority of the respondents comprises of professionals that are recognized as participants in Nigeria construction industry. Table 1 below shown the designation of the respondents. This shows that the respondents are qualified to give their opinion as they are qualified and have enough experience.

Table 3. Background Information

Designation of respondents	**Frequency**	**Percent (%)**
Builder	22	27.50
Architect	10	12.50
Engineer	37	46.25
Quantity surveyor	11	13.75
Total	**80**	**100**
Academic qualification of respondents	**Frequency**	**Percent (%)**
HND	34	42.50
B.Sc	28	35
M.Sc	9	11.25
Ph.D	2	2.50
Other (PGDiploma)	7	8.75
Total	**80**	**100**
Year of Experience	**Frequency**	**Percent (%)**
1- 5 years	12	15
6-10 years	32	43.7
11-15 years	29	32.5
16-20 years	10	6.30
21 years and above	2	2.50
Total	**80**	**100.0**
Area of specialization of organization	**Frequency**	**Percent (%)**
Contracting firm	21	26.25
Consultancy and design firm	11	13.75
Contracting and consultancy	44	55
Other(consultancy)	4	5
Total	**80**	**100**

Source: field survey 2017

3.4 Status of Current Project(s)

Table 4 showed the status of the construction project currently handle by the respondents. 66.25% of the current projects handle by the respondents are behind schedule while 33.75% are on schedule.

Table 4. status of current project(s)

S/N	Status of current project	Frequency of respondents	Percentage (%)
1	On schedule	27	33.75
2	Behind schedule	53	66.25
	Total	**80**	**100**

Source: field survey 2017

3.5 Status of Cost Incurred on the Current Project(s)

Table 5 showed the status of the cost incurred on the project currently handle by the respondents. 62.5% are under-budget while 37.5% are as-budget, there is no over-budget.

Table 5. status of cost incurred on the current project(s)

S/N	Status of cost incurred on the current project(s)	Frequency of respondents	Percentage (%)
1	Under-budget	50	62.5
2	As- budget	30	37.5
3	Over budget	0	0
	Total	**80**	**100**

Source: field survey 2017

3.6 Reliability Test

Cronbach's Alpha Coefficient is used as indicators of internal consistency of the scale adopted and the scale adopted in this work is [23] affirmed that, the satisfaction with life scale has good internal consistency when the Cronbach's alpha coefficient is over 0.70, and in this study the coefficients are 0.779 and 0.746, respectively, this indicate the scale adopted has a good internal consistency.

Table 6. Cronbach's Alpha coefficient obtained for project scheduling determinant and hindering factors.

Reliability Test	Determinant factors (D1 to D20)	Hindering factors (E1 to E23)
Cronbach's Alpha coefficient	0.779	0.746

Source: field survey 2017

3.7 The Analysis of Activities involve in Project Scheduling

Table 7 shown the activities that have high degree of consideration. "Determination of work activities" has a scale of 0.97 for the relative impact index. Next is "monitoring and control of the schedule'' which has a scale of 0.94. "Estimation of activities duration has a scale'' of 0.92 while "Implementation of schedule" have a scale of 0.91. "Cost and resources allocation" has relative impact index value of 0.86, follow by "Review and analyzing of the schedule" with RII value of 0.84. "Drawing of logic network and critical activities'', "Determination of logical relationship'' and "Resource levelling'' have RII value of 0.81, 0.78 and 0.72 respectively. Based on the respondents' opinion, all these activities are significant in planning and control of project scheduling.

