Effects of Increase in Petrol (PMS) Pump Price on the Prices of Selected Building Materials in Nigeria. (1990 – 2009).

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Abstract
This paper examines the effect of increase in fuel pump price on the prices of selected building materials in Nigeria. The objective is to determine the relationship existing between fuel price increase and the price of selected basic building materials. Using a simple interactive polynomial technique and working at 95% confidence limit a computation was made of the research variables. The result showed a significant relationship between the variables tested. Prices of cement, blocks and paint had linear, quadratic and cubic relationships respectively with increase in fuel price. Coefficients of determination of 93.02% for cement, 92.89% for blocks and 94.52% for paints were found for these tested variables. The results of the study indicate that the relationships were either linear or non linear in the tested variables. This demonstrates that petrol price increase will cause the price of building materials to rise at various degrees, thereby exerting an enormous financial pressure on the building developers. Government fuel price hike policies should be considerate. This paper concludes that adequate and appropriate measures should be put in place to forestall rise in prices of building materials.
Keywords: Petrol, Pump price, building materials, price hike, haulage, economy

Introduction

Petroleum or Crude Oil is a natural occurring flammable liquid found in rock formations in the earth consisting of a complex mixture of hydrocarbons of various molecular weights plus other organic compounds. The most common distillations of petroleum are fuels, which include Ethane, Diesel fuels (petro diesel), fuel oil, Gasoline (Petrol), Jet fuel, Kerosene and Liquefied petroleum gas, (Speight, 1999). The refined oil is moved to the end user through pipelines, by ships and by tanker trucks. About 90% of vehicular fuel needs are met by petroleum oil. Petroleum's worth as a source of energy to power the vast majority of vehicles and also as the base of many industrial chemicals makes it one of the world's most important commodities. In Nigeria, petroleum industry is the largest industry and main generator of gross domestic product in the nation. Petroleum production and export play a dominant role in Nigeria's economy and account for 90% of her gross earning. This paper, however, examines the effect of increase in petrol pump price on the prices of building materials. Statistical analysis was employed to determine the interrelationships.

The Implications of Fuel Price Increase on the Economy

A nation's development is usually measured by the strength or weakness of the construction and building industry (Adesina, 1991). High construction costs have become a major indicator to the malfunction of the construction industry in Nigeria today. This has manifested in low construction and abandoned projects with severe consequences on the nation's socio-economic and technological development (Abiola, 2000). Osula and Adebisi (2001) in their study of the fuel price increase in Nigeria on travel expenditures discovered that significant changes had occurred in travel money expenditures across socio-economic state. They suggest a transportation policy that will ensure special treatment to cushion the effect of energy policy change. Nkoro (2005) also states that increase in fuel prices has worsened the economic crisis in the Nigerian economy. He says that whenever the fuel price increases the Gross Domestic Product (GDP)

tends to decrease. He suggested that government should control the prices of petroleum products, rather than leaving it to market forces. Besides the nation's refineries should be functioning at full capacity to meet internal demand.

Effect of Increase in Fuel Prices on Haulage of Materials

Vincent (2008) reports that recently, the Malaysian Government revamped its petrol subsidy system by increasing petrol prices by a steep of 41% and this resulted in a hike in cost of living. Alan (2007) observes that within the European Union cost of fuel typically accounts for between a quarter and a third of the total cost of operating a truck. This makes economic conditions in the road haulage industry highly sensitive to the prevailing prices of fuel particularly during periods of rising fuel prices. Asleigh (2008) commenting on the protection against materials cost hikes enumerates a range of factors affecting the cost of building materials. Some of these include; Inflation, tropical storms, rising fuel prices, the dismal housing market and weakening economy. He points out that these factors impact on the prices of building materials by causing fluctuations in supply and demand. The net effect is a seemingly unpredictable effect in the builder's profit margin. Humble (2009) reviewing the fuel prices increase in United Kingdom notes that, the positive side of fuel price increase is that taxing people who use cars by increasing fuel price will encourage the use of public transport thus reducing carbon emissions. On the other hand, Government stands to realize huge sums of money in the subsidy cuts as a result of increase in fuel prices. With such, there are possibilities of improving and expanding the public transportation system and other public beneficial programmes. However, he suggests that there should be discount for haulage transport companies and owner operators in order to reduce haulage cost and its resulting effects on goods and materials.

