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Keywords: left singular semigroup, monoi semiring, non-positively ordered, rectangular band. 2000 Mathematics Subject Classification: 20M10, 16Y60

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Amulia P. M., Jisha G.

Abstract: P2P networks are popular in multikeyword searching systems. There are centralized and decentralized P2P networks. P2P systems can also be structured or unstructured. The common technique like flooding used in unstructured network for keyword search incurs large amount of unnecessary traffic. The bloom filter technique used in keyword search reduces unnecessary traffic in the network. With user demand becoming complex and broad, multikeyword search is becoming popular. This paper gives a comparison between flooding and bloom filter based multikeyword search techniques.

Keywords: P2P, flooding, TTL, query, bloom filter

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Impact of Petroleum Price Increase on Cost of Selected Building Finishings Materials during Early Period of New Millennium Civilian Era in Nigeria

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ABSTRACT: *This paper was aimed at examining the influence of petroleum price increase on the prices of some selected finishing materials in Niger State from 2000 - 2005 in the light of high construction cost in the Nigerian Construction Industry. The data collected were based on three basic finishings materials, which are floor tiles, gloss emulsion paints and ceiling boards, with different alternatives for each finishing material. Correlation and Regression Analyses used to analyze the collected data showed some level of high significance between the independent variable (regulated petroleum prices) and the dependent variables (finishing materials) i.e. Coefficient of Determination of values ranging from 61% to 90%. It was concluded that increase in the regulated price of petroleum products accounts for high cost of finishing materials in building projects. One of the recommendations from the study included the need for a better regulating price system to adequately monitor price with regard to building materials.*

KEYWORDS: *building, finishings materials, petroleum price, civilian era*

I. INTRODUCTION AND BACKGROUND OF THE STUDY

All construction projects are liable to have an increase in price as a result of direct and indirect effects of petroleum price increase to certain degrees. The cost of delivery of construction materials will go up; the operating cost of construction equipment like compactor, bulldozer and the like will also increase. The cost of building materials such as gravel, paint, cement and the like will rise accordingly and this will automatically increase the cost of the whole building structure. This high cost of building materials have become a major pointer to the malfunction and abandonment of building construction projects in Nigeria today. This has resulted in severe consequences on the nation's socio-economic and technological development.

The Nigerian oil boom of the early 70s coincided with the after war construction and rehabilitation period in the country created very heavy task. Therefore, in order to meet up the human, technological and material resources required to undertake the huge construction activities going on at the time, there was recourse to importation. This action looks alright then, especially since the oil provided the much required financial backing. This confidence was however short-lived as oil revenue crashed in the early 80s. Faced with the depressed economy and a crushing foreign department, the nation witnessed introduction of the Structural Adjustment Programme (SAP) in 1986 and consequent devaluation of Naira.

Consequently, there was the need for Nigeria to be a self reliant nation of which as a result, a call to harness local resources in all sections of the economy, including the construction sector became necessary. The local building materials have been discovered to possess great potentials for transforming the Nigerian construction industry. The need for importation of building materials also stifled local initiative in the production and utilization of local materials and technologies. The indigenous contractors that sprang up during the oil boom controlled only 50% of the construction activities, consequently most of them folded up (Encyclopedia Americana[12], 1981). The important trend has failed the nation towards enjoying economic growth and employment opportunities commensurate with huge financial investments on the channel to the construction industry.

Due to the discovery from many researchers, it has been noted that high construction cost has become a major problem in the Nigerian construction industry today. All construction projects have increased in cost due to

increase in prices of petroleum products which results to variation and fluctuation of market prices of materials for construction projects. This paper is the first phase of an ongoing research. The second face will study the impact of petroleum price increase and the cost of building finishings materials during the current period of democratic dispensation while the third phase will compare the research findings of the first phase and second phase. This study is therefore necessary, in view of the identified problems, to form a good basis for investigating the impact of petroleum on the cost of building finishings materials between 2000 and 2005 (early period of new democratic dispensation) and 2006 – 2011 (transition in to more advanced level of democratic dispensation) thereby enabling the contractors and clients have fair judgment in terms of claims by assisting to develop a cost guide for pricing building construction works and cost analysis of building works in Niger State, Nigeria.

In view of the problems stated, this paper aims at examining the influence of increase in price of petroleum products on the prices of some selected building finishings materials in buildings in Niger State between 2000 and 2005 with a view to advising the government and stake holders in the construction industry on ways of preventing the effects of increase in prices of petroleum products on building project delivery. In order to achieve the aim, the study has the following objectives:

(i) To determine the relationship between the regulated price of petroleum products and price of the selected building finishings materials.

