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# **PROCEEDING 11**



**NIGERIAN INSTITUTE OF  
QUANTITY SURVEYORS:  
1<sup>st</sup> ANNUAL RESEARCH  
CONFERENCE - AnReCon**

**3<sup>rd</sup> to 5<sup>th</sup> September 2013**

# Proceedings

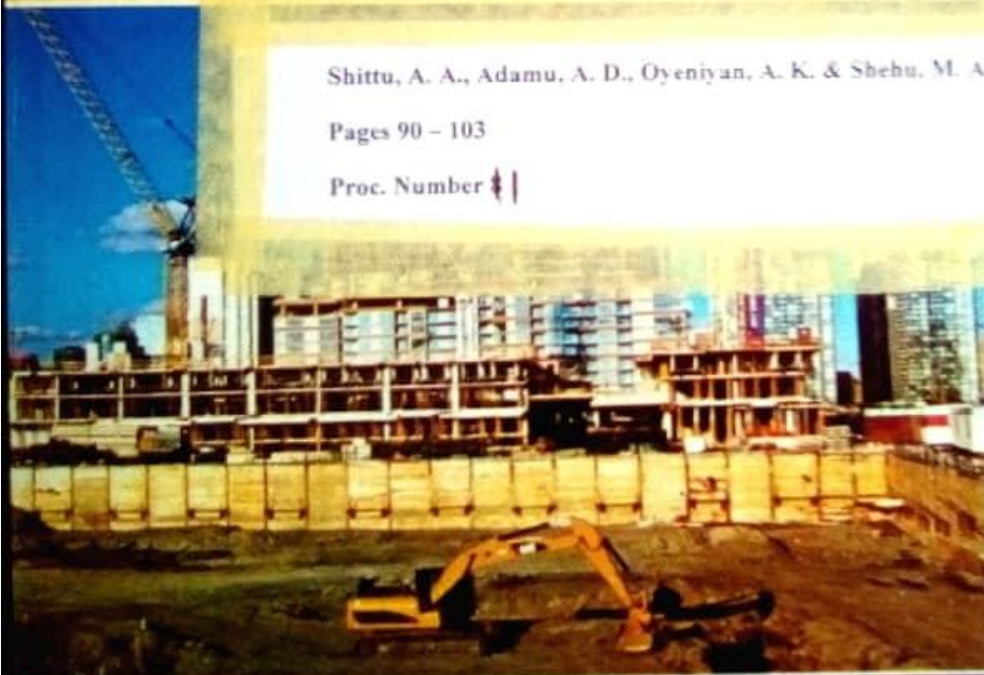
**Theme:**

**Innovative and Sustainable Management  
of Building and Infrastructure Projects**

Shittu, A. A., Adamu, A. D., Oyeniyen, A. K. & Shehu, M. A.

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**Editors:**

Dr. Ahmed D. Ibrahim

Dr. Kulomri J. Adogbo


Dr. Yahaya M. Ibrahim

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## FOREWORD

The publication of this volume containing presentations from the first Nigerian Institute of Quantity Surveyors' inaugural research conference, *Innovative and Sustainable Management of Building and Infrastructure Projects*, is at once a giant step forward and a modest accomplishment. This is only a very modest beginning because we have a long way to go in making practitioners research in the field of Quantity Surveying specifically and the construction industry more broadly. We hope that they (practitioners) can fulfil the objectives which we had in mind while developing a *Research Policy* viz. make a contribution to learning, influence government policy and resolve diverse problems in the practice of Quantity Surveying and allied professions in Nigeria.

As can be easily gleaned from the theme of the inaugural conference, our vision in crafting and publishing a *Research Policy* in 2012 and subsequently initiating a *Research Conference* is to improve knowledge, policy and practice in the very broad field of construction in Nigeria. Though our *Research Policy* has a very ambitious mission, this publication is adequate evidence that we have set out very boldly in the pursuit of this mission.

The NIQS *Research Policy* and its outputs such as this volume fill an enormous gap in Nigerian academia and in the spheres of policymaking and the regulation of professional practice. According to Groundwater-Smith and Mockler (2006) "those involved in practitioner inquiry are bound to engage with both "theoretical" and "practical" knowledge moving seamlessly between the two". Our research conferences and publications such as this will complement and make great contributions to research and teaching in our higher institutions of learning.

This is particularly valuable given that Nigerian institutions often lack the funding to engage practitioners in the field and collect data to enrich the teaching of textbook-derived theory. I believe that our *Research Policy* and this publication will contribute a lot to the evolution of a dynamic and fruitful interaction between the Ivory Tower and the field of practice in Nigeria. The importance of such an interaction is underscored by the recent trend of industry-based Doctor of Engineering (EngD) degrees in western universities in which candidates spend 70-80% of the duration of the programme in the premises of a collaborating company or in the field.

It is my hope that our colleagues in the academia will fully embrace the exciting opportunities inherent in our interest and investment in research. There is a twin challenge to us in the field: we must not do research for research sake. As it is often said, the aim of practitioner research is to improve rather than to prove, a satisfactory goal for academic research but not for practitioner enquiry. In our offices and in the offices of our clients, the fruit of our *Research Policy* must be evident in the knowledge and expertise we bring to bear on projects. Where the outcome of our research suggests that changes to Government policy and regulation are required, we must convert our research into powerful tools of advocacy.