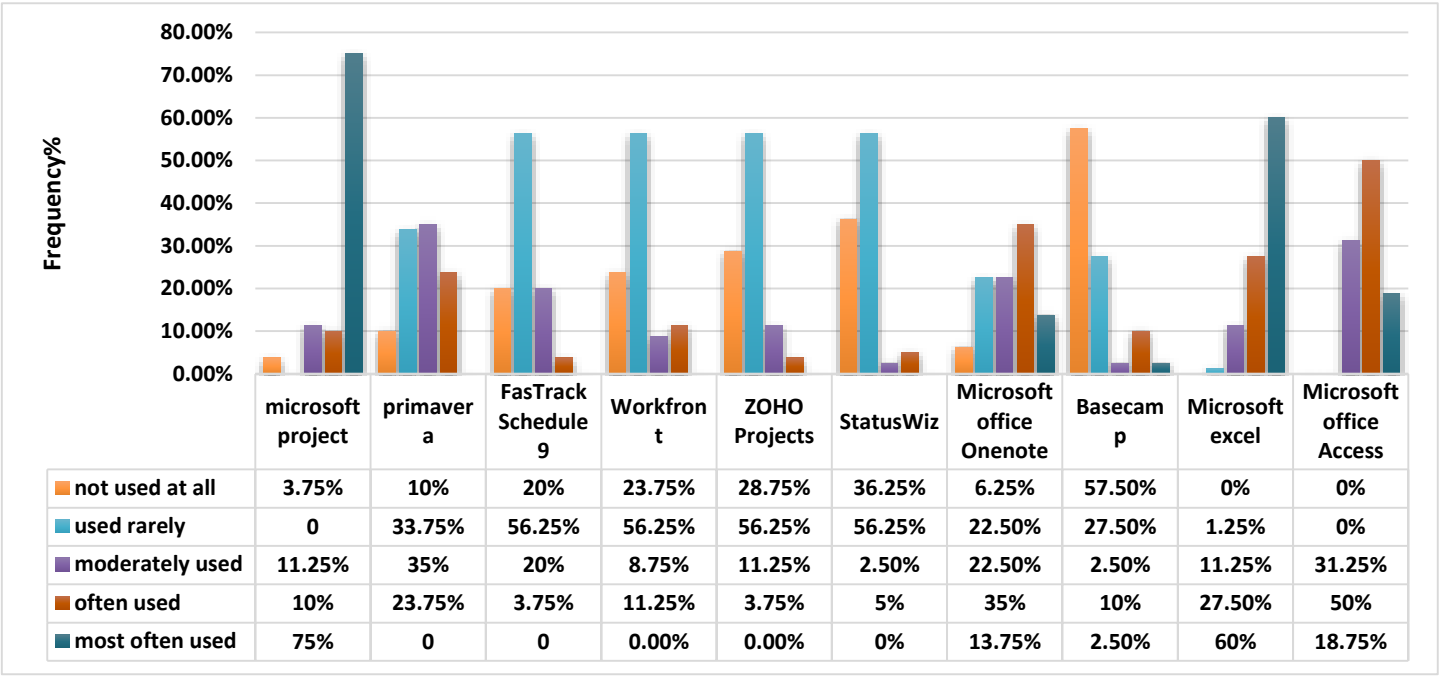
Table 7. Activities involve in project scheduling

Activities involve in project scheduling	RII value	Rank	Category of significance
Determination of work activities	0.97	1	ES
Monitoring and control of the schedule	0.93	2	ES
Estimation of activities duration	0.92	3	ES
Implementation of schedule	0.91	4	ES
Cost and resources allocation	0.86	5	ES
Review and analyzing of the schedule	0.84	6	VS
Drawing of logic network and critical activities	0.81	7	VS
Determination of logical relationship	0.78	8	VS
Resource leveling	0.72	9	S

Source: field survey 2017

3.8 The Analysis of Software used for Project Scheduling

Figure 1 showed the tabulation of software used for project scheduling in terms of its frequency. 75% of the respondents mostly use Microsoft project for their project scheduling, 10% of the respondents often used it while 11.25% moderately used it and 3.75% does not used it all, next is Microsoft excel where half of the respondents often used it and 18.75% used it mostly. Microsoft office and primavera follow with 35% of the respondents often used them and 23.75% used them mostly.It can be deduced that fastrack schedule9, workfont, ZOHO projects and Basecamp are not popular in Nigeria construction industry with 56.25% (fastrack schedule9, workfont, ZOHO projects and statuswiz) used them rarely and 57.50% does not Basecamp at all. 36.25%, 28.75% and 20% of the respondents does not use statuswiz, ZOHO projects, workfont, and fastrack schedule9 at all for their project scheduling.



	microsoft project	primavera	FasTrack Schedule 9	Workfront	ZOHO Projects	StatusWiz	Microsoft office Onenote	Basecamp	Microsoft excel	Microsoft office Access
not used at all	3.75%	10%	20%	23.75%	28.75%	36.25%	6.25%	57.50%	0%	0%
used rarely	0	33.75%	56.25%	56.25%	56.25%	56.25%	22.50%	27.50%	1.25%	0%
moderately used	11.25%	35%	20%	8.75%	11.25%	2.50%	22.50%	2.50%	11.25%	31.25%
often used	10%	23.75%	3.75%	11.25%	3.75%	5%	35%	10%	27.50%	50%
most often used	75%	0	0	0.00%	0.00%	0%	13.75%	2.50%	60%	18.75%

Figure 1. Tabulation of project scheduling software

Source: field survey 2017

3.9 The analysis of Factors that determine the nature of Project Scheduling

Table 8, shows the scale of factors that determine the nature of project scheduling and their rank. All the twenty (20) factors are consider to be significant, sixteen (16) of the factors are consider to be extremely significant since their RII value is above 0.857 out of 1.00 scale. "Type of project'' and "complexity of the project'' were rank highest with RII value of 0.95 each, this indicate that, the two factors greatly determine the nature of project scheduling. "Materials requirement'' for the work was rank second with RII value of 0.94, this indicate that, the availability of materials, conversion process of the materials and handling affects the nature of project scheduling which will determine the level of details of the work breakdown structure. "Scope and nature of work'', "contract agreement'', "degree of mechanization'', "technical skills requirement'' and "client requirement" were all rank fourth with RII value of 0.93 follow by "procurement strategy adopted'' and "cost of hiring equipment" with (RII=0.87). "Technological advancement'', "nature of project'', "financial strength of the company'' and "company policy'' were rank next with RII value of 0.86. "Building regulation and control'' and "climatic condition of the site'' have RII value of 0.77 and 0.75 respectively and they are categorized to be very significant factors that determine the nature of project scheduling.

