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Trend Analysis on the Price Stability of Galvanized Iron Sheet

[I]Ojo Oluwafemi .D., [II]Adeoye Akeem .O., [III]Jimoh Bilikis .T.
[I,II]Dept. of Mathematics and Statistics Federal Polytechnic Offa, Nigeria
[III]Department of Statistics University of Ilorin(Student), Ilorin, Nigeria
[II]akeemwaju@yahoo.com

Abstract
This research stability in sale prices of galvanized iron sheet is aimed at examining the price stability of galvanized iron sheet, to determine the trend of galvanized iron sheet, to estimate the seasonal variation and to forecast the future price of cement and galvanized iron sheet of the monthly sales of galvanized iron sheet between years (1998 - 2009) .Time series analysis was use to analyse the data , the trend values of all the variable were estimated using least square method and multiplicative model of time series analysis , result of the analysis revealed that price of galvanized iron sheet is not stable over the years under consideration. It was observed that the data contain trend which exhibited a linear upward pattern. Looking at the Seasonal variation, detrended data, and deseasonalized data it was discover that sales are usually high during the 'ember months, even for both original data and forecast values . It was therefore recommended that government at all level should endeavour to create a long term stability in the price of galvanized iron sheet so as to beautify our society with latest house structures and construction works.

Keywords
Stability, Sale Prices, Galvanized Iron Sheet, Trend , Forecasts

I. Introduction

The importance and usefulness galvanized iron sheet to the citizens of this country cannot be over emphasized as it is very essential for building major and minor mechanical activities. Thus, there is need for price of galvanized iron sheet to be readily affordable. Nigeria's increasing wealth and population is driving market demand for galvanized iron sheet. Galvanized iron sheet are used as roofing material on nearly all houses in Nigeria and the surrounding region. It is also used in a variety of industries like agricultural implements, consumer durable goods etc. Galvanized iron sheet are one of the importing goods from Asia continent. It has a surface treatment of aluzinc and galvanize with 0.12mm – 1.2mm thickness and of different colours. It has a width length of 914mm – 1500mm. It surface texture is divided into normal spangles(Z), small spangles(X), with solid galvanizing coat, the product has excellent anticorrosive property, good welding property & cold processing and molding property.

II. Methodology

1. Time Series Analysis

Time series is a set of observations taken at specific time, usually at equal intervals. Mathematically, a time series is defined by the values Y_1, Y_2,... of a vertical variable Y (Prices) at times t_1, t_2,.. Thus, Y is a function of t, this is symbolised by Y = F(t) [2-3]. Time series interact effectively and the model is given by: $Y_t = f(T_t, S_t, C_t, I_t)$. Time series analysis consist of two models which can be expressed as the function of its component namely: Additive model (Yt = Tt + St +Ct + It and Multiplicative model($Y_t = T_t \times S_t \times C_t \times I_t$) From the two models, Y_t = value of the series at time t, T_t = trend at time t, S_t = seasonal variation at time t and C_t = cyclical variation at time t. In this research, multiplicative model will be adopted in analysing the data.

2. Estimation of Trend

A trend can be estimated using any of these ways: Least square method, Free hand method, Moving average method and Semi average method but least square method will be used in this research to estimate the trend.

3. Least Square Method

This method can be used to find the appropriate trend curve or trend line. The regression approach is employed when using this method. This method estimate a dependent variable (Y) given the value of another variable (independent variable X) and to discover if the relationship that exists between the two variable is linear or not.From this least square equation, we can compute the trend values T [1,4]. The least squares line approximating the set of points (X_1,Y_1), (X_2,Y_2), ..., (X_n,Y_n) has the equation: $Y = a + b\bar{X}$

Where the constants a and b are determined by solving the equations simultaneously:

$$\sum_{i=0}^{n} Y = na + b\sum_{i=1}^{n} X^2 \sum_{i=0}^{n} Y = na + b\sum_{i=1}^{n} X^2 \quad \text{eqn (1)}$$

$$\sum_{x=1}^{n} XY = a\sum_{i=1}^{n} X + b\sum_{i=1}^{n} X^2 \quad \text{eqn (2)}$$

The estimates are given as:

$$\hat{a} = \bar{Y} - b\bar{X}$$

$$\hat{b} = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2}$$

Now, the trend line equation is $Y = \hat{a} + \hat{b}X$ and it can be referred to as simple linear regression equation.