I congratulate and thank everyone who has been involved in this project-both the elaboration of the *Research Policy*, the organization of our inaugural research conference and the publication of this volume. These are first baby steps given the enormity of the challenge of informing theory and policy with developments on the field and enriching practice in the field with theory in Nigeria but they are very strong foundations to build on.

**AGELE J. ALUFOHAI, MPM, FRICS, FNIQS**

*President*

*Nigerian Institute of Quantity Surveyors*

*July, 2013*

## PREFACE

It has been a winding but interesting journey for the Nigerian Institute of Quantity Surveyors to getting started in cutting its teeth deep into the research side. In November 2011, at the inception of the 2011-2013 National Executive Council's administration, we made a commitment to embrace research undertakings within the Institute due to the increasing impacts that research has on the practice of the Quantity Surveying profession. To actualize our commitments to research, the first activity we engaged in was to prepare a research policy for the Institute hence, on 15 April 2012, the NQS Research Policy was published. This policy provides the essential framework for the 7<sup>th</sup> NQS Research Conference and its Proceedings – the current publication.

Knowledge creation may be seen from different epistemological lenses but predominantly from the academic research lens because of the long-standing tradition of seeing knowledge creation as synonymous with academic ethos. Things are however changing so rapidly that the context and process of knowledge creation are being redefined with the critical intent of expanding the context and relaxing the fixed and sometimes restrictive processes and methods. It may however not be out of place to acknowledge the influential impacts of the private sector, corporate bodies and professional institutes (like the NQS) on the current research reconfigurations as they define, through their funds and interests, the nature and mode of current research engagements.

Our interest is to encourage practice-based research and harness the pool of knowledge generated in practice but which are, up to date, disproportionately recognised. Our efforts at doing this could be seen in the composition of research papers published herein, which have the trappings of practice-based research and which, under the main theme of *Innovative and Sustainable Management of Building and Infrastructure Projects*, have been classified into the following six (6) sub-themes:

- Cost and Value Management
- Project and Construction Management
- Technology, Productivity, Health and Safety
- Construction Procurement
- Professional Practice
- Construction Economics and Project Financing

Each of the forty-five (45) papers included in this Proceedings were peer-reviewed by at least two members of the Scientific Committee. We cannot claim to have reached the peak with only a publication hence, the consistent organisation of NQS Annual Research Conference and the publication of its Proceedings would go a long way in creating new practice-based knowledge or deepening the existing ones. We believe that the *2012*

place practice-based research in its rightful place as alluded to by Peter Jarvis who, in his epic book, *The Practitioner-Researcher: Developing Theory from Practice*, opines that contemporary research engagements are increasingly becoming practice-based rather than being a tenant in the ivory towers. I hope that the papers published herein would encourage you not only to recognise the enormous knowledge being created in practice but also to apply such knowledge for the development and practice of Quantity Surveying.

My appreciation goes to the President of the Nigerian Institute of Quantity Surveyors Mr Agele Alufohai FNIQS and the entire members of the National Executive Council 2011-2013 for their support. I also wish to thank the members of the Local Organising Committee under the Chairmanship of Dr Ahmed Doko Ibrahim for their dedication and commitment in organising the 1<sup>st</sup> NIQS Research Conference.

**Olorunfemi Balogun, FNIQS**

*Secretary for Professional Development and Library*

*Nigerian Institute of Quantity Surveyors*

*Abuja, Nigeria.*

*July 2013*

## **ACKNOWLEDGEMENTS**

We are very grateful to the President of the Nigerian Institute of Quantity Surveyors (Mr Agele Alufohai, FNIQS) and the entire members of the National Executive Council (2011-2013), particularly the Secretary for Professional Development and Library (Mr Olorunfemi Balogun, FNIQS) for their vision, leadership and support which has made this maiden research conference a reality. We are also grateful to the several people and organisations who have contributed to the success of the conference: authors, delegates, local organising committee, scientific committee and members of the Professional Development and Library committee of the NIQS.

We are particularly grateful to firms and organisations that provided sponsorship towards hosting of the conference. We would like to thank the Keynote Speakers: Prof. D.R. Ogunsemi, Prof. Yakubu Ibrahim and Assoc. Prof. G.O. Jagboro. We are also grateful to the Resource Persons that anchored the Research Skills Workshop: Prof. Bola Babalola, Prof. K.T. Odusami, Dr. A.D. Ibrahim, Dr. Y.M. Ibrahim, Dr. P.O. Lawal and Mr. B.A. Kolo. We are also grateful to Dr. K.J. Adogbo (Conference Secretary) for ensuring excellent administration and smooth running of the conference organisation.

Finally, we are grateful to the Secretariat of the Nigerian Institute of Quantity Surveyors for the logistic and administrative support.

