Application of Forecasting Methods for the Estimation of Production Demand

By

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Abstract: The researcher applied forecasting method to analyze the production demand in millennium plastic industry. The data were analyzed using double exponential smoothing and winters methods to see if the products were going to either decreasing or increasing in future demand. This technique will help during production planning.

Key words: Forecasting, Production Planning, Production Demand Dust Pan and Paint Bucket

Introduction to Forecasting

Forecasting is the process of making statements about events whose actual outcomes (typically) have not yet been observed. A commonplace example might be estimation of some variable of interest at some specified future date. Prediction is a similar, but more general term. Both might refer to formal statistical methods employing time series, cross-sectional or longitudinal data, or alternatively to less formal judgmental methods. Usage can differ between areas of application: for example, in hydrology, the terms "forecast" and "forecasting" are sometimes reserved for estimates of values at certain specific future times, while the term "prediction" is used for more general estimates, such as the number of times floods will occur over a long period.

Risk and uncertainty are central to forecasting and prediction; it is generally considered good practice to indicate the degree of uncertainty attaching to forecasts. In any case, the data must be up to date in order for the forecast to be as accurate as possible.[1]

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Objective of the study is the use of historical data to foreseen the future. This was accomplish by the use of forecasting tools

Categories of Forecasting Methods: Qualitative forecasting techniques are subjective, based on the opinion and judgment of consumers, experts; they are appropriate when past data are not available. They are usually applied to intermediate- or long-range decisions. Examples of qualitative forecasting methods are informed opinion and judgment, the Delphi method, market research, and historical life-cycle analogy.

Quantitative forecasting models are used to forecast future data as a function of past data; they are appropriate when past data are available. These methods are usually applied to short- or intermediate-range decisions. Examples of quantitative forecasting methods are last period demand, simple and weighted N-Period moving averages, simple exponential smoothing, and multiplicative seasonal indexes.

Naïve approach: Naïve forecasts are the most cost-effective objective forecasting model, and provide a benchmark against which more sophisticated models can be compared. For stationary time series data, this approach says that the forecast for any period equals the historical average. For time series data that are stationary in terms of first differences, the naïve forecast equals the previous period's actual value.

Time series methods: Time series methods use historical data as the basis of estimating future outcomes.

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Causal / Econometric Forecasting Methods: Some forecasting methods use the assumption that it is possible to identify the underlying factors that might influence the variable that is being forecast. For example, including information about climate patterns might improve the ability of a model to predict umbrella sales. This is a model of seasonality which shows a regular pattern of up and down fluctuations. In addition to climate, seasonality can also be due to holidays and customs; for example, one might predict that sales of college football apparel will be higher during the football season than during the off season.[2]

Causal forecasting methods are also subject to the discretion of the forecaster. There are several informal methods which do not have strict algorithms, but rather modest and unstructured guidance. Alternatively, one can forecast based on, for example, linear relationships. If one variable is linearly related to the other for a long enough period of time, it may be beneficial to extrapolate such a relationship into the future.

Causal methods include:

- Regression analysis includes a large group of methods that can be used to predict future values of variable using information about other variables. These methods include both parametric (linear or non-linear) and non-parametric techniques.

- Autoregressive moving average with exogenous inputs (ARMAX)[3]

Quantitative forecasting models are often judged against each other by comparison of their in-sample or out-of-sample mean square error, although some researchers have advised against its use.[4]

Judgmental Methods: Judgmental forecasting methods incorporate intuitive judgments, opinions and subjective probability estimates.

Demand Forecasting: demand forecasting is the activity of estimating the quantity of a product or service that consumers will purchase. Demand forecasting involves techniques including both informal methods, such as educated guesses, and quantitative methods, such as the use of historical sales data or current data from test markets. Demand forecasting may be used in

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making pricing decisions, in assessing future capacity requirements, or in making decisions on whether to enter a new market.

Importance of Demand Forecasting: Production Planning and product scheduling a business firm cannot function in wilderness. It has to take crucial decisions about what to produce and how much to produce. This in return depends upon its estimate of future demand for the product. If the forecasted demand is likely to rise, the firm can plan expansion of its production capabilities to meet the growing demand at the right point of time. In the eventuality of declining demand

Inventory planning Demand forecasting is useful for the firm to acquire the right quantum of inventory at the right point of time, to meet the needs of the production same time without unnecessarily locking up the finances of the firm in inventory accumulation.

Capital planning: Increased production requires increased capital resources fixed as well as working capital. Availability of demand forecasts helps the firm to mobilize the capital resources in time.

Marketing strategy: Demand forecasting will be useful in devising appropriate sales promotion or marketing strategies. If the demand forecasts indicate a declining trend in sales, it should resort to intensive sales promotion campaign to sustain its sales.

Manpower planning: A firm has to recruit and train the appropriate level of work force. This calls for forecasting the demand well in advance so that the required contingent of the labor resources could be obtained.

