Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol 2, No.10, 2012

Analysis And Prediction Of Cost And Time Overrun Of Millennium Development Goals (MDGS) Construction Projects In Nigeria.

Edoka Augustine Ijigah Ezekiel Babatunde Ogunbode* Moshood O. Ibrahim
Department Of Building, Federal University of Technology, P.M.B. 65, Minna, Niger State Nigeria.
* E-mail of the corresponding author: onbodmail@yahoo.com

Abstract

The paper focuses on the analysis and forecast of cost and time overrun of MDGs construction projects in Nigeria. Twenty five MDGs construction projects from (2006-2009) were critically investigated and time and cost overrun of the project were studied. The Statistical Package for Social Scientists (SPSS) 19.0 version was used to analyse the variables using Paired t-test and simple regression at 95% confidence limits. The analysis was based on the adaptation of requisition method. The validity test on the efficiency of the model was highlighted using the confidence interval to enhance the application of the models. Mathematical models were developed. The findings shows that there is a significant different between the total contract sum, cost overrun, total contract duration, and time overrun for the MDGS projects. The study suggests acute need for government to engage in proactive strategic planning and approaches to keep construction project cost and time within reasonable limit for the actualization of MDGs policy of development and environmental sustainability.

Keywords: Analysis and Prediction, Cost Overrun, Time Overrun, Millennium Development Goals and Construction Projects.

1. Introduction

The Millennium Development Goals which are to be realized by 2015 are a set of developmental targets aimed at affecting measurable improvement in the life of the world's poorest citizens. The goals are related to poverty reduction, gender inequality, child and material health, combating HIV/AIDS, malaria and other diseases, environmental sustainability, and international cooperation for development. (MDGs, 2010). Eboh, (2008); UNDP (2009); UN (2009) UNECA (2009) & MDGs (2010) all reports that a variety of problems have persisted, slowing the country's growth and attainment of development objectives. These include inadequate human development, inefficient agricultural systems, weak infrastructure, lacklustre growth in the manufacturing sector, a poor policy and regulatory environment, and mismanagement and misuse of resources. The above issue propelled the United Nation General Assembly to adopt and declare the millennium development goals (MDGs), committing nations of the world to battle poverty, diseases, gender inequality, and environmental degradation and to foster a global partnership for development (Otti, 2012).

Following the debt-relief grant of US$18 billion in 2005, a Virtual Poverty Fund was established to ensure that monies realised (about US$1 billion each year) from debt relief were channelled towards poverty reduction and the other MDGs. In collaboration, the federal government took both policy and institutional step towards achieving the MDGs. These include: the National Economic Empowerment and Development Strategy (NEEDS) , State Economic Empowerment and Development Strategy (SEEDS), Fiscal Responsibility Act, Medium-Term Sector Strategies (MTSSs), Medium-Term Expenditure Framework (MTEF), Nigeria Vision 20:2020, NEEDS II and 7-Point Agenda (MDGs, 2008) . Simultaneously, several states have developed their own medium-term development strategies which have been harmonised with the Vision 20:2020 National Plan and currently provides the overall (national) policy framework for the MDGs in Nigeria.

The construction industry is generally responsible for the physical development or the transformation of the environment (Hillebrandt, 2000). The built environment is vital to social-economic development of a nation and its contribution to MDGS goals are crucial and a focus of any nation's economy (Ijigah, Oloruntaba & Mohn,

2012). But several finding of studies shows that the industry has reduced in its contribution to the national economy and its performance in terms of cost and time of project (Olomolaiye, 1987; Aniekwu, 1995; Adeyemi et al. 2005; Oladipo, 2006; Oladapo, 2011 & Ijigah, et al. 2012).