### **Editors:**

Dr. Ahmed D. Ibrahim

Dr. Kulomri J. Adogbo

Dr. Yahaya M. Ibrahim

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## **INFLUENCE OF PRICES OF SELECTED BUILDING MATERIALS ON THE RATE OF HOUSING DEVELOPMENT IN MINNA (2003 - 2012)**

**A.A. Shittu<sup>1</sup>, A.D. Adamu<sup>1</sup>, A.K. Oyeniyen<sup>1</sup> and M.A. Shehu<sup>2</sup>**

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### **ABSTRACT**

This study focused on filling the wide gap between income and housing cost in Nigeria which has almost eliminated the low-income earners from the housing market. To solve this problem, this research studied the relationship between the prices of eight building materials (cement, gravel, sharp sand, reinforcement bar, emulsion, texcote & gloss paints and roofing sheet) and the rate of housing development with a view to suggesting strategies that will assist in the provision of housing to low-income earners by the government in Minna. Both descriptive and inferential statistics were used for data analysis. It was established that the trend of the rate of housing development significantly differs from the ones observed for the building materials but the rate of housing development could roughly be estimated by employing the price of sharp sand and the price of texcote paint respectively because these materials correlated significantly and positively with rate of housing development. A major recommendation from the research findings was that policy makers should use the changes in the prices of sharp sand and texcote paint to infer the solution to the problem of annual decrease in the rate of housing development.

**Keywords:** Building Materials, Housing Development, Regression, Correlation.

### **INTRODUCTION**

Housing is paramount to human existence as it ranks among the top three needs of man and its provision has always been of great necessity to man. As a unit of the environment, housing has profound influence on the health, efficiency, social behaviour, satisfaction and general welfare of the community. It is a reflection of the cultural, social and economic values of a society and one of the best historical evidences of the civilization of a country (Olotuah, 2000).

In Nigeria, like in many other developing nations of the world housing problems are multi-dimensional and the problems of population explosion, continuous influx of people from rural to urban centres, and lack of basic infrastructure required for good standard of living have compounded housing problems over the years. Ogieto (1987) has observed that the disparity between the price and quantity of housing on one hand, and the number of households and the money available to them to pay these prices on the other, constitutes the central problem of housing. According to Okupe & Windapo (2000) the

gap between income and shelter cost in Nigeria is very wide. This has almost eliminated the low-income earners from the housing market. A panacea to the problem is the persistent increase in the prices of building materials; this study focuses on facilitating improved accessibility level to housing finance by low-income earners in Nigeria by studying the impact of increase in the prices of building materials on the rate of housing development.

In order to study the identified problem this study aims to determine the influence of the price of building materials on the rate of housing development with a view of suggesting strategies of improving the provision of housing efficiency and development control in Minna. To achieve the aim, the following objectives are pursued:

- i. To present a trend analysis of the price of each of the selected building materials over the study period.
- ii. To present a trend analysis of the rate of housing development over the study period.
- iii. To determine the relationship between the price of building materials and the rate of housing development.
- iv. To suggest strategies that will assist in the provision of housing to low-income earners by the government in Minna.

The following null hypotheses were postulated for this research work based on the third objective and literature findings and study of Olakotan (2006):

- i. Ho: 1: There is no significant relationship between the price of each of the building materials and the rate of housing development.
- ii. Ho: 2: There is no significant relationship between the price of all the concrete materials combined together and the rate of housing development.
- iii. Ho: 3: There is no significant relationship between the price of all the painting materials combined together and the rate of housing development.
- iv. Ho: 4: There is no significant relationship between the price of all the building materials combined together and the rate of housing development.

The study covers Minna, Niger State between the period of 2004 and 2012. The selected building materials are 50Kg Portland cement, sharp sand, coarse aggregate (gravel), 12mm high tensile reinforcement bar, corrugated galvanised iron (G.I) roofing sheet, 20 litre gallon emulsion paint, 10 litre gallon of texcote paint and 4 litre gallon gloss paint. The officially compiled statistics of houses constructed annually kept by Niger State Urban Development Board were employed in lieu of actual field data on rate of housing development due to time constraint.

## **LITERATURE REVIEW**

### **Concept of Housing**

According to Jinadu (2004), housing can be classified under five categories as highlighted below:

- i. Housing types based on location or setting
- ii. Housing types based on ownership structure
- iii. Housing types based on structure, design or layout
- iv. Housing types based on internal composition/height
- v. Housing types based on building materials

In addition to the above, Achueni & Achueni (2006, 2008) gave another type of housing as "Social Housing" which could also be referred to as subsidized housing. Social housing is government-supported accommodation for people with low to moderate incomes. Social housing could also be rental housing owned and managed either by the state or not for profit organisations, or a combination of the two. It also includes affordable housing, community housing or cooperative housing. Most social housing providers are non-profit oriented.

It was reported in [www.manufacturingtoday.nigeria](http://www.manufacturingtoday.nigeria) (2012) that the official estimate shows a shortage of 16 million housing units in Nigeria with 80% of the population living in informal housing. These are structures of varying degrees of degeneration on land which they have no ownership or title rights. Ibimilua (2013) reported that the challenges of housing in terms of quality and quantity appear to be the same all over the world. The needy have less access to housing while the less needy have greater chances of accessing housing. In Nigeria, housing is generally inadequate in the rural areas in terms of quality, while the major problem in urban areas is more of quantity, although quantity is also an issue. The shortage of housing is one of the factors responsible for the poor environmental quality across Nigeria. In 1991, the national housing policy was promulgated in order to propose possible solutions to the housing problems in Nigeria. Twenty years on, millions of Nigerians are still homeless while many others are living in indecent houses. Ibimilua (2013) therefore identified the major challenges to be due to poor implementation, corruption, bureaucracy and political instability. He then recommended that housing finance, cooperatives, use of local building materials, development of infrastructure, policy implementation and review of the housing policy are the possible solutions to the housing problem in Nigeria.

