

Labour Output on Painting Activity in the Construction Industry in Edo State, Nigeria

Mike I. Udegbe

*Department of Building, Faculty of Environmental Studies, Ambrose Alli University,
Ekpoma, Nigeria*

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ABSTRACT The construction of a house is capital intensive and seems to discourage some people from building personal houses. Government concerted effort at housing provision since independence in 1960 through the various national development plans seems not successful. Labour force in the building construction industry fall into skilled and unskilled. The financial implication of using any of the trades contribute to the cost of construction. The utilization of labour force in the construction industry accounts for a significant proportion of the cost of buildings. This study looks at the factors that can affect painting activity output in building construction in Edo State and concludes that painters should cover a minimum surface area of 76m² per unit rate daily.

INTRODUCTION

A building is one of man's basic requirements after food and can be used to determine the development of any nation. Research has shown that the cost of building a house is high and principally depends on cost of labour and materials (Maloni, 1983, Oloko, 1985, Omenge, 2000; Udegbe, 1997).

The effect of labour cost on building projects though important, has not been singularly treated because of scarce literature on labour dynamics. Adeyemi and Alli (2000) believe that the primary purpose of cost analysis is to optimize the client's expenditure in order to have good value for money.

Reducing the cost of building construction requires indept studies of the actual cost of labour and comparing it with results from other similar studies. Cost reduction in building construction must take cognisance of factors like labour welfare, tactics and interplay, relationship with sub ordinates, skills acquired coupled with educational qualification and the overall importance of labour force in construction.

Different workers have different variables affecting their levels of productivity. The most prevalent includes the following; Level of education / training, Method of work, Direction of flow of work, Personal health / hygiene, Motivational factors, Type of tools, Machine, Equipment and Materials employed, Character traits and Inter-personal skills, Work-load to be executed. Expected quality of work, Location of

work to be done, Type of work to be done, Type of supervisory personnel, Stake in the outfit etc.

Rationale For The Study

There is no known standard theoretical yardstick for determining the financial value of painters' daily output. This leaves clients with the choice of paying any of sum of money for services rendered. This paper originates with the objective of setting the tone for clients, contractors and professionals involved in building projects with a view to, providing them with necessary ideas about site work force management and elaboration on optimum output per person per day. This will enable the equivalent cost to be determined.

This study looks into painting activity output in the construction industry with a view to determining the following objectives:

- (a) The actual daily output of painting activity
- (b) The statistical interplay and tactics of labour in cost determination
- (c) The statistical effect of labour relationship with subordinates
- (d) The statistical role of labour force on construction sites.

METHODOLOGY

Data for this study relied on practical work measurement of the painters on site and the use of structured questionnaires, which were administered to the labour force. Specifically, the

study accomplished this through the following processes: (a) work measurement entailed the use of stopwatch and measurement tapes to determine work output. While the stopwatch enabled accurate measurement of effective working, idle, break, closing and resumption time, the measurement tape was used to measure the total effective area covered by painters per day. (b). The structured questionnaires were distributed to literate workers on the construction sites that are literate while oral interviews reflecting the content of the questionnaire was used for the illiterate work force (those that cannot read and write). The response to the distributed questionnaires gave information on the gender composition of workers on site, academic qualification, and painters' attitude to work, the influence of labour force on construction and the effect of supervisors on site work.

RESULTS

Out of the one thousand (1000) questionnaires distributed in all the local government areas of Edo state, eight hundred and forty-five were retrieved (this represents about eighty five percent of the total questionnaires administered). It must however be mentioned that some local government areas did not have very big sites that involved categories of labour force. Since the thrust was to identify available labour force on construction sites in all the local government areas, questionnaires were distributed to available labour forces (skilled and unskilled) in all the local government areas.

Evaluated response from the questionnaire show that:

- (a). 75% of labour force on site are males while females account for about 25%. The latter percentage of female were mostly in cleaning and menial sites jobs.
- (b). Under classification by academic qualification, 25% were found not to be formally educated, while primary, secondary and technical education attracted 37%, 12.5% and 25% respectively.
- (c). It was significantly clear from the response that labour force relationship with supervisors on any construction site must be good for effective result. 70% of respondents subscribed to good relationship while 25% and 5% subscribed to fair and poor relationship respectively for effective output.

The above results gave rise to the under-mentioned hypotheses in line with the outlined objectives of study.

Hypothesis I: Understanding labour tactics and interplay cannot affect labour cost of construction.