(ii) To establish a model based on the existing relationship for forecasting prices of finishings materials.

The finishing materials covered for the study are Spanish Ceramic Tiles (33x33cm), China Vitrified Tiles (30x30cm) and Royal Ceramic Tiles (30x30cm), as the floor finishing materials; the ceiling finishing materials are Asbestos (4inch x 4inch) and Hard Board (4inch x 8inch), and the wall finishing materials covered are Emulsion (20ltr) and Gloss (4ltr) paints of Zuma and Berger products each. The petroleum product considered for the study is Premium Motor Spirit (PMS) popularly known as petrol which is the most widely used petroleum product in Nigeria.

Petroleum is one of Nigeria's most valuable endowments from which the nation's revenue is derived to run the country's economy and on which the livelihood of socio-political life's sustainability depends. It is also worth noting that it is a reality to see the oil as a strategic resource because of the increased importance and sensitivity of the oil industry. Government has, therefore, over the years found it not only necessary but also obligatory to regulate, organize and standardize the marketing and distribution of petroleum products in Nigeria.

According to Dzukogi et al[1] (2013) Nigeria has a population of over 160 million people and an abundance of natural resources especially hydrocarbons. Oil was discovered in Nigeria in 1956 at Oloibiri in the Niger-Delta after half a century of exploration. The discovery was made by Shell – BP. Nigeria joined the ranks of oil producers in 1958 when its first oil field came on stream producing 5, 100 bpd. Nigeria joined the Organization of Petroleum Exporting Countries (OPEC) in 1971 and established the Nigerian National Petroleum Corporation (NNPC) in 1997; state owned and controlled company which is a major player in both the upstream and downstream sector. Nigeria has an estimated proven oil reserve of 22.5 billion barrels and produces 90 million tonnes per year 2.6 million bpd of crude oil. Today, Nigeria is the 7th largest oil producer in the world.

Other aspects of the corporation's activities include transporting and distributing petroleum products throughout the nooks and crannies of the country's production of petrochemicals to provide the needed raw materials for rapid agricultural and industrial development of the country. The responsibilities also include the supervision of the activities of oil companies and services companies operating in the nation's petroleum industry (both foreign and indigenous), particularly those in which Government has participatory interest, and the statutory regulation of the nation's petroleum industry.

The refined product lines that are presently offered for sale to the public by Pipelines and Product Marketing Company Limited (PPMC), which is a subsidiary of NNPC, through the network of depots, are:

1) Liquefied Natural (Petroleum) - LNG - deregulated
2) Premium Motor Spirit - PMS - regulated
3) Dual Purpose Kerosene - DPK - regulated
   House Hold Kerosene - HHK - regulated
   Aviation Turbine Kerosene - ATK - regulated
4) Automotive Gas Oil - AGO - regulated
5) Fuel Oil
   i. Low Pour Fuel Oil - LPFO - effective 1st of July, 2002
   ii. High Pour Fuel Oil - HPFO

N.B. LPFO and HPFO do not attract bridging claims.

Kaduna Refining and Petro-Chemical Company processes important crude to produce non-conventional petroleum products like.

a) Base oil b) Bitumen c) Asphalt d) Paraffin wax and Sulphur

There are two classes of marketers. First are the eight major marketers namely: Mobil Oil PLC, AGIP Oil PLC, Texaco PLC, A.P. PLC, Unipetrol PLC, National Oil PLC and Total/Elfina PLC. The second category on the other hand is made up of the indigenous business men and women that own outlets in both rural and urban areas in the country. The independent marketers provided a rapid increase in the number of filling stations in all corners of the country.

The method of petroleum products distribution is by Rail, Road, Sea and Pipelines. Bridging is the movement of petroleum products by road haulage from one depot district to another, over and above distances of 450km. The movement is an arrangement to complement movement of products through the pipeline during periods of breakdowns and/or maintenances of the pipeline network or Turn-Around maintenances of refineries. Bridging allowances are built into the petroleum pricing system so that Government will be able to implement the regulated pricing scheme.

Building materials refer to all or any material(s) used in construction such as brick, steel, cement, glass, aluminium, paint and tiles among others while components are products made as separate units to serve particular functions. They help to form or complete the building. Researchers in the construction field have shown that materials make up a very significant portion of the total cost of a building.