Note: At times a linear trend may be fitted into a series which is exactly linear.

4. Estimation of Seasonal Variation

To determine the seasonal factor S in Y = T x S x C x I, one must first estimate how the data in the time series vary from month to month throughout a typical year. A set of numbers showing the relative values of a variable during the month for the year is called a Seasonal Index [1]. The mean seasonal index for the year should be 100% i.e. the sum of 12 months index numbers should be 1200%.This research will employ the percentage moving method in estimating the seasonal variation of the series.

III. Analysis of Data

A. Original,Detrended and Seasonally Adjusted

Data Four plots were presented. Fig. 1(a) shows the plot for the original data for galvanized iron sheet. Fig. 1(b) shows the plot

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after the original data has been detrended i.e. the data is free from trend. Fig. 1(c) shows the plot after the original data has been deseasonalizded i.e. the data is free from seasonal variation. While fig. 1d shows the plot combining the detrended and deseasonalized data. i.e. the data is free from trend and seasonal variation.

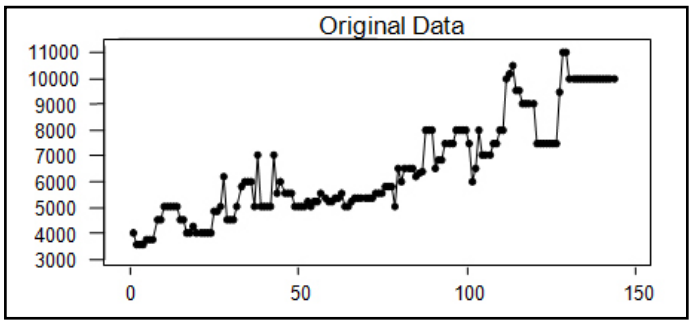

Fig. 1(a):

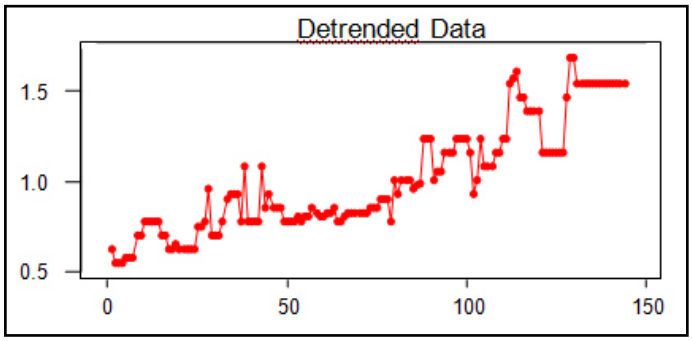

Fig. 1(b)

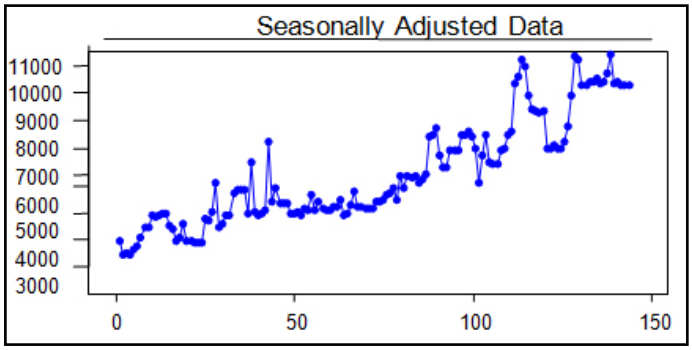

Fig. 1(c):