This hypothesis was tested using the chi-square, given that the frequency counts were occurring in two or more mutually exclusive categories of data. The result of the χ^2 is presented in table 1.

Since the calculated value of chi square of 19.6, is greater than the chi square table value of $df = 2$ at .05 level of significance which is 5.99, the null hypothesis is hereby rejected.

This shows that deliberate actions of labour force by using delay tactics and wastage of materials increases cost of construction, slow down pace of work and affects overall daily output of labour.

Hypothesis II: Labour force does not play any significant role in construction.

The hypothesis was also tested using the chi-square. The result of the hypotheses test is presented in table 2.

Since the calculated chi-square value of 11.77 is greater than the chi-square table value of $df = 3$ at 5% level of significance, which is 7.815, the null hypothesis is rejected. This shows that without the use or influence of labour force on any site, progress on site will be minimal and the eventual total cost of a building will be high.

Hypothesis III: Relationship with subordinates cannot affect Labour output/production.

The calculated value of chi-square on table 3 gives 8.66 which is greater than the chi-square table value of $df = 2$ at 5% level of significance which is 5.99. With this result, the null hypothesis is rejected. This result explains the suggestion that subordinate's good public relationship with

Table 1: Test of attitudes and tactics to work

Option	o_i frequency	e_i	$o_i - e_i$	$(o_i - e_i)^2$	$(o_i - e_i)^2 / e_i$
Positive	13	5	8	64	12.8
Negative	2	5	-3	9	1.8
Neutral	-	5	-5	25	5
Total	15	15		98	19.6

Table 2: Influence of labour force on construction

Option	o_i	e_i	$o_i - e_i$	$(o_i - e_i)^2$	$(o_i - e_i)^2 / e_i$
High	10	4.5	5.5	30.25	6.72
Low	5	4.5	0.5	0.25	0.05
Poor	3	4.5	-1.5	2.25	0.5
No idea	-	4.5	-4.5	20.25	4.5
Total	18	18			11.77

Table 3: Labour force relationship with subordinates

Option	o_i	e_i	$o_i - e_i$	$(o_i - e_i)^2$	$(o_i - e_i)^2/e_i$
Good	7	3	4	16	5.33
Fair	2	3	-1	1	0.33
Poor	-	3	-3	9	3.0
Total	9				8.66

labour force, enhance their productivity and help to reduce cost of construction within acceptable quality.

Apart from the above tested hypothesis, it was necessary to study the labour force further, with a view to finding out.

(a) The actual time workers report for work, (b) When workers are idle, (c) When labour force is effective, (d) Work output in the morning and in the afternoon, (e) The total hour put in by the work force and (f) The nature of target work by skilled and unskilled work force.

On the average a pair of skilled and unskilled workforce put in 8 hours daily as shown on table 4.

Table 4 shows the practical time study observed on labour force at construction sites in the study area. The skilled and unskilled labour forces have varied start and break times. The idle moments can be deduced from the table and represent the time that either the skilled or unskilled labour force is not effectively being utilized. The effective work duration represent the recorded time when labour force is actively involved in output/productivity. At most of the sites visited, unskilled and skilled labour forces were treated as one pair and paid together. The skilled worker collects the day's pay and pays both the skilled and unskilled. This accounts for why

the average total input has been considered together for the skilled and unskilled labour forces.

WORK MEASUREMENT

To establish the cost of labour force and identify output/productivity, accurate work measurement was carried out in all the local government areas of Edo State. The work measurement was based on kind of work, skill of workers, working tools, experience, locations of site, and condition of service and time of work. These measurements were determined in each site for the different locations in the state. Activity sheets were prepared and used to record results with respect to time. Timing was carried out by the use of stopwatch. Start and finish times for different activities were recorded and the corresponding output noted. The difference between the start and finish times represents the duration for the activity of the particular trade.

Table 5 shows the site measurements recorded for Painting activity in the different local government areas of Edo State from 1991 to 2000. Fig. 1, 2, 3, and 4 show graphs of painting over the years in the study area. All the Figures show a general reduction in output over the years.

Table 6 also shows random site labour force output for painting activity in all the local government areas in Edo State. The normalized values were based on observed deviation and pattern of participation of labour force on all the sites visited.