High construction costs have been a major pointer to the malfunction of the construction industry in Nigeria today (0tti, 2012 & Ijigah et al.,2012). This has manifested in low construction activities and abandoned projects with severe consequences on the nation's socio-economic and technological development. Most construction project are being completed at costs much higher than initial estimated which indicate that initial cost estimates on construction projects can hardly be relies upon by clients (Achuenu & Kolawole, 1998; Kunya,2006; Oladipo, 2011; 0tti, 2012 & Ijigah et al. 2012). The study of Adewuyi & Anigbogu (2006) also assert the scenario in which clients are compared to pay for unbudgeted increase in projects or abandon the project out rightly. Ogunsemi (2002); Achuenu & Ujene (2006); kunya (2006) ; Otti (2012) & Ijigah et al. (2012) all submits that in the recent past, many projects are still subjected to cost and time overruns which results in claims between clients and contractors. This has also affected the MDGs projects as the study by Otti (2012) & Ijigah et al. (2012) reviewed that several of the 2006 MDGs construction projects funded still remained at different stages of completion as at June 2007 while many had not started at all.

Considering the relationship between construction projects and the national Development , it becomes necessary that the cost and time overrun of MDGs construction projects be investigated as they is insufficient data to achieve a significant improvement in the lives of at least 100 million slum dwellers in Nigeria in the 2010 MDGs report.

It is against this background that this study, therefore seeks to developed mathematical forecasting model for predicting cost and time overrun that are likely to arise from any MDGs construction project in Abuja Nigeria. Kunya (2006) have at different time developed similar models for predicting project variation claims of public buildings. Kunya (2006) states that the efficiency of such models is based on certain assumptions such as controllable and predictable inflating trends, availability of historical construction data and quick access to construction project information.

2. Methodology

A non-probability convenience sampling method was adopted; this is a sampling method) that involves choosing from a sample that is not only accessible (Teddlie & Yu, (2007) and Collins, Onwuegbuziu & Jiao (2007) but the respondent are willing to take part in the study. This work deals with the analysis of data sourced from various contract documents of completed (MDGs) construction projects in Abuja, F.C.T. from 2006-2009. Thirty three contract documents submitted were collated from consultants, out of which eight were discarded for lack of constancy and twenty five were used for analysis (75.76%). The characteristics of the project were obtained and used to tabulate the estimated project duration, final project duration, estimated project cost and final project cost of the (MDGs) projects. The Statistical Package for Social Scientists (SPSS) 19.0 version was used to analyse the variables using Paired t-test and simple regression at 95% confidence limits. The paired t-test method of analysis compares two samples and determines the likelihood of the observed different between the samples occurring by change. The change is reported as the p-value (Kunya, 2006). A p-value close to 1 means, it is likely that the hypothesized and sample means are the same, since it is very likely that such would happen by change, if the null hypotheses of no difference exist. Regression method of analysis was adopted, where relationship between variables is determined using the method of least, squares which sicks to minimize the sum of the square of the difference between the observed values and the predicted values of the form.

$y = a + bx$

Where; y - is a dependent variable, (Time Overrun, %Time Overrun, Cost Overrun and %Cost Overrun,); x - is an independent variable (Project Duration and Project Cost?)

The choice of this model is informed by the fact that once the relationship has been determined, it can be used to mark any number of forecasts simply by inserting the value of x for which a forecast is necessary. Where change may have taken place, it is necessary to collect new set of data and recomputed the value of "a" and "b"

The following equation were also used in the analysis

Time overrun = actual project duration - estimated project duration

Cost overrun = actual project cost - estimated project cost

$$\%\text{cost overrun} = \frac{\text{cost overrun x100}}{\text{estimated project cost}}$$

$$\%\text{time overrun} = \frac{\text{time overrun x100}}{\text{estimated project duration}}$$

3. Results and Discussion

The results of the analysis for the (mdgs) construction projects studied are presented below:

Table 1: Cost and Time Overrun of (MDGs) Construction Project in Abuja

	Estimated Project Duration (Months)	Actual Project Duration (Months)	Time Overrun Months	% Time Overrun	Estimated Cost of Project N,000,000	Final Cost of Project N,000,000	Cost Overrun N,000,000	% Cost Overrun
1	12.0	17.0	5.0	41.67	4.70	6.00	1.30	27.66
2	12.0	13.5	1.5	12.50	86.40	93.50	7.10	8.22
3	24.0	18.5	6.0	27.08	21.02	25.76	4.74	22.55
4	23.0	30.5	6.5	13.04	300.00	370.00	70.00	23.30
5	15.0	20.0	5.0	33.33	30.90	40.00	9.10	29.45
6	8.0	11.5	3.5	43.75	4.74	6.84	2.10	44.30
7	18.0	25.0	7.0	38.89	62.80	89.6	26.8	42.68
8	13.0	16.0	3.0	23.08	5.70	6.10	0.40	7.02
9	11.0	12.5	1.5	13.64	402.00	503.00	101.00	25.12
10	24.0	38.0	14.0	58.33	20.67	29.23	18.56	31.74
11	12.0	10.0	2.0	16.67	78.00	89.00	11.00	14.10
12	7.0	8.5	1.5	21.43	254.00	290.00	36.00	14.17
13	24.0	28.0	4.0	16.67	60.87	50.45	10.42	17.12
14	22.0	28.0	6.0	27.23	4.50	6.70	2.20	48.89
15	12.0	15.5	3.0	25.00	24.00	27.00	3.00	12.50

16	23.0	29.5	6.5	28.26	300.00	370.00	70.00	23.33
17	17.0	24.5	7.5	44.12	320.00	358.00	38.00	11.88
18	7.0	8.0	1.0	14.29	12.00	10.00	2.00	16.67
19	24.0	36.0	12.0	50.00	17.23	22.94	5.71	33.14
20	16.0	19.0	3.0	18.75	53.30	64.10	10.80	20.26
21	21.0	27.5	6.5	30.95	48.00	62.00	14.00	29.17
22	24.0	29.0	5.0	20.83	72.60	85.50	12.90	17.77
23	9.0	13.5	4.5	50.00	4.74	5.84	1.10	23.21
24	5.0	7.0	2.0	40.00	43.70	54.80	11.10	25.40
25	24.0	29.0	5.0	20.83	58.30	72.50	14.20	24.36

Table 1 below presented the project cost and time overrun for the twenty five authenticated project studied. They are (MDGS) projects executed in Abuja between 2006-2009 and they have cost and time overrun. It shows that the maximum percentage time and cost overrun are (58.33 & 48.89) while the minimum percentage time and cost overrun are (12.50 & 7.02). This indicates that the (MDGs) projects all have cost and time overrun. The paired t-test results show significant differences of 5% level of significant between contract duration and time overrun and contract cost and cost overrun for projects considered for this study. The results are summarized in Table 2 and Table 3. A similar study by Adewuyi & Anigbogu (2006) on duration performance of universal basic education reviewed that only 69.6% of projects awarded in Nigeria were completed and the balance of 30.4% were either under construction or abandoned after $4^{½}$ years of contract award (Adewuyi & Anigbogu, 2006). The research by Otti (2012) & Ijigah et al. (2012) have shown that they is an improvement in the performance of the construction industry from 2008. These are due to better project management, improved contract method and the involvement of clients and contractors in project delivery.

Table 2. Paired t-test Results of Contract Duration and Time Overrun

	Project Duration	Time overrun
Mean	16.2800	4.9000
Std. Deviation	6.58610	3.12916
Observation	25	25
Hypothesis	0	
df	24	
t-start	11.480	
Sig. (2-tailed)	0.00	
P(T<=t)one	0.00	
t critical one	12.359	
P(T<=t)two	0.00	
t critical two	7.830	

In the comparison in Table 2, p-value of 0.00 <0.05 means that there is less than 5% chance of contract time overrun to be higher than the total project duration. This shows that for this project, contract duration is always higher than the time overrun

Table 3. Paired t-test Results of Contract Cost and Cost overrun

	Project Cost	Cost Overrun
Mean	91.6068	19.3412
Std. Deviation	118.77983	25.57566
Observation	25	25
Hypothesis	0	
df	24	
t-start	3.787	
Sig. (2-tailed)	0.001	
P(T<=t)one	0.001	
t critical one	3.856	
P(T<=t)two	0.001	
t critical two	3.781	

In the comparison in Table 3, p-value of 0.00 <0.05 means that there is less than 5% chance of contract time overrun to be higher than the total project duration. This shows that for this project, contract duration is always higher than the time overrun.