Research Methodology

The data for prices of building materials were collected from primary and secondary sources. The primary source was from market survey while the secondary source was obtained from building price books. The data for inflation and petrol fuel price were obtained from CBN and NNPC publications respectively. The data for this research work spanned a period of twenty years from 1990 to 2009; this is to enable one pay particular attention to Government fuel price policies from ten years upwards into the Military and Civil Regimes. The building materials selected for study were considered on the basis that they constitute main cost elements of a building apart from electrical, plumbing and roofing sheet materials.

The data obtained (see table 1) were subjected to statistical analysis. The interactive polynomial modelling was used to analyse the data using two graphical interfaces for polynomial fitting. The basic fitting tool is the MATLAB interface which allows for the computation of norm of the residuals which is the measure of the goodness of fit and model coefficients.

Results and Discussion of Research Analysis

Figure 1, shows the linear polynomial model of the relationship between increase in price of petrol and price of cement. The result of analysis showed coefficients of determination of 93.02%, 93.6% and 94.0% with corresponding probability values (P value) of 0.0000, 0.242 and 0.326 for linear quadratic and cubic polynomials respectively. The P values for quadratic and cubic models were higher than 0.05 level of significance adopted in the study which makes both model non significant and non suitable for prediction purposes. The linear model was the best goodness fit, with probability value (P value) less than the 0.05 level of significance. The R-square value of 0.9302 shows that 93.02% variation in price of cement is accounted for by the increase in price of petrol. The equation model, cement =315.6+19.78 petrol, was established.

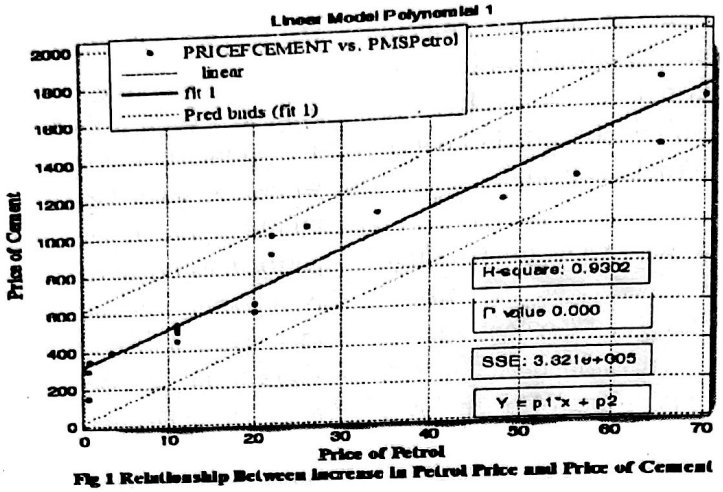

Fig 1 Relationship Between Increase in Petrol Price and Price of Cement

Figure 2 shows the quadratic polynomial model of the relationship between increase in fuel price and price of 225mm blocks. The analysis reveal the coefficients of determination of 86.2%, 92.9% and 94.0% with corresponding P values of 0.000, 0.002 and 0.110 for linear, quadratic and cubic models respectively. The linear and quadratic models were significant because their P values were less than 0.05 significant level. However, the quadratic polynomial has a better improved goodness of fit for the relationship under study in view of the fact that it has a higher R-square of 92.9% as shown in figure 2, which means that 92.9% variation in the price of blocks is accounted for by the increase in price of petrol. The quadratic equation model, block = 9.134+2.57petrol - 0.01899petrol^2, which is positive was established

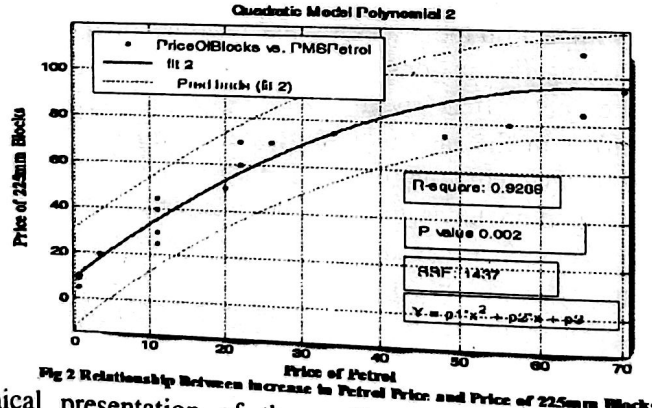

Fig 2 Relationship Between Increase in Petrol Price and Price of 225mm Blocks

Figure 3, is a graphical presentation of the relationship between increase in pump price of petrol and price of reinforcement bars in tons. The relationship is a positive linear form with the equation, Reinft bars=4202+1778petrol. The linear model gave the best goodness of fit because of its probability value of 0.000 which is less than the 0.05 significant level considered for the study.

