

AREAS OF PRODUCTIVITY IMPROVEMENT IN THE NIGERIAN CONSTRUCTION INDUSTRY

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ABSTRACT

This paper discusses the areas where productivity improvements are required in the Nigerian construction industry. The questionnaire used for the study was adopted from the research of Arditi and Mochtar (2000) with additional questions on the factors influencing productivity and the actions thought necessary to improve productivity in the Nigerian construction industry. A combination of judgmental and snowballing (both non probability) sampling techniques were used for the study. The reason for this is that, the combination gives a strong semblance of probability sampling technique and this advantage makes it possible to make conclusive inference based on the findings of the research. The questionnaire for the study was distributed among construction contractors and design professionals that were located within the Lagos Island axis of Lagos state. Sixty-four (64) questionnaires were retrieved out of the one hundred and eighty (180) that were distributed to the respondents and this gives a total of 35.6% retrieval. The results of the research show that productivity improvement is mostly required in the Nigerian construction industry in four categories which are communication, management, computer utilization and labour. It was also discovered that most Nigerian contractors and designers are not willing to contribute funds to support programmes aimed at improving construction productivity. However, they were willing to serve as members of groups that would identify productivity problems and attend construction productivity conferences and meetings.

Keywords: *Construction Industry, Contractors, Designers, Nigeria, Productivity Improvement*

INTRODUCTION

An attempt to fashion a suitable definition for productivity is a herculean task. However, irrespective of the definition given to productivity, it is important to continuously seek its improvement in all areas of construction activities because the activities of the construction industry contribute immensely to the gross domestic product (GDP) of most developed and developing countries (Baba, et al., 2013). Thus, the development of any nation depends

on the productivity and the level of productivity improvements in its construction industry.

The construction industry is generally acclaimed to underperform when compared with other industries and this could be as a result of the low productivity in many areas of construction activities. The problem is that many research works (Sacks, et al, 2000; Alwi, 2003; Al-Saleh, 1995, Hammad, et al, 2011; Abdel-Wahab, et al, 2008 and Cunningham, 2010) aim at improving productivity within the construction industry but they fail to identify the major areas where these improvements are required. This paper aims at identifying the potential areas where productivity improvements are required in the Nigerian construction industry, determining the factors influencing productivity improvement in the Nigerian construction industry and exploring the actions thought necessary to be taken in order to improve construction productivity.

The determination of the key areas where productivity improvements are required in the Nigerian construction industry will enable future efforts on productivity to be channelled towards the right direction. The research was carried out within Lagos state based on the assumption that majority of construction works in Nigeria take place in Lagos state, especially the Island axis and as a result, the findings of the study could be generalised.

Arditi and Mochtar (1996) conducted a similar research on productivity improvement in the Indonesian construction industry and the results revealed that contractors found areas for improvement in the categories of management, engineering and computer utilisation while design professionals place high priorities on the categories of engineering and computer utilisation.

The areas of productivity improvements are expected to differ from country to country and depend on many factors which are outside the scope of this study. In the light of this, the study identifies the core areas where productivity improvements are desired in the Nigerian construction industry.

LITERATURE REVIEW

Several areas have been identified and require serious needs for improvement in order to increase productivity. Veiseth, *et. al.* (2003) identified the areas where productivity improvement in the construction industry could be achieved as early phase of a project, planning, changes, communication/cooperation, project management, culture and logistics. In an interview session with actors in the construction industry, it was also identified that attention needs to be directed to the areas of: (1) Interface between the builders, the advisers and the executors and (2) Logistic problems for building materials and other products used during the construction project planning and management.

However, in order to significantly improve productivity in the construction industry, Abdel-Razek (1998) highlighted 16 factors that could influence productivity improvement and the factors were subsequently categorized into four as follows: (1) Improvement of employees' satisfaction, (2) Improvement of training and leaning, (3) Improvement of company processes and regulations and (4) Improvement of productivity system.

Rahman, *et. al.* (2003) opined that productivity can be improved by the adoption of flexible organizational culture such as competitive strategy, employment enhancement, process bench marking, technical applications, organisation structure, political environment, market condition and structure of the industry. Allen, *et. al.* (1999) suggested that for significant improvement in productivity to be experienced, there is need for the construction companies to experience a paradigm shift from cost, time and quality to a more critical emergence which focuses on knowledge, integration and trust. Maqsood, *et. al.* (2003) and Thompson (2007) recommended that due to robustness and ability of Information and Communication Technology (ICT) to quickly disseminate data/information, it has the capacity to address highlighted communication issues in a structured and efficient manner.