### **Rising Cost of Building and Effect of Materials Price Increase on Construction Cost**

Building cost has been on the increase in our contemporary society and this attracts a great deal of concern to both private and public bodies. The rapid increase in cost of construction is observed to be influenced by various variables. Onibokun (1985) observed that although Nigeria is potentially endowed with natural resources to produce most materials required for their construction industry vast of the resource still lies fallow and local production of building materials had never matched demand at any time. Onibokun (1985) noted further that 20% paint and a reasonable percentage of the cement consumed in 1974 were imported. Omole (1988) is of similar view that essential materials like cement, finishing materials are sometimes scarce to come by in Nigeria. Oladapo (1988) in the same vein agreed that most building materials with the exception of wood could be said to be imported. Jackson (1988) reported that the basic cost of a building is determined by the design. A large house will cost more than a small one and equally finished large windows costs more than smaller one. Jackson (1988) added that about

This paper sets level of statistical significance at 5%. Hence, for any value of Probability (P) from 0.00 to 0.05 there is significance in the test but for values greater than 0.05 there is no significance in the test.

## RESULTS AND DISCUSSIONS

The data collected for this study are presented in Table 1.

Table 1: Data on Building Materials Prices and Rate of Housing Development

Year	50 Kg bag of Cement (N)	Gravel [10 Tonne] N/Trip	Sharp Sand [10 Tonne] (N/Trip)	12mm High Tensile Reinforcement Bar (N/Kg)	20 Ltr Gallon of Emulsion Paint (N/Gallon)	10 Ltr Gallon of Texcote Paint (N/Gallon)	4 Ltr Gallon of Gloss Paint (N/Gallon)	Corrugated G.I Roofing Sheet (N/Bundle)	Rate of Housing Development in Minna (Nr.)
2003	1,550	11,500	10,000	800	2,000	4,000	1,500	10,500	497
2004	1,300	11,550	10,000	1,000	2,000	4,200	1,530	14,500	401
2005	1,200	11,550	10,250	1,200	2,000	4,000	1,550	8,500	394
2006	1,300	11,650	10,350	1,050	2,200	4,500	1,550	9,000	311
2007	1,450	11,800	10,200	1,283	2,400	4,500	1,650	9,500	277
2008	1,500	11,850	10,500	2,300	2,400	4,550	1,700	9,000	495
2009	1,700	11,900	10,550	1,770	2,420	4,550	1,800	17,500	365
2010	1,600	11,950	10,700	1,250	2,500	5,000	2,200	9,500	317
2011	1,650	12,000	10,800	1,280	2,700	5,000	2,250	11,000	363
2012	1,700	12,000	12,000	1,650	2,800	5,500	2,400	11,300	197

SOURCE: i. Author's Market Survey (2013)

ii. Niger State Urban Development Board, Minna (2013)

Table 1 shows the data collected on four concrete materials (cement, gravel, sharp sand and reinforcement bar), three painting materials (emulsion paint, texcote paint and gloss paint), roofing sheet and the rate of housing development expressed in terms of number of houses approved annually for development by the Niger State Urban Development Board, Minna, for a ten-year period.

### Results for Inferential Analysis

Bar chart was used to carry out the descriptive analysis of data collected for the study. The bar graphs show the pattern of prices of building materials studied and the line graph shows the rate of housing development for a ten-year period (2003 - 2012). These bar graphs and line graph showing trend analysis are presented and discussed below.