CONCLUSION

In most parts of the study area, labour teams

Table 4: Observed labour force working time, idle time and overall daily input for Edo state

Day	Labour type	Time in start time		Effective work duration morning hours	Break time	Effective work duration afternoon hours	Total average input (hrs)
Monday	Skilled labour	8.00am	8.30am	8.30am- 12.05noon	12.08-1.00pm	1.10-5.15	7.53hrs
	Unskilled labour	8.00am	8.05am	8.05am- 12.30noon	12.08-1.00pm	1.05-5.25	
Tuesday	Skilled labour	8.00am	8.05am	8.05am- 12.30noon	12.38-1.00pm	1.25-5.20	8.45hrs
	Unskilled labour	7.40am	7.45am	7.45am- 12.30noon	12.38-1.00pm	1.06-5.30	
Wednesday	Skilled labour	8.00am	8.30am	8.30am- 12.15noon	12.18-1.00pm	1.20-5.15	7.45hrs
	Unskilled labour	8.00am	8.25am	8.25am- 12.15noon	12.18-1.00pm	1.05-5.20	
Thursday	Skilled labour	7.50am	8.15am	8.15am- 1.00noon	1.05-1.20pm	1.35-5.10	8.10hrs
	Unskilled labour	7.50am	7.55am	7.55am- 1.00noon	1.05-1.20pm	1.35-5.20	
Friday	Skilled labour	8.30am	9.00am	9.00am- 12.05noon	12.10-1.20pm	1.10-5.10	7.33hrs
	Unskilled labour	8.30am	8.30am	8.35am- 12.05noon	12.10-2.50pm	2.50-5.25	
Saturday	Skilled labour	8.15am	8.35am	8.35am- 12.10noon	12.15-2.50pm	1.25-5.20	7.43hrs
	Unskilled labour	8.15am	8.25am	8.25am- 12.10noon	12.15-2.50pm	2.55-5.25	

Source: Researcher's Field Work, July 2004.

Table 5: Labour force output on painting activity

Locations	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	average
Uromi	120	118	118	117.6	94.08	94	94.5	24	23.52	24	82.77
Ekpoma	118	117.4	117	118.2	94	94.4	94.08	23.52	23	24.4	82.42
Abudu	116	116.4	116.5	117.6	93.5	94.08	94.08	22.8	23.2	23	81.716
Igueben	117	118	118	118	94.08	94	94.3	23.5	23.5	24	82.438
Auchi	118	117.6	117.6	117.5	94.1	93.8	94.08	23.5	23.6	23	82.278
Ubiaja	116	116.8	116.9	117	94	94	93.7	22.7	23.8	22.5	81.74
Benin-city	116	116	117.6	117.6	94.4	94.4	94.08	23.52	23.52	23	71.572
Afuze	126	120	118	118	95	94	94	25	24	22	83.6
Agenebode	118	118	118	118	95	94	93	25	23	23	82.5
Ehor	120	118	116	116	94	94	93	23	23	23	82.1
Fugar	118	116	116	116	93	93	93	25	24	24	81.8
Idogbo	116	114	114	116	94	94	94	24	23	23	81.2
Igarra	118	116	116	114	94	93	95	24	22	22	81.4
Iguobazuwa	120	118	116	114	95	94	94	24	23	23	82.1
Irrua	120	118	116	114	95	94	94	25	24	24	82.4
Okada	118	116	116	114	94	94	93	23	23	23	81.4
Sabogida-ora	118	118	116	108	94	94	94	23	24	24	81.3
Urelu	118	118	116	108	96	95	94	24	24	23	81.6
Average of total	118.3889	117.5556	116.6444	115.5278	94.28667	93.98222	93.87889	23.86333	23.39667	23.21667	81.463

Source: Researcher's Field Work, April 2000.