Other ways of improving construction productivity are - use of project homepage to collect daily progress data, improvement of planning, scheduling and analysis of construction operations for the purpose of controlling and reducing cost (Shash

and Al-Abdullatif, 1993) and registration of contractors with registering organization (Loh and Ofori, 2000). Furthermore, identification of productivity problems, contribution of fund to support productivity improvement programmes, development of projects aimed at improving construction productivity, evaluation of results of projects aimed at improving construction productivity, attending conferences and meetings on construction productivity and subscribing to construct productivity information service to improve construction productivity (Arditi and Mochtar, 2000) are suggested methods of improving productivity in the construction industry.

Ogunlana, *et. al.* (2003) categorized the main efforts to improve the construction industry's productivity into four major components; Resource development, Enterprise development, documentation and procedures development and appropriate policies. However, it was acknowledged that a successful combination of policies in a specific country might not be applicable or successful in another country. Thwala and Monese (2008) opined that labour productivity can be improved by satisfying workers' needs (incentives) and putting the right people on a job at the right time.

Some authors have included the benefits of construction industry's productivity in the scope of their research. At micro-level, Thwala and Monese (2008) stated that improved productivity decreases unit cost and serves as an indicator of project performance while at macro-level, it is a vital tool in countering inflationary effects, determining wage policies, producing more wealth and enhancing investment without any burden to governments. According to Shash and Abdullatif (1993), the advantages of improved construction productivity are; improved planning, improved project control, significant cost savings, improved communications among work force, improved bidding and estimating and faster response to management crises.

METHODOLOGY

For this study, a quantitative exploratory research design method was adopted. The contractors (the executors of construction projects and the employers of artisans and labour) and the

designers were chosen as the subjects for this study because of their knowledge and experience on the main theme of this study. Hence, the study was conducted among the construction contractors and design professionals that have projects they are executing in Lagos state, Nigeria.

The judgmental and the snowballing sampling techniques were used simultaneously for this study. The combination of judgmental and snowballing (both non probability) sampling techniques give a strong semblance of probability sampling technique (Asika, 2004) and this advantage makes it possible to make conclusive (generalized) inferences based on the findings of the research. It is worth mentioning that, a similar research has been carried out by Arditi and Mochtar (1996 & 2000) in the Indonesian and US construction industries and this study adapted a part of the researchers' (Arditi and Mochtar, 1996) questionnaire with some additions/subtractions. The results of its findings were also presented in a different manner.

For this research, sixty-four (64) questionnaires were retrieved out of the one hundred and eighty (180) that were distributed to the respondents and this gives a total response rate of 35.6%. The data collected through the questionnaire was analysed with the statistical package for social sciences (SPSS 15) and the main tool employed for the study is the Mean Item Score (MIS) and percentages.

DATA ANALYSIS AND PRESENTATION OF RESULTS

Table 1 gives the background information about the respondents and their respective organisations' operations. The respondents used for the study are the contractors' and the designers' organisations which have equal frequencies and percentages of 32 and 50 each respectively.

Table 1: Information about respondents and their companies

	Frequency	Percentage
Line of operation		
Contractor	32	50
Designer	32	50
Types of projects handled		
Building projects	53	82.80
Engineering projects	11	17.20
Annual turnover (Naira)		
< 25 million	30	46.90
25-50 million	20	31.30
50-100 million	10	15.60
100-500 million	2	3.10
> 500 million	2	3.10
Number of permanent employees		
< 50	36	56.30
50-100	7	10.90
100-200	9	14.10
200-500	8	12.50
> 500	4	6.30
Number of temporary employees		
< 50	50	78.10
50-100	8	12.50
100-200	6	6.30
Naira value (millions) of construction equipment		
< 5	22	34.40
5-25	32	50
25-50	8	12.50
50-200	2	3.10
Percentage of construction equipment leased or rented		
None	21	32.80
< 25	27	42.20
25-50	12	18.80
50-75	4	6.30
Amount of work (percentages) subcontracted		
< 25	31	48.40
25-50	25	39.10
50-75	8	12.50

The respondents that are into building projects are 82.80% while 17.20% of the respondents are into engineering projects. The annual turnovers of most (46.90%) of the respondents' organisations are less than N25 million. Most (56.30% and 78.10% respectively) of the respondents' organisations have permanent and temporary employees of less than 50 numbers. Also, one-half of the respondents' organisations (50%) make use of construction equipments of N5-25 million. The respondents' organisation that do not lease any of the equipment used for the execution of their projects are 32.80% while 42.20% lease less than 25% of the equipment they use for executing their projects. 48.40% of the respondents' organizations give out less than 25% of their jobs to sub-contractors.