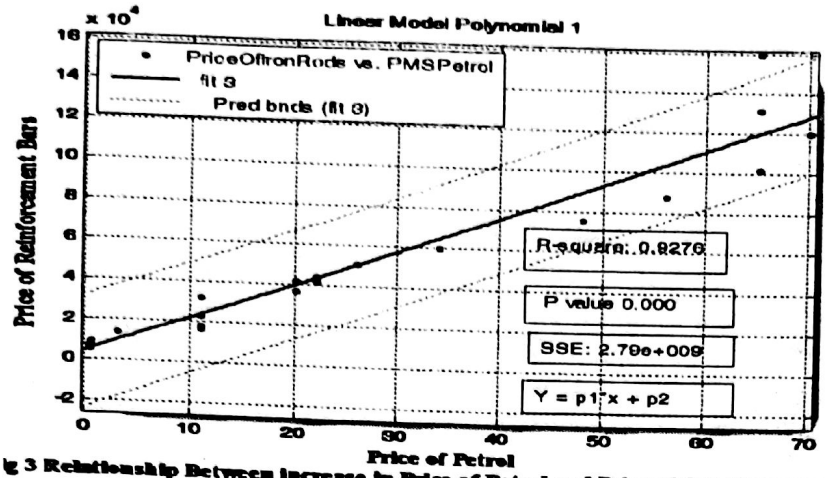

Fig 3 Relationship Between Increase in Price of Petrol and Price of Reinforcement Bars

The quadratic and cubic models have P values of 0.366 and 0.675 respectively which are higher than the level of significance. Therefore, they were considered non significant for prediction. The R-square of 92.8% shows that major variation in the price of reinforcement bars is accounted for by the increase in pump price. Figure 4, below is a cubic model polynomial of the relationship between increase in price of petrol and price of paint in gallons. The model has the equitation of Paint= 13.42+24.15 petrol -0.5633 petrol^2 + 0.004551 petrol^3 which is positive. The cubic model gave the best goodness of fit for this relationship because it has the highest R-square value of 94.52% when compared with linear and quadratic models of 78.8% and 89.9% respectively. All the P values for the three models were significant at 0.05 level of significance. This means that 94.52% variation in the price of paint is accounted for by the increase in petrol price.

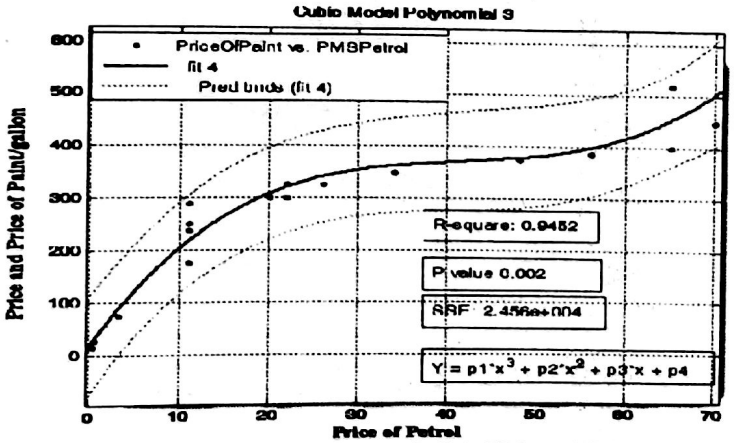

Fig 4 Relationship Between Increase in Petrol Price and Price of Paint

Figure 5, beneath shows a graphical presentation of the relationship between increase in petrol and price of shop sand. The relationship is a linear positive one with an equation of this form; sharp sand = 45.87+ 99.94petrol. The linear model relationship was found to be the best goodness of fit because of it satisfactory P value of 0.000 which is less that 0.05 significant level allowed for the study. The other models of quadratic and cubic were not good enough in their curve fitting because their P values were higher than 0.05 significant level. Although the coefficient of determination (R-Square) values of 85.5%, 85.6% and 85.7% for linear, quadratic and cubic respectively, were almost the same, the R-square value for linear was considered fit because of its satisfactory significant posture, which means that about 85.5% variation in the price of sand is explained by the increase in price of petrol, while about 15% are accounted for by other factors not considered in this study