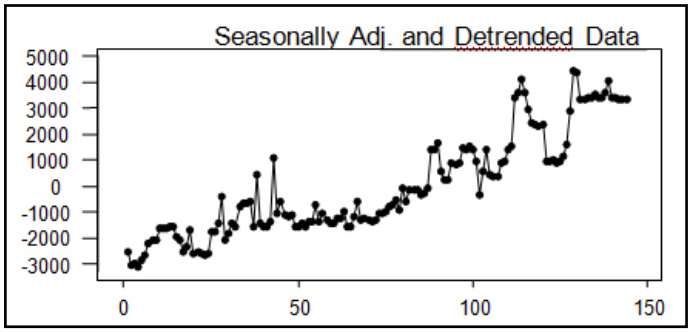

Fig. 1(d):

Fig. 1: Plot of the Original, Detrended and Seasonally Adjusted Data of Galvanized Iron Sheet

B. Plot for Forcasted Sales of Galvanized Iron Sheet

The plot below shows the five years forecasted sales for galvanized iron sheet. As it was observed from trend line plot and linear trend model, the forecast values for the sales took an upward trend.

Time Series Decomposition

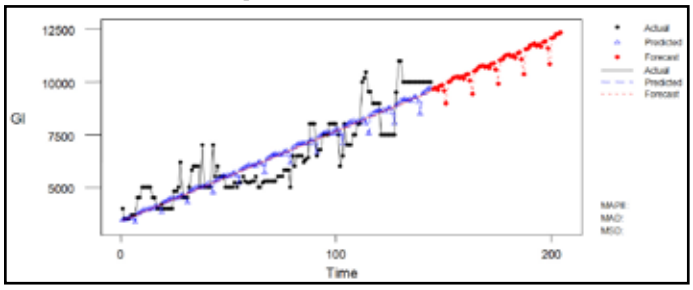

Fig. 2: Plot for Forecasted Sales of Galvanized Iron Sheet

In the decomposition of this data, the multiplicative least square method was used in deseasonalizing, detrending and forecasting.

Data galvanized iron sheet
Length 144.000
NMissing 0

Trend Line Equation
Yt = 3379.63 + 42.8480*t

Accuracy of Model
MAPE: 11
MAD: 697
MSD: 735580

Table 1: Forecast Value for Five Years

Row	Period	FORE1	
1	145	9657.7	
2	146	9723.8	
3	147	9630.9	
4	148	9817.7	
5	149	9849.6	
6	150	9581.0	
7	151	8975.2	
8	152	10010.8	
9	153	10040.4	
10	154	10177.1	
11	155	10230.1	
12	156	10252.3	
Row	Period		Forecast
13	157		10175.4
14	158		10242.7
15	159		10142.5
16	160		10337.0
17	161		10368.3
18	162		10083.4
19	163		9443.8
20	164		10531.1
21	165		10560.1
22	166		10701.5
23	167		10755.0
24	168		10776.1

Row	Period	FORE1
25	169	10693.1
26	170	10761.6
27	171	10654.2
28	172	10856.3
29	173	10887.0
30	174	10585.7
31	175	9912.3
32	176	11051.5
33	177	11079.7
34	178	11225.9
35	179	11279.9
36	180	11300.0

Row	Period	FORE1
37	181	11210.7
38	182	11280.5
39	183	11165.8
40	184	11375.6
41	185	11405.7
42	186	11088.0
43	187	10380.8
44	188	11571.8
45	189	11599.3
46	190	11750.3
47	191	11804.8
48	192	11823.8

Row	Period	FORE1
49	193	11728.4
50	194	11799.4
51	195	11677.5
52	196	11894.9
53	197	11924.4
54	198	11590.4
55	199	10849.3
56	200	12092.1
57	201	12118.9
58	202	12274.7
59	203	12329.7
60	204	12347.6

IV. Conclusion

For the sales of galvanized iron sheet, the time series plot for their monthly sales exhibited a linear upward pattern. The forecast revealed that future prices will be a linear trend (straight line) model. The least square trend model for galvanized iron sheet isYt =3379.63+42.8480*t.The slope of the trend line indicates that galvanized iron sheet sales in Eruwa market have experienced an average increase of 43 Naira (#43) per month over the twelve years period with mean square deviation (MSD) = 735580, mean absolute deviation (MAD) = 697 and the mean absolute percentage error (MAPE) = 11.