Table 2 indicates the rating of the designers, contractors and the overall for the areas where productivity improvements are required. The table contains 73 improvement areas out of which only ten (10) from four categories (communication, management, computer utilization and labour) are core to the Nigerian construction industry.

Table 2: Overall productivity improvement areas

Improvement Area	Category	Designer		Contractor		Overall mean	
		Mean score	Rank	Mean score	Rank	Score (OMS)	Rank
With company	Communication	2.69	3	2.94	1	2.81	1
With client	Communication	2.81	1	2.81	2	2.81	1
Office management	Management	2.81	2	2.66	5	2.73	3
With contractor	Communication	2.50	13	2.81	3	2.66	4
Office management	Computer Utilization	2.69	4	2.59	6	2.64	5
Communications	Management	2.59	6	2.59	7	2.59	6
With subcontractor	Communication	2.34	29	2.75	4	2.55	7
With designer	Communication	2.56	8	2.50	9	2.53	8
Labour relations	Labour	2.47	17	2.56	8	2.52	9
Labour availability	Labour	2.69	5	2.34	16	2.52	9
Architectural design	Computer Utilization	2.50	14	2.44	11	2.47	11
Labour working hours	Labour	2.53	12	2.41	13	2.47	11
Design standards	Engineering	2.41	23	2.47	10	2.44	13
Estimating	Management	2.56	9	2.28	23	2.42	14
Cost control	Management	2.50	15	2.31	20	2.41	15
Procurement	Material	2.56	10	2.25	27	2.41	15
Turnover	Labour	2.44	20	2.34	17	2.39	17
Availability	Material	2.47	18	2.31	21	2.39	17
Delivery	Material	2.56	11	2.22	30	2.39	17
Structural design	Computer Utilization	2.31	32	2.41	14	2.36	20
Specification	Computer Utilization	2.44	21	2.28	24	2.36	20
Selecting contractors	Contracting	2.41	24	2.28	25	2.34	22
Health	Regulation	2.25	38	2.44	12	2.34	22
Cost estimating	Computer Utilization	2.31	33	2.34	18	2.33	24
Equipment management	Computer Utilization	2.59	7	2.03	50	2.31	25
Specifications	Engineering	2.28	36	2.28	26	2.28	26
Storage	Material	2.50	16	2.06	47	2.28	26
Material management	Computer Utilization	2.34	30	2.19	33	2.27	28
Resource allocation	Management	2.38	28	2.16	35	2.27	28
Personnel management	Computer Utilization	2.41	25	2.09	44	2.25	30
Maintainability	Equipment	2.09	51	2.41	15	2.25	30
Safety	Management	2.25	39	2.22	31	2.23	32
Field inspection	Management	2.31	34	2.16	36	2.23	32
Selecting designers	Contracting	2.31	35	2.16	37	2.23	32
Contract agreement	Labour	2.22	42	2.25	28	2.23	32
Cost accounting	Computer Utilization	2.13	50	2.34	19	2.23	32
Standardization	Material	2.47	19	1.97	54	2.22	37
Quality control	Labour	2.41	26	2.03	51	2.22	37
Systems engineering	Engineering	2.41	27	2.03	52	2.22	37
Drafting	Computer Utilization	2.19	45	2.25	29	2.22	37
Environment	Regulation	2.22	43	2.16	38	2.19	41
Safety monitoring	Computer Utilization	2.34	31	2.03	53	2.19	41
Utilization	Equipment	2.44	22	1.91	57	2.17	43
Selecting sub-contractor	Contracting	2.25	40	2.09	45	2.17	43
Design practices	Engineering	2.22	44	2.13	42	2.17	43
Scheduling/planning	Computer Utilization	2.16	46	2.16	39	2.16	46
With research organisations	Communication	2.16	47	2.16	40	2.16	46
Design-Build contracting	Contracting	2.16	48	2.13	43	2.14	48
Simplicity	Equipment	1.94	55	2.22	32	2.08	49
Capacity	Equipment	1.81	61	2.31	22	2.06	50
Value engineering	Engineering	2.25	41	1.88	59	2.06	50
Scheduling	Management	2.28	37	1.84	62	2.06	50
Marketing	Computer Utilization	1.94	56	2.16	41	2.05	53
Replacement analysis	Equipment	1.97	54	2.06	48	2.02	54
Drafting	Engineering	1.88	58	2.09	46	1.98	55
Integration	Management	2.00	53	1.94	56	1.97	56
Training	Labour	2.13	49	1.81	63	1.97	56
Taxes	Regulation	1.69	66	2.19	34	1.94	58
Packaging	Material	2.03	52	1.81	64	1.92	59
Risk distribution	Contracting	1.72	64	2.06	49	1.89	60
Bonding	Contracting	1.84	59	1.91	58	1.88	61
Insurance	Contracting	1.94	57	1.81	65	1.88	61
Dispute resolution	Contracting	1.78	66	1.88	60	1.83	63
Integration	Computer Utilization	1.78	62	1.88	61	1.83	63
Marketing	Management	1.59	69	1.97	55	1.78	65
CM contracting	Contracting	1.72	65	1.78	66	1.75	66
Prefabrication	Material	1.78	63	1.72	67	1.75	66
New products	Material	1.69	67	1.69	68	1.69	68
Local codes	Regulation	1.66	68	1.50	69	1.58	69
Precast element	Construction tech	1.53	70	1.41	70	1.47	70
Preassembled modular	Construction tech	1.22	71	1.28	71	1.25	71