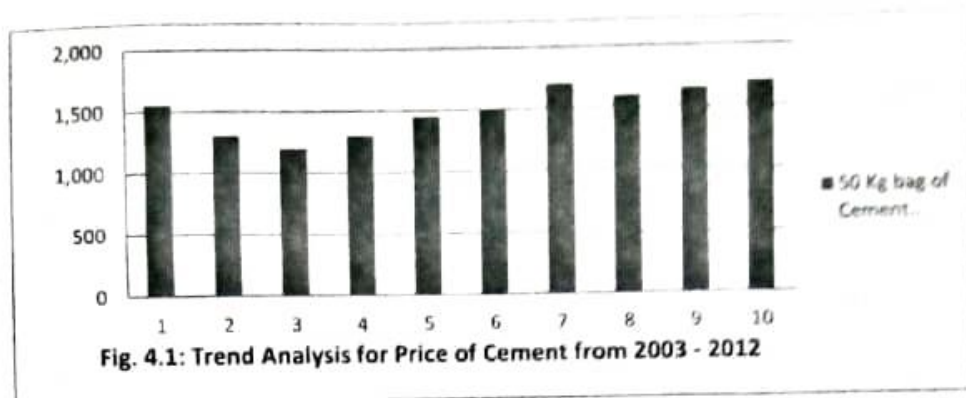
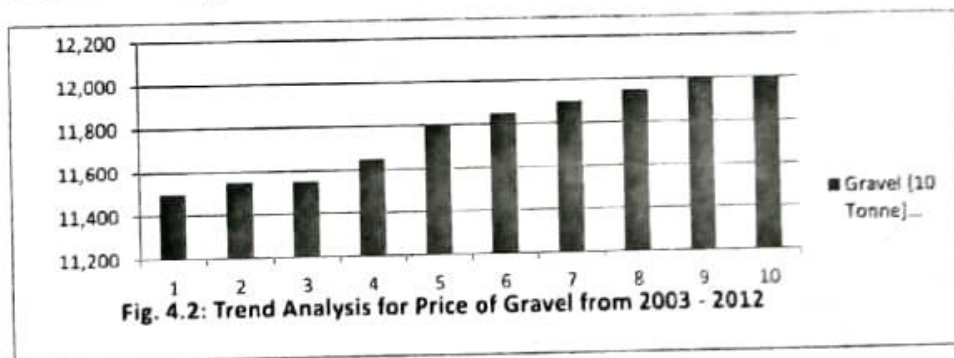
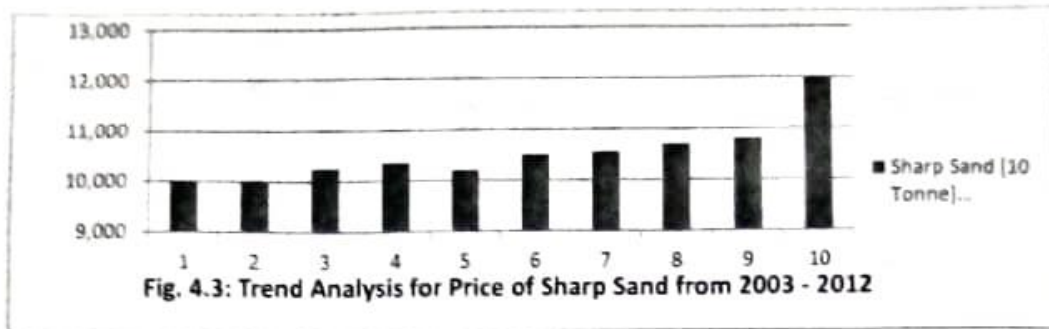


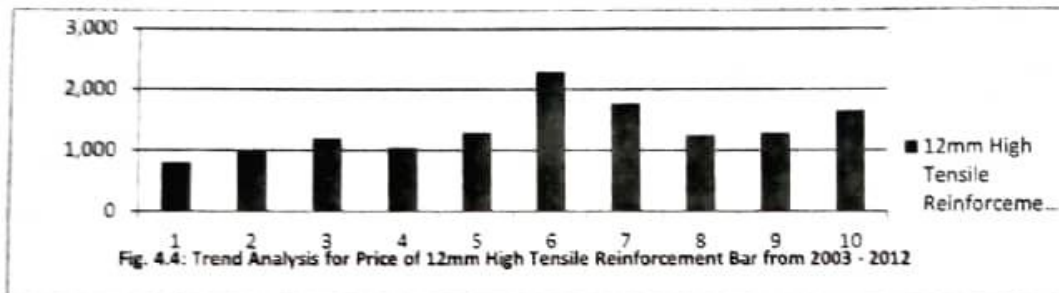
Figure 1 above shows the trend of the prices of the price of cement for the period under review (2003 - 2012). It was shown from the graph that the price of cement dropped annually for the first three years and this was followed by annual increase for the next three years. The next three years (i.e. the seventh to ninth year) shows further annual increment in the price of cement and the tenth year shows an increase in the price of cement. This therefore implies that the price of cement fluctuates over the period under review on the average.



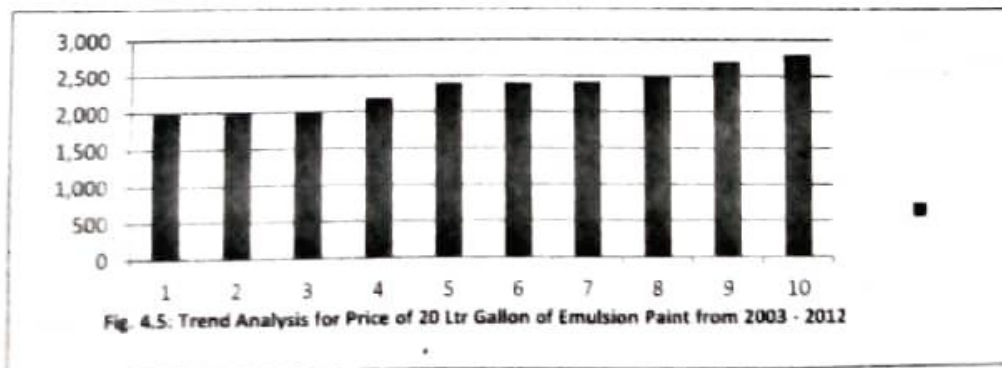
It was observed from the trend analysis of the price of gravel for a ten-year period (2003 - 2012) in Fig. 2 that the price of gravel increases annually over the period under review except during the third year (2005) when there was a decrease in the price of gravel. The trend pattern of the price of gravel differs from that of cement significantly.



The trend in the price of sharp sand was observed to show annual increment over the study period (2003 - 2012) in Fig. 3 except during the fifth and tenth years where a decrease in the price of sharp sand was observed respectively. The trend pattern of the price of sharp sand gives a similar result with that of gravel.