Olateju[6] (1991) and Jagboro[3] (1992) asserted that material occupies above 60% of the total cost of construction. Jagboro[3] (1992) re-emphasized that all building materials used do not have the same significance on the cost of the building and also do not have the same relative importance on the existence of the building. Onibokun & Agboola[7] (1990) classified building materials into six broad categories on conventional construction method. These include: flooring materials, walling materials, ventilation materials, roofing/ceiling materials, painting materials and sanitary wares.

Okafor[5] (2003) classified construction cost into direct cost and indirect cost. Directs costs are predominantly the cost of all plant equipment as well as materials and labour involved in the actual installation and erection while indirect costs include transportation cost among others. Cost of transportation is defined as the cost incurred in moving persons or commodities over distances. This cost of transportation includes the freight rate but also cost of documentation, packaging, insurances and inventory cost. The costs may be expressed in terms of transport effort like the tonne or kilometer or in monetary form and the most important consideration in transportation are cost of carriage, speed of carriage and quantity of load factor.

The potential of a country's transportation is to some extent determined by the level of economic development. The social state of a country has great influence on the rate and development of transportation and the kind of services made available. The tremendous growth in the standard of living in Nigeria has led to demand in different modes of transportation. These include road, rail, sea and air. Road transportation is the most developed and exploited of all four.

II. STUDY AREA

The area of the study (Niger State) is located in the Central region of Nigeria. It lies within latitude $3^0\ 20^{'}$ East and longitude $11^0\ 3^{'}$ North. Sokoto and Kebbi States border the State to the South, while Kaduna and the Federal Capital Territory border the State to both North East and South West respectively. Niger State has common boundary with the Republic of Benin along New Bussa, Agwara and Wushishi Local Government Areas. This gives way to common water-border trade within the State (Oyebanji[8], 1993).

III. METHODOLOGY AND DATA COLLECTION

One of the methods of survey employed in this study is the random sampling technique in getting pertinent information in the location. This was done by sending out questionnaires to shops dealing with building materials to form the data in conjunction with direct observation. Data on prices of petroleum products were gathered from Mobil Petroleum (independent marketer).

The relationship between the variables in the data collected was determined using correlation and simple regression analysis, the correlation coefficient (R), coefficient of determination (R^2) and the tests of significance (F-test and P -test). The regression analysis was also used to formulate predictive models of the variables simultaneously observed in relation to one another.

Basically, the following null hypothesis was tested at 95% confidence level in order to promote the achievement of the objectives of the study:

Ho: There is no significant relationship between the prices of petroleum products and price of the selected building finishings materials of building.

The research data collected from the independent marketer and authors' field survey are presented as TABLE 1(Appendix).

IV. RESULTS AND DISCUSSIONS

The regression analysis was carried out to test the formulated hypotheses at 5% level of significance under four major analyses as given and discussed below.

The first analysis (Analyses 1a, 1b and 1c) was carried out to test the relationship between price of each of the three floor finishings materials (i.e. Spanish ceramic tiles, China vitrified tiles and Royal ceramic tiles) and the regulated price of petroleum products. The coefficients of correlation (R) and determination (R^2) observed respectively were 93% and 87% for Spanish Ceramic Floor tiles Vs Price of petroleum products; 92% and 85% for China vitrified floor tiles Vs price of petroleum products; and 87% and 75% for Royal ceramic floor tiles Vs price of petroleum products respectively. This implies that the relationship between each of the three floor finishings materials and price of petroleum products was positive, linear and very strong. Therefore, increase in the prices of floor finishings is accounted for as a result of increase in the price of petroleum products and vice-versa. The values of F calculated observed respectively were 105.225, 92.037 and 48.931 which were greater than the value of F tabulated of 4.49 while the P value (0.000) in each of the three cases was less than 0.05. This implies that there exists a significant relationship between the variables and the null hypothesis was therefore rejected in each of the three cases.

The relationship between the prices of each of the two ceiling finishings materials selected for this study (i.e. 4" x 4" asbestos ceiling board and 4" x 8" hard board) and regulated price of petroleum products was determined in the second analysis. A very strong R and R^2 values of 82% and 68%; and 85% and 72% were observed in each of the two cases respectively. It was observed in each of the two cases that there exists a positive, linear, very strong and significant relationship between the variables. The null hypothesis was also rejected in each of the two cases in this analysis because the F calculated value was greater than the F tabulated and the P value was less than 0.05 in each of the two cases.