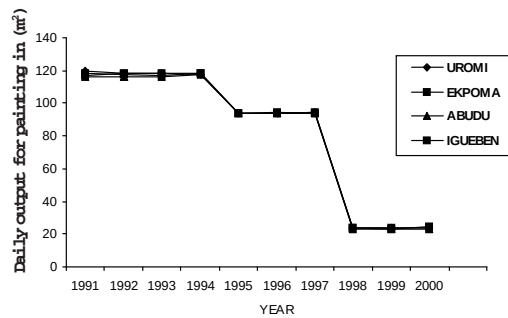
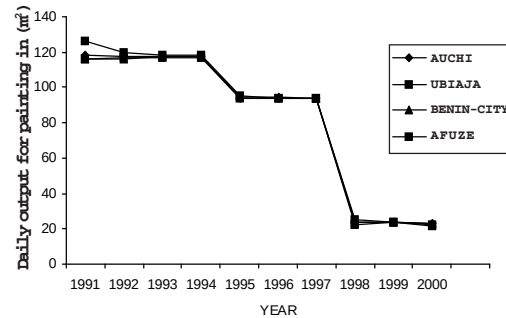
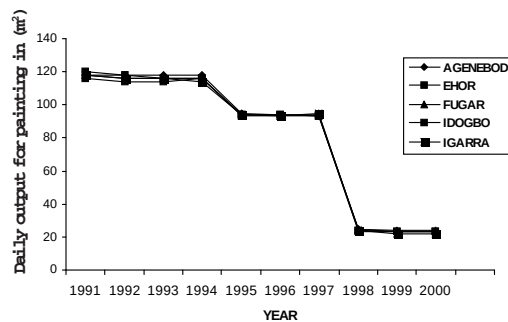
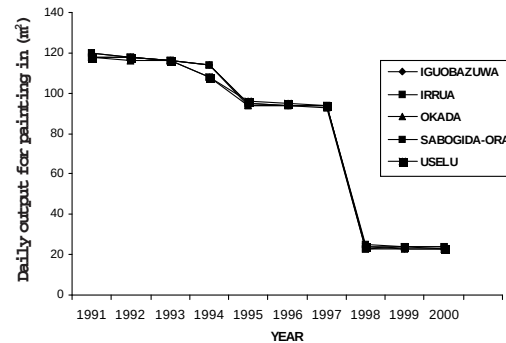
**Fig. 1. Labour force output on painting activity****Fig. 2. Labour force output on painting activity****Fig. 3. Labour force output on painting activity****Fig. 4. Labour force output on painting activity**

Table 6: Random site measurement on painting activity in edo state

Site location	No of sites visited	Avg measured time in hrs	Avg area covered in m ²	Normalise avg measured time	Normalised avg output in no.
Ubiaja	2	3	44	4	59
Auchi	3	3	45	4	50
Okada	1	1 ⁵ / ₆	43	4	94
Idogbo	3	2	45	4	90
Abudu	3	2 ³ / ₄	40	4	59
Igueben	3	3	44	4	59
Uromi	2	2 ¹ / ₂	40	4	64
Irrua	3	2 ¹ / ₂	46	4	74
Agenebode	3	3	42	4	56
Sabogida-ora	4	3	40	4	54
Fugar	2	2	40	4	80
Ekpoma	2	2	42	4	84
Benin-city	3	2 ¹ / ₂	44	4	71
Ehor	3	2	39	4	78
Afuze	3	2 ¹ / ₂	43	4	69
Igarra	3	2 ¹ / ₂	42	4	68
Iguobazuwa	4	2 ³ / ₄	42	4	61
Urelu	2	1 ³ / ₄	40	4	92

were chosen from own employees (FOE) and individual agreements (I.A) reached on what to do, where to work, how to work, when to start and complete work and the cost of labour contracts agreements were not written (UW).

If a labourer (an unskilled worker) is trained and employed to serve a skilled worker in a site, the master-servant inter-play would be highly boosted, leading to high productivity value of about 76% (seventy six percent) .

Finally, the dissemination of labour cost information in Edo State can assist professionals and non-professionals in handling building projects.

RECOMMENDATIONS

Management roles in labour force productivity or output are dependent on a number of variables, which also hinge on human factors. It is important to note that, the dynamism of a productive labour force can be found in the quality of leadership, which directly or indirectly influence the quality of the followership. The study area (Edo State) presents quite an interesting cosmopolitan labour force which exhibits characteristics that favour statistical deductions. An attempt at optimization with a view to predictive conclusion has been carefully explored.

Following the results of this research, the under-listed recommendations will go a long way in addressing the issue of the cost of painting

activity in building construction in Edo State of Nigeria.

- The use of unqualified supervisors should be discouraged. In their place, professional builders should be allowed to supervise and control labour and materials on site, so as to minimize construction problems.
- Productivity or output will increase/ appreciate if company directors are directly involved in overseeing labour forces.
- Painting is subjective and should cover a minimum of 75m² for unit daily rate
- Project managers should induce loyalty from all grades of site staff, by being fair and just
- Occasional training either on the job locally or elsewhere should be encouraged
- Morale boosting incentives (e.g. extra pay, welfare packages, overtime etc) can be introduced to motivate workers.
- In most building construction sites, efforts should be made to ensure labour productivity or output of at least 70%.

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