Table 2 cont'd

Foreign development	Construction tech	1.19	72	1.22	72	1.20	72
Use of robots	Equipment	1.16	73	0.81	73	0.98	73

(Mean score of 2.5-3.0 = Acceptable Area for Productivity Improvement in the Nigerian construction industry)

The acceptable mean value adopted for this study is 2.50 and above. The designers choice of areas of improvement in the Nigerian construction industry are; communication with client, office management, communication with company, computer utilisation and labour availability amongst others while contractors choice of areas of improvements are communication with company, communication with client, communication with contractors, communication with subcontractor and office management among others.

The areas for productivity improvement according to the designers and contractors are communication with company (2.81), client (2.81), office management (2.73), communication with contractors (2.66), office management with computer (2.64), management communications (2.59), communication with designers (2.53), labour relations (2.52) and labour availability (2.52) accordingly.

Table 3 shows the factors that influence productivity improvement in the Nigerian construction industry as rated by the designers and the contractors.

Table 3: Factors influencing productivity improvement in the construction industry

Factor	Contractor		Designer		Overall	
	Mean	Rank	Mean	Rank	Mean	Rank
Increase awareness and understanding of productivity importance among all employees	2.50	1	2.38	5	2.44	1
Increase employee's participation in improvement efforts	2.47	3	2.38	5	2.42	2
Improve cooperation and relations with clients and consultants	2.44	4	2.41	4	2.42	2
Improve documentation, communication & information system	2.50	1	2.22	9	2.36	4
Improve company's method & procedure of selecting subcontractors	2.38	5	2.34	7	2.36	4
Improve employees' financial standard	2.16	14	2.53	1	2.34	6
Improve financial & intangible incentives & link them with Productivity	2.22	9	2.47	2	2.34	6
Improve and upgrade training method	2.22	9	2.44	3	2.33	8
Implement/improve productivity control & assurance system	2.31	7	2.31	8	2.31	9
Delegate full authorities to project managers	2.22	9	2.22	9	2.22	10
Improve estimating and tendering departments	2.38	5	2.13	11	2.20	11
Development/improve research and development departments	2.25	8	2.00	14	2.13	12
Widen the scope of cooperation with advanced international organisations	2.06	16	2.09	12	2.08	13
Inject new and varied expertise into the company	2.06	16	2.06	13	2.06	14
Non acceptance of projects imposed on the company with financial losses	2.19	12	1.91	15	2.05	15
Improve project's cash flow by improving company's liquidity	2.19	12	1.81	16	2.00	16

0 = Not applicable, 1 = Slightly applicable, 2 = Averagely applicable, 3 = Highly applicable
 * (2.5-3.0 Mean score = Acceptable factor that influences productivity improvement)

Taking 2.5 as the value for accepting that a factor influences productivity improvement, increase in awareness and understanding of productivity importance among all employees, improve documentation, communication and information system and Increasing employee's participation in improvement efforts are factors that influence productivity from the contractors' point of view while improving employees' financial standards and Improving financial & intangible incentives & link them with Productivity top the designers' rating. However, from the collective rating of the contractors and designers, none of the factors influence productivity improvement in the Nigerian construction industry.

Table 4 indicates the actions that the respondents' organisations thought necessary to take in the interest of improving productivity in the Nigerian construction industry.