It was observed from the third analysis that there exists a positive, linear, very strong and significant relationship between each of the selected painting materials (i.e. Zuma gloss paint and Zuma emulsion paint) selected for the study and price of petroleum products. Very high R and R^2 values of 78% and 61%; and 95% and 90% respectively were observed in each of the two cases respectively. The respective values of F calculated were 25.074 and 136.137 which were each greater than F tabulated value of 4.49, while the P value of 0.000 observed in each of the two cases was less than 0.05 and this also led to the rejection of the null hypothesis in this analysis.

The fourth analysis also showed a positive, linear, very strong and significant relationship between the independent variable (regulated price of petroleum products) and each of the two dependent variables (Berger gloss paint and Berger emulsion paint) respectively. The correlation coefficients observed in each of the cases were 79% and 80% respectively, while the respective coefficient of determination observed were 63% and 64%. The null hypothesis was also rejected in this analysis because the F calculated value was greater than the F tabulated value and the P value was less than 0.05 in each of the two cases.

The results of the regression analyses discussed above, as well as the regression equations used to formulate a predictive model for the study, were summarized in TABLE 2 (Appendix).

V. FORMULATION OF A PREDICTIVE MODEL

TABLE 2 shows that all of the materials that were compared with the regulated price of petroleum products have strong positive correlation with the regulated price of petroleum products. Therefore the null hypothesis is rejected while the alternative hypothesis is accepted.

In order to provide a model, based on the existing relationship, for forecasting price trends of finishings materials, regression analysis was used. Since there is a positive relationship between the regulated price of petroleum products and prices of some building finishings materials, an average value of the determinant was used to establish the model. The regression equation (model) is therefore given as thus:

$$Fm = 525.633 + 23.94Pp$$

Where Fm = Cost of Finishing Materials in Building; and

Pp = Regulated Price of Petroleum Products

VI. CONCLUSIONS

This study has shown through analysis of data collected on the prices of finishing materials and regulated prices of petroleum products over the period under review and concludes as follows:

- Increase in the regulated price of petroleum products accounts for high cost of finishings materials in building projects.
- From the analyses, the R^2 values were shown to range between 60% and 90% indicating a high level of significance. For instance Zuma emulsion paint showed a high level of significance with R^2 value of 90%, using 2000 as the base year.
- The significance of the relationship of paint can be attributed to the fact that some of the constituents of paints are gotten from petroleum products, and other building finishings materials, whether imported or local, also have high relationship with PMS because they have to be transported to their various construction sites and this cost of transportation also increases with increase in the price of petroleum products, thereby increasing the price of building finishings materials.
- The formulated descriptive model can be used for forecast at 95% confidence limit.

VII. RECOMMENDATIONS

- The Federal Government should embark on regulated price of building materials at fixed price especially for those foreign materials like Brazilian hard board ceiling and Spanish tiles since there is increase in price of finishings materials due to in price of petroleum products.
- More quality input should be encouraged in locally processed building materials so that they have long life span and can be recommended to all construction projects, like the use of Abeokuta WC, Royal tiles, Royal paint or Zuma paint and asbestos ceiling board.
- The predictive model should be reviewed at regular interval in the light of changing environmental circumstances by any user of the model for the model to stand the test of time

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APPENDIX

Table 1: Research Data on Prices of Petroleum Products and Selected Finishing Materials in Building in Niger State (2000-2005)