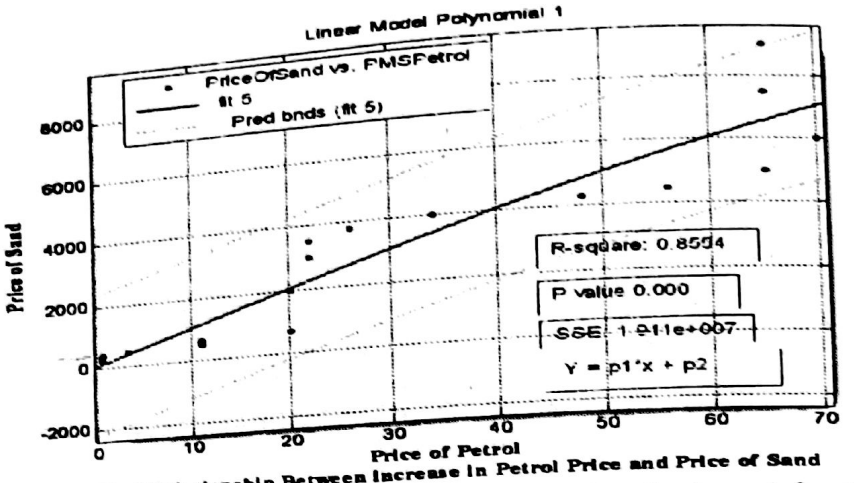

Fig 5 Relationship Between Increase in Petrol Price and Price of Sand

Figure 6, shows the polynomial relationship between increase in price of petrol and price of timber. The analysis revealed R-square values of 92.2%, 94.6% and 94.6% with P values of 0.000, 0.015 and 0.783 for linear, quadratic and cubic models, respectively. The second degree polynomial model (quadratic) was considered the best fit because it was significant at 0.015 probability value which is lower than 0.05 significant level adopted for the study. With R-square of 94.6%, it all means that the major variation in the price of timber is explained by the increase in pump price of petrol, with the equation model for the fit given as; Timber =4.084 +6.043 petrol - 0.03405petrol^2.

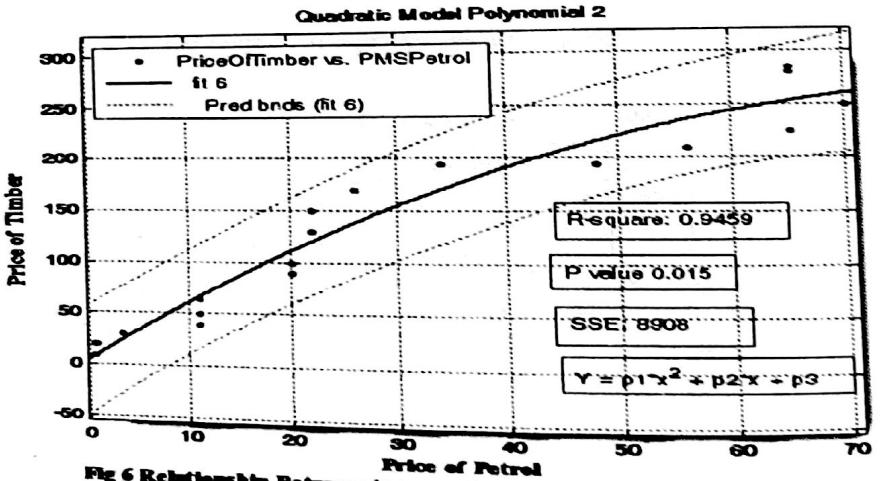

Fig 6 Relationship Between Increase in Petrol Price and Price of Timber

Regression Trend Analysis

Using a simple statistical analysis based on regression, the data for prices of building materials were further analysed and a projection was made into the future using trend analysis. In order to predict into the future, the following predictive equation models have been developed for each of the materials.