The price of high tensile reinforcement bar, from Figure 4, was observed to show annual increase in the first three years and this was followed by a decrease in the price of reinforcement bar in the fourth year. This was followed by annual increment from the fourth to the sixth year and an annual decrease in price was noticed again from the sixth to the eighth year. Finally, an annual increase in the price of reinforcement bar was observed from the eighth to the tenth year. This trend pattern implies that on the average the price of high tensile reinforcement bar fluctuated over the study period (2003 - 2012). This shows a trend pattern similar to that of the price of cement.



A different trend pattern was observed for the price of emulsion paint from that of the prices of cement, sharp sand, gravel and reinforcement bar. It was observed from Figure 5 that the price of emulsion paint was constant for the first three years and this was followed by an increase in price of emulsion paint in the fourth year. The price of emulsion paint was also noticed to be constant again for a three-year period (fifth to seventh year) after an increase in the fourth year. The last three years (eighth to tenth year) showed annual increase in the price of emulsion paint.

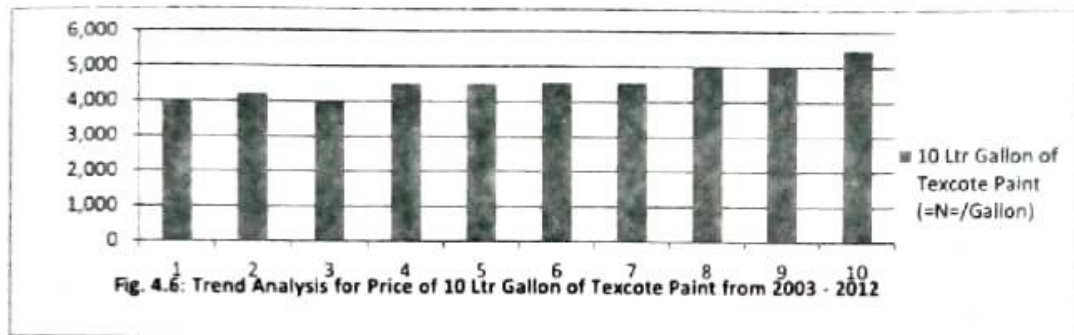


Figure 6 shows a fluctuating trend in the price of texcote paint for the first four years and this was followed by a trend showing constant price of texcote paint for a four year period (fourth to seventh year). The price of texcote paint increased in the eighth year, remained constant in the ninth year and finally increased in the tenth year. This trend in price of texcote paint is similar to that of the price of emulsion paint.

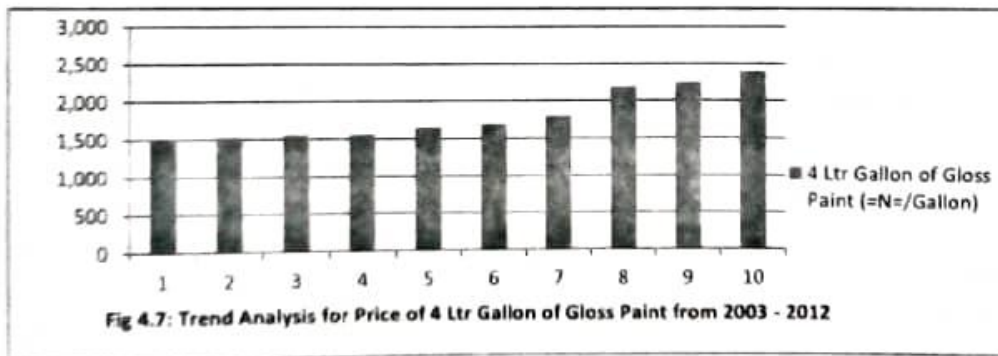
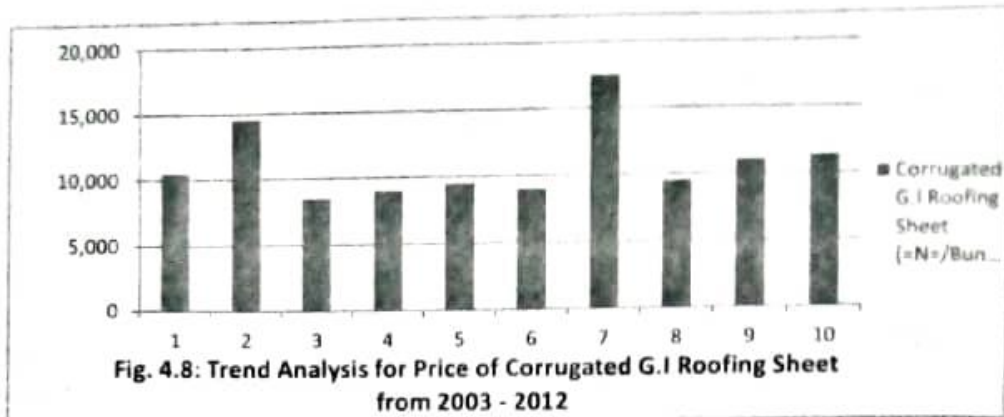


Figure 7 shows the trend of the price of gloss paint during the period under review (2003 - 2012). It was observed that throughout the period under review the price of gloss paint increased on annual basis. This trend pattern is unique and different from that of other building materials studied. This implies that a consistent trend pattern was noticed for the price of gloss paint.