Table 4: Actions thought necessary by respondents' organisations to improve productivity

Action	Contractor		Designer		Overall	
	Mean	R	Mean	R	Mean	Rank
Serve as a member of a group that identifies productivity problems	2.56	1	2.59	1	2.58	1
Attend construction productivity conference and meetings	2.50	2	2.38	2	2.44	2
Subscribe to a construction productivity information service	2.47	3	2.13	5	2.30	3
Help develop a project aimed at improving construction productivity	2.22	7	2.38	2	2.30	3
Conduct/participate in a project aimed at improving construction Productivity	2.25	5	2.31	4	2.28	5
Evaluate the result of a project aimed at improving construction Productivity	2.47	3	1.97	6	2.22	6
Contribute funds to support programmes aimed at improving construction productivity	2.25	5	1.75	7	2.00	7

0 = Not necessary, 1 = Slightly necessary, 2 = Averagely necessary, 3 = Highly necessary
 * (Mean score of 2.5-3.0 = Acceptable action thought necessary by respondents) R = Rank

From the contractors' point of view, serving as a member of a group that identifies productivity problems, attending construction productivity conference and meetings, subscribing to a construction productivity information service and evaluating the result of a project aimed at improving construction productivity are the actions that are necessary to improve productivity in the Nigerian construction industry. According to the designers,

serving as members of a group that identifies productivity problems is the only action that could be taken to improve productivity. The collective opinion of the respondents also saw serving as a member of a group that identifies productivity problems as the action that could be taken to improve productivity.

RESULTS AND DISCUSSION OF FINDINGS

Unlike the Indonesian construction industry where it was found out that contractors are diversified, Nigerian contractors and designers are not diversified, as most (82.80%) of them execute building projects and only a few (17.20 %) execute engineering (roads, bridges, stadia etc) projects. No contractor or designer that responded to this survey engaged in industrial projects as it is the case in Indonesia and United States. This result is not surprising because not many industrial projects are being executed in Nigeria and the few ones that are executed are handled by expatriate companies. The same trend is applicable to engineering projects and that may be the reason for the non diversification of the contractors and designers in Nigeria.

The findings of this study were different from that of Arditi and Mochtar (1996) in some ways. While Arditi and Mochtar (1996) realised that improvement lies more in management, engineering and computer utilization from the perspective of contractors and none from the designers' perspectives, this study found out that the categories of improvement areas are basically management, computer utilization, communication and labour for both contractors and designers. Only management and computer utilization were similar when compared with the study carried out in the Indonesian construction industry.

Communication is expected to be an area for productivity improvement in the Nigerian construction industry because (1) communication via telephone is viewed as being relatively expensive (2) communication via internet is unpopular in the construction industry, relatively expensive and not understood by some construction contractors and designers (3) role and superiority rivalry is dominant in the Nigerian construction

industry, thus communication gap exists.

Also, labour as a productivity improvement area is not surprising because skilled labours are not many and educational/professional certificates are not so required to work on most sites in the Nigerian construction industry. The US research carried out by Arditi and Mochtar (2000) show that their construction industry is relatively acceptable in terms of productivity and there are no areas where high ratings were given. Labour relations and availability were chosen by contractors and designers in the Nigerian construction industry as areas where productivity improvement are required. This may be due to the reason given earlier that there are no skilled labours in the Nigerian construction industry and there are not much institutions where such labours are being trained. Thus, if all the first ten improvement areas identified by contractors and designers could be dealt with, productivity within the Nigerian construction industry would be greatly improved.

Arditi and Mochtar (1996) Show that contractors were mostly willing to conduct projects aimed at improving construction productivity, evaluate results of projects aimed at improving construction productivity and develop projects aimed at improving construction productivity while designers were not willing to participate in any of the productivity improvement options. This result shows some level of distaste for projects and programmes aimed at improving productivity on the part of the Nigerian contractors and designers. It also shows that Nigerian contractors and designers want projects that would improve productivity and be made available through conferences and meetings. Just as it is the case in Indonesia and US construction industry, the Nigerian construction contractors and designers (both improving construction productivity) were not willing to contribute funds to support productivity programmes that are aimed at improving construction productivity.

CONCLUSION AND RECOMMENDATION

Based on findings, this study concludes that the Nigerian construction industry still has a long way to go in its quests for improving productivity. The reason being that the problem of

communication is not peculiar to the construction industry alone; it is generally applicable to most industries and sectors in the country although in varying degrees. Communication via telephone is relatively expensive when compared with other parts of the world and communication via the internet (E mail, Intranet, extranet, etc) is not widely used.

Also, if the technology sector of the nation is not improved it will lead to continuous unavailability of labour because skilled labour needs mechanized technology to compete with the global trend of construction. The paper suggests that technical schools in Nigeria need to be awakened and people should be encouraged to engage in technical education and become skilled artisans. Communication issues can be linked with computer utilisation and information technology (IT), thus contractors and designers within the construction industry need to be encouraged to engage in the adoption of information technology and create information technology department within their organisations.

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