Table 4. Regression Analysis Result (summary) of Project Duration and Time Overrun

Multiple R	0.694
R Square	0.481
Adjusted R Square	0.458
Std. Error of the Estimate	2.302
Observation	25.00

P value = 5.5×10^{6}

From Table 4 above, regression coefficient of 0.69 shows a positive linear relationship between the project duration and time overrun. A p value of 5.5×10^{6} shows a 0.0% chance of no difference between project duration and time overrun. Also from the regression analysis summary (Table 4) shows a degree of determination of 0.481 suggesting a present of negative relationship between these variables. Total regression analysis reveals the following models;

$y = -0.467 + 0.330x$

Where; y = time overrun; x= project duration.

Table 5. Regression Analysis Result (summary) of Project Duration and Percentage (%) Time Overrun

Multiple R	0.28
R Square	0.01
Adjusted R Square	-0.043
Std. Error of the Estimate	13.55097
Observation	25

From Table 5 above, regression coefficient of 0.28 shows a negative linear relationship between the project duration and percentage time overrun. This shows a 0.0% chance of no difference between project duration and percentage time overrun. Also from the regression analysis summary (Table 5) shows a degree of determination of 0.01 suggesting a present of negative relationship between these variables. Total regression analysis reveals the following models;

$y = 28.292 + 0.057x$

Where; y = % time overrun; x = project duration.

Table 6. Regression Analysis Result (summary) of Project cost and cost Overrun

Multiple R	0.931
R Square	0.857
Adjusted R Square	0.861
Std. Error of the Estimate	9.52606
Observation	25

P value = 0.00057

From Table 6 above, regression coefficient of 0.93 shows a positive linear relationship between the project duration and time overrun. A p value of 0.00057 shows a 57% chance of no difference between project cost and cost overrun. Also from the regression analysis summary (Table 6) shows a degree of determination of 0.857 suggesting a present of high positive relationship between these variables. Total regression analysis reveals the following models;

$y = 0.974 + 0.200x$

Where; y = cost overrun; x= project cost.

Table 7. Regression Analysis Result (summary) of Project Cost and Percentage (%) Cost overrun

Multiple R	0.238
R Square	0.057
Adjusted R Square	0.015
Std. Error of the Estimate	10.64880
Observation	25

From Table 7 above, regression coefficient of 0.238 shows a negative linear relationship between the project and time overrun. This shows a 0.0% chance of no difference between project cost and percentage cost overrun. Also from the regression analysis summary (Table 7) shows a degree of determination of 0.057 suggesting a present of negative relationship between these variables. Total regression analysis reveals the following models;

$y = 25.728 - 0.21x$

Where; y = % cost overrun; x = project cost.

4. Conclusion

The study was able to establish some average percentage of cost overruns and time overrun of Abuja MDGs construction project which are found to vary between 58.33% and 12.50% for time overrun and between 48.89% and 7.02% for cost overrun. The result of the Paired t-test carried out on time/cost of project shows that there is a significant difference between total project duration/cost and total time/cost overrun with time/cost overrun representing an increase in initial projects duration and cost. The simple regression analysis indicates that there is a positive linear relationship between these variables, which shows that total time and cost of project and time and cost overrun can be predicted from total project duration and cost within 95% confidence limits using simple regression models. Similarly from the regression analysis result, percentage (%) time overrun and percentage (%) cost overrun can also be predicted from total project cost within 95% confidence limits using the developed regression models within certain confidence intervals of regression constant. The study suggests acute need for government to engage in proactive strategic planning and approaches to keep construction project time and cost within reasonable limit for the actualization of MDGS policy of affordable shelter for its citizens. There is also the need to incorporate into tender price the expected cost and time variation as this will address cost and time overrun of construction projects hence avert the incidence of project abandonment resulting from time and cost overrun of construction projects.