Cement = $207.886 + 26.67x + 2.67x^2$.....(1)

Block =$-1.789 + 5.488x$..... (2)

Reinforcement =$-20719.3+7131.602x$ ..... (3)

Paint =$-115.56+82.065x -5.702 x^2+0.161x^3$..(4)

Sand = $-1544.211+418.925x$..... (5)

Timber = $5.87 +7.514x +0.381 x^2$..... (6)

Where x=time

Considering a twenty five year trend commencing from 1990, and substituting the values of petrol in the above equations, the predicted prices of the above materials will be N2,543.40, N135.211, N157,570.75, N1,119.06, N8,930.00 and N420.00 for cement block, reinforcement, paint, sand and timber

respectively. The mean percentage increase of the above predicted prices of building materials is 40%. With this level of increment, it would mean that in about five years time, a colossal amount of financial pressure would be placed on the building industry. The cost of construction would likely increase by the same percentage margin.

Conclusion

The results of this investigation demonstrate that linear and non-linear relationships exist between prices of building materials and petrol price increase. Cement, reinforcement bars and sharp sand materials had a linear statistical relationship with fuel price increase, with R-Square values of 93.02%, 92.76% and 85.54% respectively. Blocks and timber materials had non linear improved polynomial relationships with R-Square values of 92.9% and 94.6% respectively while paint materials maintained a non linear cubic relationship with the independent variable of increase in price of petrol, with R. Square of 94.5%. All these reveal that the effects of petrol price increase on prices of building materials are either directly or indirectly proportional to one another. This demonstrates that petrol price increase will cause the price of building materials to rise at various degrees, thereby exerting an enormous financial pressure on the building developers. Government fuel price hike policies should be considerate. Therefore adequate and appropriate measures should be put in place to forestall rise in prices of building materials.

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Table 1 Prices of Building Materials, Inflation rate and Price of Petrol (PMS).

Year	Price of Cement /bag	Price of sand/trip	Price of Timber/ length	Price of paint/ 4litres	Price of block /Nr	Price of iron rods / tonne	Inflation Rate (%)	PMS(PETROL) N/litre
1990	150.00	250.00	10.00	15.00	5.00	5,580.00	7.50	0.51
1991	300.00	350.00	20.00	16.00	9.00	7,440.00	12.90	0.60
1992	350.00	420.00	20.00	28.00	10.00	9,300.00	44.50	0.70
1993	400.00	460.00	30.00	75.00	20.00	13,950.00	57.30	3.25
1994	450.00	500.00	40.00	175.00	25.00	16,740.00	57.00	11.00
1995	500.00	550.00	40.00	238.00	30.00	18,600.00	73.10	11.00
1996	520.00	600.00	50.00	250.00	40.00	23,250.00	29.10	11.00
1997	540.00	660.00	65.00	288.00	45.00	32,550.00	8.50	11.00
1998	600.00	700.00	90.00	300.00	50.00	37,200.00	10.00	20.00
1999	640.00	2,000.00	100.00	300.00	50.00	41,850.00	6.60	20.00
2000	900.00	3,000.00	130.00	300.00	60.00	41,850.00	6.90	22.00
2001	1,000.00	3,500.00	150.00	325.00	70.00	44,640.00	18.90	22.00
2002	1,040.00	3,800.00	170.00	325.00	70.00	51,150.00	12.90	26.00
2003	1,100.00	4,000.00	195.00	350.00	75.00	60,450.00	14.00	34.00
2004	1,140.00	4,300.00	195.00	375.00	75.00	76,050.00	15.00	48.00
2005	1,250.00	4,500.00	210.00	388.00	80.00	88,350.00	17.90	56.00
2006	1,400.00	5,000.00	225.00	400.00	85.00	102,300.00	NA	65.00
2007	1,650.00	6.000.00	250.00	450.00	95.00	120,000.00	NA	70.00
2008	1,750.00	7,500.00	280.00	520.00	110.00	160,000.00	NA	65.00
2009	1,750.00	9,000.00	285.00	520.00	110.00	132,000.00	NA	65.00

Source: Building Price Book 2009, CBN, NNPC Publications 2008 & Market Survey 2009.