It was observed from Figure 8 that the price of roofing sheet fluctuated for the first three years (first to third year) and then increased annually from the third to fifth year. Another fluctuating pattern was also noticed in the price of roofing sheet from the fifth to eighth year and finally an annual increase in the price of roofing sheet was noticed again from the eighth to tenth year. This pattern is also different from the ones observed for other building materials studied.

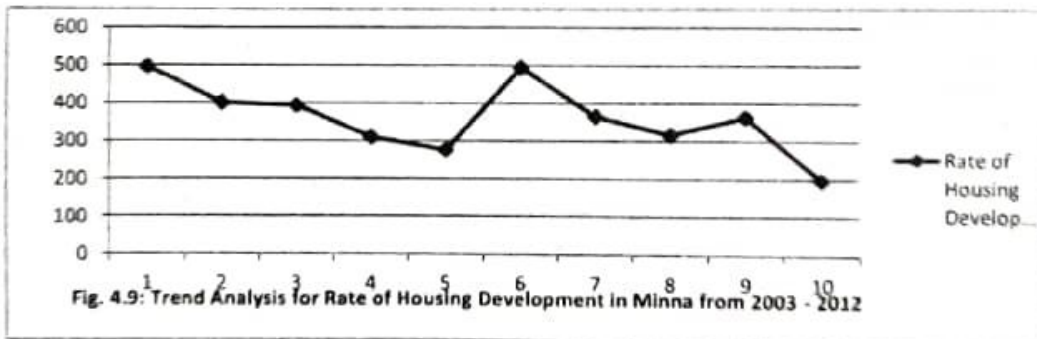


Figure 9 is a line graph of the trend analysis showing the rate of housing development for the ten-year (2003 - 2012) period studied. It was observed that there was a constant annual decrease in the rate of housing development from the first to fifth year (2003 - 2007) and there was a rapid increase in the rate of housing development in the sixth year (2008). This was followed by another constant and annual decrease in the rate of housing development from the seventh to tenth year (2009 - 2012) except in the ninth year when there was a slight increase in the rate of housing development. This implies that the trend pattern of the rate of housing development significantly differs from the ones observed for the building materials studied over the period under review.

### **Results for Inferential Analysis**

It was discovered from the inferential analysis that all the building materials showed a weak and non-significant relationship with the rate of housing development with  $R^2$  values ranging from 0 to 48%, except for the prices of sharp sand and texcote paint which show significant but weak relationship with rate of housing development. The prices of five of the building materials (gravel, sharp sand, emulsion paint, texcote paint and gloss paint) however showed strong correlation (degree of association) with the rate of housing development with the correlation coefficient values ranging from 51%/0.51 to 69%/0.69 while the prices of three building materials (cement, reinforcement bar and roofing sheet) showed very weak correlation with the rate of housing development with the correlation coefficient values ranging from 0.4%/0.004 to 22%/0.22. The findings here slightly differs from that of Olakotan (2006) because in this case only two one concrete materials (sharp sand) showed significant and weak relationship with the rate of housing development while in the study of Olakotan (2006) there existed a strong and significant relationship between three concrete materials (cement, gravel and sand) and the rate of housing development.

The inferential analysis also revealed that positive correlation exists between the prices of four building materials (reinforcement bar, emulsion paint, gloss paint and roofing sheet) and the rate of housing development implying that there is a tendency for increase in the prices of reinforcement bar, emulsion paint, gloss paint and roofing sheet respectively to be accompanied by a corresponding increase in the rate of housing development and decrease in the prices of reinforcement bar, emulsion paint, gloss paint and roofing sheet respectively will be accompanied by a corresponding decrease in the rate of housing development. It was also discovered that negative correlation exists between the prices of four building materials (cement, gravel, sharp sand and texcote paint) and the rate of housing development implying that there is a tendency for increase in the prices of cement, gravel, sharp sand and texcote paint respectively to be accompanied by a decrease in the rate of housing development and decrease in the prices of cement, gravel, sharp sand and texcote paint respectively will be accompanied by an increase in the rate of housing development. This also slightly differs from the findings of Olakotan (2006) where positive correlation was observed between the prices of cement and sand respectively and rate of housing development, while negative correlation was noticed between the prices of gravel and reinforcement bar respectively and rate of housing development, as compared with the findings of this study where negative correlation was observed between the prices of each of the concrete materials and rate of housing development except for the price of reinforcement bar.

A combination of the prices of all the building materials also show a non-significant but very strong relationship and very strong correlation with the rate of housing development with  $R^2$  and  $R$  values of 93% and 96% respectively. A similar relationship of a non-significant but very strong relationship and very strong correlation was observed between the prices of all concrete materials and all painting materials respectively with the rate of housing development with the  $R^2$  and  $R$  values of 72% & 56% and 85% & 75% respectively. This finding is similar to that of Olakotan (2006) where a combination of

the prices of the building materials showed a non-significant but strong relationship with the rate of housing development.