Reference

Achuenu, E. & kolawole, J.O. (1998). “Assessment of Cost Overrun of Public Building Projects in Nigeria” Nigerian Journal of Construction Technology and Management Vol.1NO.1, pp11-15.

Achuenu ,E. & Ujene, A.O. (2006). “Evaluation of Material and Labour Cost of Building Elements in Nigeria” Nigerian Journal of Construction Technology and Management Vol. 7No. 1, pp 99-110.

Adewuyi, T. O. & Anigbogu, N.A.(2006). “Duration Performance of Universal Basic Education (UBE) Project in Nigeria” Nigerian Journal of Construction Technology and Management Vol.7 No.1, pp 26-38.

Collins,K.M.T., Onwuegbuzie, A.J. & Jiao, Q.G.(2007). “A Mixed Methods Investigation of Mixed Methods Sampling Designs in Social and Health Science Research” Journal of Mixed Method Research, Vol. 1 No.3, pp 267-294.

Eboh, E.C. (2008). Template for Tracking the Impact of SEEDS Expenditures on the MDGs. Report submitted to European Union-Support for Reforming Institutions Programme (EU-SRIP), Abuja, Nigeria.

Federal Government of Nigeria. (2004). Nigeria: National Economic Empowerment and Development Strategy – NEEDS. Abuja: National Planning Commission.

Hillebrandt, P. M. (2000) Economic Theory and the Construction Industry. London. Macmillan Publishers Ltd.

Human Development Report Nigeria. 2008-2009: Achieving Growth with Equity. Abuja: UNDP.

Ijigah, E.A.,Oloruntoba, K.. & Mohd H. R. (2012).Towards Accomplishing Millennium Development Goals (MDGs) In Abuja F.C.T Nigeria: The Project Management Consultants Roles, “International Journal of Research in Management & Technology” *(IJRMT), Vol. 2, No. 4 pp.414-424, (ISSN: 2249-9563)*

Kunya, S.U. (2006). Analysis and Prediction of Contract Variation Claim of Public Building Projects in North-Eastern Nigeria, Nigerian Journal of Construction Technology and Management, Vol.7 No.1, pp 86-89.

Office of the Senior Special Assistant to the President on the MDGs. (2008). Mid-point Assessment of the Millennium Development Goals in Nigeria. Abuja: OSSAP-MDGs.

Office of the Senior Special Assistant to the President on the MDGs. (2010). Assessment of the Millennium Development Goals in Nigeria. Abuja:

Ogunsemi D. R. (2002), Cost and Time Performance of Construction Projects in South-westernNigeria. A Phd. thesis submitted to the School of Postgraduate Studies, Federal University of Technology Akure.

Oladapo, A. A. (2006). The Impact of ICT on Professional Practice in the Nigerian Construction Industry. The Electronic Journal of Information Systems in Developing Countries Vol.24 No.2, pp1-19.

Oladipo, F.O. & Oni, O. (2012). A Review of Selected Macroeconomic Factors Impacting Building Material Prices In Developing Countries – A Case Of Nigeria, Ethiopian Journal of Environmental Studies and Management EJESM Vol. 5 No. 2 pp. 131-137

Otti, V.I. (2012). Engineering Implication for Millennium development Goals in Revamping and Sustaining Nigeria Economy, International Journal of Engineering Research and Applications (IJERA), Vol. 2, no. 2, pp.1373-1377 ISSN: 2248-9622

Teddie, C. & Yu, F. (2007). Mixed Methods Sampling, A Typology with Examples, Journal of Mixed Methods Research Vol.1 No.1, pp 77-100.

United Nations Development Programme. (2009). Human Development Report Nigeria. 2008-2009: Achieving Growth with Equity. Abuja: UNDP.

United Nations Economic Commission for Africa. (2009). Assessing Progress in Africa toward the Millennium Development Goals. Addis Ababa: UNECA.

United Nations. (2010). Global Millennium Development Goals 2010 Report. New York: UN. United Nations Development Programme. (2009).

United Nations Economic Commission for Africa. (2009). Assessing Progress in Africa toward the Millennium Development Goals. Addis Ababa: UNECA.