Year	Interval	Regulated Prices of Petroleum (₦/Ltr)	Floor Finishes (₦/m²)			Ceiling Finishes (₦/m²)		Paints Prices (₦/m²)		Berger Paints (₦/5ltr)	
			Spanish Ceramic Tiles 33x33cm	China Vitrified Tiles 30x30cm	Royal Ceramic Tiles 30x30cm	Asbestos 4ft x 4ft	Hard Board 4ft x 8ft	Gloss (4Ltr)	Emulsion (20Ltr)	Gloss (4Ltr)	Emulsion (2ltr)
2000	Jan to April	20.00	750.00	600.00	500.00	520.00	700.00	650.00	2000.00	800.00	1800.00
	May to Aug	22.00	800.00	650.00	550.00	420.00	750.00	700.00	2100.00	900.00	4000.00
	Sept to Dec	22.00	850.00	650.00	230.00	450.00	650.00	750.00	2250.00	1000.00	4500.00
2001	Jan to April	22.00	866.00	700.00	595.00	450.00	650.00	750.00	2250.00	1000.00	4500.00
	May to Aug	23.00	900.00	700.00	130.00	450.00	830.00	750.00	2250.00	1000.00	4600.00
	Sept to Dec	27.00	900.00	720.00	680.00	480.00	850.00	750.00	3000.00	1000.00	4700.00
2002	Jan to April	24.00	950.00	750.00	655.00	480.00	870.00	750.00	3000.00	1000.00	2500.00
	May to Aug	24.00	950.00	750.00	650.00	480.00	850.00	900.00	3200.00	1000.00	5500.00
	Sept to Dec	28.00	980.00	780.00	700.00	520.00	850.00	1600.00	3300.00	2400.00	5500.00
2003	Jan to April	28.00	1000.00	800.00	730.00	520.00	850.00	1600.00	3300.00	2400.00	5500.00
	May to Aug	34.00	1000.00	800.00	750.00	520.00	850.00	1600.00	3300.00	2400.00	5500.00
	Sept to Dec	43.00	1100.00	800.00	750.00	540.00	900.00	1600.00	3400.00	2400.00	5600.00
2004	Jan to April	43.00	1100.00	800.00	750.00	540.00	900.00	1600.00	3400.00	2400.00	5600.00
	May to Aug	47.00	1120.00	850.00	780.00	550.00	920.00	1600.00	4500.00	2450.00	5650.00
	Sept to Dec	52.00	1120.00	900.00	780.00	570.00	950.00	1600.00	4900.00	2500.00	6000.00
2005	Jan to April	52.00	1150.00	950.00	800.00	570.00	950.00	1600.00	4900.00	2500.00	6000.00
	May to Aug	52.00	1200.00	950.00	850.00	550.00	960.00	1600.00	5000.00	2500.00	6000.00
	Sept to Dec	87.00	1300.00	1000.00	800.00	550.00	900.00	1600.00	6000.00	2500.00	6000.00

SOURCE: 1. Independent Mobil Petroleum Marketer (2012) 2. Authors' Field Market Survey

Table 2: Summary of Results for Regression Analysis

Test No. 1	Variables		Type of Model	Observations					Inferences		
	X	Y		Regression Equation	R^2 (%)	F_{cal}	F_{tab}	P_{value}	Strength of Relationship	Rem	Action On Hyp
1a	Petroleum	SpanishTiles	Linear	SpanishTiles = 660.220 + 9.849Petroleum	87	105.225	4.49	0.000	Very Strong	SS	Reject Ho
1b	Petroleum	ChinaTiles	Linear	ChinaTiles = 532.619 + 3.324Petroleum	85	92.037	4.49	0.000	Strong	SS	Reject Ho
1c	Petroleum	RoyalTiles	Linear	RoyalTiles = 431.102 + 7.015Petroleum	75	48.933	4.49	0.000	Strong	SS	Reject Ho
2a	Petroleum	AshCeiling	Linear	AshCeiling = 407.697 + 2.603Petroleum	68	33.507	4.49	0.000	Strong	SS	Reject Ho
2b	Petroleum	HBCeiling	Linear	HBCeiling = 715.714 + 3.976Petroleum	72	41.359	4.49	0.000	Very Strong	SS	Reject Ho
3a	Petroleum	ZumaGloss	Linear	ZumaGloss = 380.217 + 24.328Petroleum	61	25.074	4.49	0.000	Strong	SS	Reject Ho
3b	Petroleum	ZumaEmul	Linear	ZumaEmul = 826.855 + 77.234 Petroleum	90	136.137	4.49	0.000	Very Strong	SS	Reject Ho
4a	Petroleum	BergerGloss	Linear	BergerGloss = 392.537 + 41.343Petroleum	63	27.233	4.49	0.000	Strong	SS	Reject Ho
4b	Petroleum	BergerEmul	Linear	BergerEmul = 3837.376 + 41.617Petroleum	64	28.887	4.49	0.000	Strong	SS	Reject Ho

Source: Authors' Data Analysis (2013)

Key:

SS = Statistically Significant

Petroleum = Regulated Price of Petroleum Products

SpanishTiles = Price of 33 x 33cm Spanish Ceramic Floor Tiles

ChinaTiles = Price of 30 x 30cm Chaia Vitrified Tiles

RoyalTiles = Price of 30 x 30cm Royal Ceramic Tiles

AshCeiling = Price of 4' x 4' Asbestos Ceiling

HBCeiling = Price of 4' x 8' Hirschorn Hard Board Ceiling

ZumaGloss = Price of Zuma 4 Ltr Gloss Paint

ZumaEmul = Price of Zuma 20 Ltr Emulsion Paint

BergerGloss = Price of Berger 4 Ltr Gloss Paint

BergerEmul = Price of Berger 20 Ltr Emulsion Paint