Only "subcontracting requirement'' and "labour rate'' are regarded to be only significant with RII value of 0.64 and 0.62 respectively and they were rank last among the factors.

Table 8. Factors that determine the nature of project scheduling

Factors that determine the nature of project scheduling	RII value	Category of significance

Type of project	0.95	ES
Complexity of Project	0.95	ES
Materials requirement for the work	0.94	ES
Scope and nature of Work	0.93	ES
Contractual agreement	0.93	ES
Degree of mechanization	0.93	ES
Technical skills require for the work	0.93	ES
Expertise required	0.93	ES
Client requirements	0.93	ES
Procurement strategy adopted	0.87	ES
Cost of hiring equipment	0.87	ES
Technological advancement	0.86	ES
Nature of Project	0.86	ES
Financial strength of the company	0.86	ES
Company policy	0.86	ES
Size of Project	0.8	VS
Building regulations and control	0.77	VS
Climatic condition at site	0.75	VS
Subcontracting requirement and labour rate	0.64 0.64	S S

Source: field survey 2017

3.10 The analysis of Factors hindering the Performance Project Scheduling

Based on the Table 9, eleven (11) factors shows RII value above 0.857. However, the remaining twelve (12) factors show RII value between 0.635 to 0.857. "Poor managerial decision on critical activity'' (E3) has RII value of 0.963 that is between 0.857 and 1.00 which shows that it is extremely significant. "lack of expertise in scheduling'' have RII value of 0.93, and "inaccurate estimate of human resources required'' have RII value of 0.92 and "Inaccurate estimate of materials requirement'' have RII value of 0.923 which is also considered to be extremely significant by the respondents. These factors were considered as extremely significant as the rating was at 1.00 for relative impact index. Besides, these factor were the most severe under this category and were considered as top priority in any case. More so, many factors fall between scale 0.714 to 0.857 which are regarded to be very significant, starting from "Trivial control'' and "reporting system between management levels'' which has RII value of 0.835, "Use of rule of thumb for labour output" comes next with RII value of 0.83. Next are "Use of wrong project scheduling techniques" with RII value of 0.82, "inefficient materials management'' with RII of 0.810, followed by "Ineffective tracking of in-progress schedule deviations'' with RII of 0.7725. Furthermore, "inefficient plant and equipment management" with RII value of 0.775 and "Inflation in cost of materials'' during execution of project with RII value of 0.77. "Inefficient materials management on site'' with scale 0.762, "Ineffective tracking of in-progress schedule deviations'', "Inefficient plant and equipment management'' and "misunderstanding of the interrelationship (alignment) between scope'', schedule and budget shows the same degree of consideration, (RII=0.73). These factors were regarded to be very significant based on $0.714 < RII \leq 0.857$ (very significant). The remaining factors have RII value between $0.571 < RII \leq 0.714$ which are considered to be significant, starting with "Absence of resource-constrained scheduling'' for dealing with "uncertainty problems'' having 0.68 RII value, and follow by "Absence of new technology'' and "software for planning and scheduling'' with RII value of 0.63.

Table 9. Factors hindering project scheduling performance

Level of consideration	RII	Rank	Category of significance
Poor decision-making regarding activity criticality	0.96	1	ES
Lack of expertise scheduling	0.94	2	ES
Inaccurate estimate of human resources required	0.92	3	ES
Inaccurate estimate of materials requirement	0.92	3	ES

Lack of effective leadership	0.91	4	ES
Absence of schedule contingency	0.91	4	ES
Insufficient support from project stakeholders in the development of plans and schedules	0.90	4	ES
Breach of contract	0.89	5	ES
Lack of resource levelling in schedule	0.87	6	ES
Incompatibility of planning methods with the project schedule's nature	0.85	7	ES
Trivial control and reporting system between management levels	0.84	8	VS
Use of rule of thumb for labour output	0.82	9	VS
Use of wrong project scheduling techniques	0.82	9	VS
Inefficient materials management	0.81	10	VS
Ineffective tracking of in-progress schedule deviations	0.78	11	VS
Inefficient plant and equipment management	0.77	12	VS
Inflation in cost of materials during execution of project	0.77	12	VS
Inefficient materials management on site	0.76	13	VS
Absence of regulatory law on meeting project completion time	0.73	14	VS
Improper document control on site	0.73	14	VS
misunderstanding of the interrelationship (alignment) between scope, schedule and budget	0.73	14	VS
Absence of resource-constrained scheduling for dealing with uncertainty problems	0.68	15	S
Absence of new technology and software for planning and scheduling	0.64	16	S