V. Recommendation

After the analysis and forecast, I thereby suggest that the government at all level should endeavour to create a long term stability in the price of galvanized iron sheet so as to beautify our society with latest house structures and construction works. But if this cannot be done, we suggest that the government should assist in subsidising the product so that rural residents, contractors and users of these building materials will be encouraged to buy the needed quantity so as to avoid the collapse of building and other construction works.

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Ojo olufemi David, was born in 1983 at Niger State of Nigeria.He attended Mustapha Comprehensive School Between the year 1988-1995 for my Kindergarten and elementary Educations. He attended Ogbomoso Baptist High school and Oyo state school of science for his High school education between the years 1995 to 2002. He obtained his first degree (Bsc in Statistics) at Ladoke Akintola University of Technology in 2010. He was posted to kwara state for the National Youth Service (NYSC) in which he served as a lecturer at the Federal Polytechnic Offa and was retained in 2013 after National Youth Service (NYSC) as an Assistant Lecturer.

Adeoye Akeem O was born on October 7th 1976 in owu isin, kwara State of Nigeria. He obtained his Higher National Diploma (H.N.D) in Statistics from the Kwara state polytechnic Ilorin 1n 1999,PGD Statistics in 2008 from University of Ilorin,PGDE Education in 2007 from University of Ado -Ekiti, Teacher training Certificate(TTC) in 2010 from Federal college of Education Akoka Lagos State, Masters degree (M.Sc) in Statistics in 2010 from university of Ilorin, Nigeria and currently on his Ph.D in statistics at the university of Ilorin Nigeria . He has been lecturing Statistics in kwara state polytechnic as an Instructor from April 2005 to March 2013 .He joined Federal Polytechnic offa from April 2013 to date as a lecturer .He attended many workshop and conferences. He has many journals for both national and international.

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Jimoh Bilikisu.T. was born on October 22nd 1977 in Ifelodun Local Government Area , kwara State of Nigeria. She obtained her first degree (BSc in Statistics) and Second degree (MSc in Statistics) from the from University of Ilorin,Nigeria in 2003 and 2013 respectively. She has been lecturing Statistics in Crown Polytecnic Ado-Ekiti Ekiti State in Nigeria as a Part-Time lecturer 2012.

year/month	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	4000	5000	4800	5000	5000	5300	5500	6200	8000	7500	7500	10000
February	3500	5000	4800	7000	5000	5300	5500	6300	8000	8000	7500	10000
March	3500	4500	5000	5000	5000	5500	5500	6400	8000	8000	7500	10000
April	3500	4500	6200	5000	5000	5000	5800	8000	8000	10000	7500	10000
May	3700	4000	4500	5000	5200	5000	5800	8000	7500	10200	7500	10000
June	3700	4000	4500	5000	5000	5200	5800	8000	6000	10500	7500	10000
July	3700	4200	4500	7000	5200	5300	5000	6500	6500	9550	7500	10000
August	4500	4000	5000	5500	5200	5300	6500	6800	8000	9550	9500	10000
September	4500	4000	5800	6000	5500	5300	6000	6800	7000	9000	11000	10000
October	5000	4000	6000	5500	5300	5300	6500	7500	7000	9000	11000	10000
November	5000	4000	6000	5500	5200	5300	6500	7500	7000	9000	10000	10000
December	5000	4000	6000	5500	5200	5300	6500	7500	7500	9000	10000	10000

Source: Department of Macro Statistics and Research, Secretariat Ibadan, Oyo State