It is evident from the findings of this study that the trend in the prices of building materials and rate of housing development in Minna, Niger State has changed from what the trend used to be from 1995 to 2005 as studied by Olakotan (2006). The summary of the inferential analysis discussed above is given in Table 2.

Table 2: Results Summary for Inferential Analysis

Analysis No.	Variables		Type of Model	Observations					Inferences		
	X	Y		Regression Equation	R/R2 (%)	Fcal	Ftab	Pvalue	Strength of Relationship	Remark	Action On Hypothesis
1	Price of Cement	Rate of Bldg. Dev.	Linear (Simple)	$Y = 533.267 - 0.115x$	22/5	0.410	5.32	0.540	Weak	NS	Accept HO
2	Price of Gravel	Rate of Bldg. Dev.	Linear (Simple)	$Y = 3193.651 - 0.241x$	51/26	2.786	5.32	0.134	Weak	NS	Accept HO
3	Price of Sharp Sand	Rate of Bldg. Dev.	Linear (Simple)	$Y = 1461.107 - 0.104x$	65/43	5.978	5.32	0.040	Weak	SS	Reject HO
4	Price of Reinforcement Bar	Rate of Bldg. Dev.	Linear (Simple)	$Y = 353.149 + 0.006x$	3/0.1	0.007	5.32	0.935	Weak	NS	Accept HO
5	Price of Emulsion Paint	Rate of Bldg. Dev.	Linear (Simple)	$Y = 808.655 + 0.191x$	59/35	4.322	5.32	0.071	Weak	NS	Accept HO
6	Price of Texcote Paint	Rate of Bldg. Dev.	Linear (Simple)	$Y = 182.199 - 0.135x$	69/48	7.407	5.32	0.026	Weak	SS	Reject HO
7	Price of Gloss Paint	Rate of Bldg. Dev.	Linear (Simple)	$Y = 646.116 + 0.157x$	58/33	3.948	5.32	0.082	Weak	NS	Accept HO
8	Price of Roofing Sheet	Rate of Bldg. Dev.	Linear (Simple)	$Y = 363.186 + 0.000x$	0.4/0.0	0.000	5.32	0.991	Weak	NS	Accept HO
9	Combined Bldg/Material Prices	Rate of Bldg. Dev.	Multiple	$Y = 17049.745 + 0.286x1 - 1.363x2 - 0.285x3 - 0.273x4 - 0.274x5 - 0.004x6 + 0.536x7 - 0.003x8$	96/93	1.712	4.41	0.533	Strong	NS	Accept HO
10	Price of Concrete	Rate of Bldg. Dev.	Multiple	$Y = 5312.140 + 0.301x1 - 0.380x2 - 0.104x3 + 0.118x4$	85/72	3.224	4.41	0.116	Strong	NS	Accept HO
11	Price of Plaster	Rate of Bldg. Dev.	Multiple	$Y = 1228.018 + 0.175x1 - 0.340x2 + 0.154x3$	75/56	2.536	4.41	0.153	Strong	NS	Accept HO

Key: SS = Statistically Significant      NS = Not Significant

## CONCLUSIONS

From the analysis carried out and findings from this study, the following conclusions were reached:

- 1) There is a constant annual decrease in the rate of housing development over the study period on the average, implying that the trend pattern of the rate of housing development significantly differs from the ones observed for the building materials studied over the period under review.
- 2) All the building materials showed a weak and non-significant relationship with the rate of housing development with R2 values ranging from 0 to 48%, except for the prices of sharp sand and texcote paint which show significant but weak relationship with rate of housing development.
- 3) The prices of five of the building materials (gravel, sharp sand, emulsion paint, texcote paint and gloss paint) however showed strong correlation (degree of association) with the rate of housing development with the correlation coefficient values ranging from 51%/0.51 to 69%/0.69 while the prices of three building materials (cement, reinforcement bar and roofing sheet) showed very weak correlation with the rate of housing development with the correlation coefficient values ranging from 0.4%/0.004 to 22%/0.22.
- 4) There is a tendency for increase in the prices of reinforcement bar, emulsion paint, gloss paint and roofing sheet respectively to be accompanied by a corresponding increase in the rate of housing development and decrease in the prices of reinforcement bar, emulsion paint, gloss paint and roofing sheet respectively will be accompanied by a corresponding decrease in the rate of housing development.
- 5) There is a tendency for increase in the prices of cement, gravel, sharp sand and texcote paint respectively to be accompanied by a decrease in the rate of housing development and decrease in the prices of cement, gravel, sharp sand and texcote paint respectively will be accompanied by an increase in the rate of housing development.
- 6) Finally, the rate of housing development can be estimated by employing the price of sharp sand and the price of texcote paint respectively.

## **RECOMMENDATIONS**

The following recommendations were made from the findings of this research:

- 1) The cost of housing development escalates as the price of major building materials like reinforcement bar, paints and roofing sheet increase, it is therefore imperative that policy makers should explore the possibility of using increase in price of materials like these to mitigate developmental pressures.
- 2) Detailed data should be maintained on the changes over time in the prices of materials like cement, reinforcement bar and roofing sheet to enable policy makers have a workable and implementable development plan for Minna town.
- 3) Policy makers should use changes in prices of sharp sand and texcote paint to solve the problem of annual decrease in rate of housing development has noticed from trend analysis.

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