Source: field survey 2017

3.10 Reliability of Rankings — Kendall's Concordance Test

Its values ranges from 0 to 1, where the higher value of (W) means the stronger agreements among raters. In similar to [14] research, the level of significance (p-values) in conjunction with W test is used to determine whether the level of agreements among respondents on such rankings is done randomly or it is rated by chance. In this study, the following hypotheses were used:

1. H_0: There is no strong association between the overall rankings by respondents
2. H_1: Rankings by all respondents are strongly associated

At 95% level of confidence, reject H_0 if p-value ≤ 0.05 (i.e. accept H_1)

Table 10. Kendall coefficients of concordance (W) obtained for project scheduling determinant and hindering factors.

Reliability Test	**Determinant factors (D1 to D20)**	**Hindering factors (E1 to E23)**
Kendall's W	0.740	0.628
Chi-Square	24.734	24.154
p-value at the 95% confidence Interval	0.015	0.002

Source: field survey 2017

Table 10 shows the level of agreement of all respondents on the rankings of the project scheduling determinant factors and hindering factors. The results showed that there is relatively a high level of concordances (W= 0.740, Chi-square= 24.734, *p-value* < 0.05; reject H_0) and (W= 0.628, Chi-square= 24.154, *p-value* < 0.05; reject H_0) for the factors. Also, the statistical level of significance indicates that the level of agreements between respondents on the overall rankings of

both determinant and hindering factors are strongly associated. Therefore, it can be agreed that the study overall rankings are reliable.

4.0 Discussion of Findings

In this study, nine (9) activities involve in project scheduling were investigated, all these activities were considered to be significant by the respondents, five (5) of the activities were considered to be extremely significant with their RII value above 0.857, these activities are; "determination of work activities'', "monitoring and control of the schedule'', "estimation of activities duration" and "implementation of schedule". This indicate that, determination of activities involve in a construction project through work breakdown structure is the first procedure in project scheduling, estimating each activity duration by the use of accurate labour constant from literature also play a vital role in preparing effective project scheduling.

The use of software for effective and efficient project scheduling were also investigated in this study, ten (10) software were identified and Microsoft project is use mostly by construction professionals in Oyo state, "Microsoft excel'', "Primavera" and "Microsoft office Note'' follow respectively. It was observed "fastrack'' "schedule9'', "workfont", "ZOHO projects'', "statuswiz" and "basecamp'' software are yet to find their ground in Nigeria construction industry.

The factors that determine the nature of project scheduling were also considered, twenty-three (23) of these factors were investigated, fifteen (15) of the factors are considered to be extremely significant, "complexity of the project'' was rank highest among the factors. "Size of project", "building regulation and control" are categorized to be very significant while "subcontracting requirement'' and "labour rate'' are categorized to be only significant. This means that most of the respondents considered those factors to be extremely significant.

The study also identified the factors that hinder the performance of project scheduling, all the factors identify by this study are all consider to be significant by all the respondents. However, poor decision making regarding critical activities was rank highest follow by lack of training and education of construction workers on planning and scheduling and inaccurate estimate of labour requirement respectively. This shows that these three factors greatly hinder the performance of project scheduling in Ibadan.

5.0 Conclusion and Recommendation

Successful completion of construction project in terms of quality, budget and time-frame wholly depends on effective project scheduling at the planning stage, its implementation and its control throughout the phase of the project. This research work has been able to appraise the practice of project scheduling in Nigeria construction Industry by identifying those factors that determine the nature of project scheduling and those that hindered its performance, this will contribute to effective project delivery and enhance the image of Nigeria construction industry.

Twenty (20) factors that determine the nature of project scheduling and twenty-three (23) factors that hinder performance were identified in this research. These factors were analyzed and the study concluded that among the factors that determine the nature of project scheduling, the "complexity'' and "type of project'' greatly determine the nature of project scheduling. "Poor decision making regarding activities that are critical'', "lack of training in planning and scheduling'' and "inaccurate estimate of labour requirement'' severely hinder the performance of project scheduling. In the light of the findings of this study on factors that hinder the performance of project schedule, the following recommendations are made:

1. The use of proficiency team in managing and controlling of scheduled activities
2. Focusing on a holistic approach rather than individual milestones
3. The use of scientific approach in estimating for labour and material requirement rather than rule of thumb
4. The use of qualify and certify professional in project scheduling
5. Provision of alternate planning methods for overcoming shortfalls with existing procedures.

6.0 Acknowledgements

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