Pricing strategies: Devising and setting the optimum pricing depends upon the forecasted demand. If the forecasts indicate a declining share in the market demand then it has to slash the prices to sustain demand. Conversely, if the forecasts indicate increased demand for the prod act over a longer period it can charge higher prices subject to the other considerations. [15]

Components of Demand Forecasting: There are two main factors that help determine the type of forecasting method that will be used. They are: Time Frame and Behavior.

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Time Frame: The length of the forecast depends on product market changes and susceptibility to technological changes. The classifications are generalizations. Short to Mid and Long range is all relative to the business and what is being forecast.

Short to Mid-Range forecasts are usually anywhere from daily to up to two years in length. They are commonly used to determine production and delivery schedules and to establish inventory levels.

Long-Range forecasts are generally over two years into the future. They are usually used for strategic planning. Strategic planning determines where the company is headed in the future. It is used to establish long-term goals, plan new products, enter new markets and develop new facilities & technology.

Behavior: Demand sometimes behaves in random and irregular ways. Other times it exhibits predictable behavior. The 3 main types of predictable behavior are trends, cycles, and seasonal patterns.

A trend is a gradual, long-term, upward or downward movement in demand. A current trend is the steady increase in sales of personal computers over the past few years.

A cycle is an up-and-down movement in demand that repeats itself over a longer time span. Automotive sales often behave in a cyclical pattern.

Application of Forecasting: The process of climate change and increasing energy prices has led to the usage of Egain Forecasting of buildings. The method uses forecasting to reduce the energy needed to heat the building, thus reducing the emission of greenhouse gases. Forecasting is used in the practice of Customer Demand Planning in everyday business forecasting for manufacturing companies. Forecasting has also been used to predict the development of conflict situations. Experts in forecasting perform research that use empirical results to gauge the effectiveness of certain forecasting models.[5] Research has shown that there is little difference between the accuracy of forecasts performed by experts knowledgeable of the conflict situation of interest and that performed by individuals who knew much less.[6]

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Similarly, experts in some studies argue that role thinking does not contribute to the accuracy of the forecast.[7] The discipline of demand planning, also sometimes referred to as supply chain forecasting, embraces both statistical forecasting and a consensus process. An important, albeit often ignored aspect of forecasting, is the relationship it holds with planning. Forecasting can be described as predicting what the future will look like, whereas planning predicts what the future should look like.[8][9] There is no single right forecasting method to use. Selection of a method should be based on your objectives and your conditions (data etc.).[10] A good place to find a method is by visiting a selection tree. [11]

Forecasting has application in many situations:

- Supply chain management - Forecasting can be used in Supply Chain Management to make sure that the right product is at the right place at the right time. Accurate forecasting will help retailers reduce excess inventory and therefore increase profit margin. Studies have shown that extrapolations are the least accurate, while company earnings forecasts are the most reliable.[12] Accurate forecasting will also help them meet consumer demand.

Limitations Forecasting Methods: Limitations pose barriers beyond which forecasting methods cannot reliably predict.

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Performance limits of fluid dynamics equations: As proposed by Edward Lorenz in 1963, long range weather forecasts, those made at a range of two weeks or more, are impossible to definitively predict the state of the atmosphere, owing to the chaotic nature of the fluid dynamics equations involved. Extremely small errors in the initial input, such as temperatures and winds, within numerical models double every five days.[13]

Complexity introduced by the technological singularity: The technological singularity is the theoretical emergence of super intelligence through technological means.[14] Since the capabilities of such intelligence would be difficult for an unaided human mind to comprehend, the technological singularity is seen as an occurrence beyond which events cannot be predicted.

Ray Kurzweil predicts the singularity will occur around 2045 while Vernor Vinge predicts it will happen sometime before 2030.

Research Methodology: The two forecasting methods adopted were double exponential smoothing and winters method. The methods were used to forecast the production demand of the case study company. This will help to understand what their future production demand will look like

Table 1: Production Demand in a Millenium Manufacturing Industry

Products	20 litres Paint Bucket			4 litres Paint Bucket			Dust Pan (Parker)		
Year /Month	2010	2011	2012	2010	2011	2012	2010	2011	2012
Jan	0	15363	0	0	18384	28062	0	1160	0
Feb	0	10216	295	0	16652	1559	0	0	0
March	0	0	0	0	51133	28411	0	0	0
April	0	0	37	0	20328	22632	0	5275	992
May	22960	0	0	0	8359	0	0	0	0
June	7418	22960	0	19429	15407	771	700	7670	18
July	6052	0	0	0	19523	0	0	0	8719
Aug	7926	0	0	13100	0	0	0	7670	17515
Sept	6134	6095	0	15882	18992	0	0	22185	0
Oct	11242	3640	3875	27605	0	0	0	0	15582
Nov	18649	4644	0	22328	32070	0	0	0	10535
Dec	21152	2374	0	9676	12657	0	0	0	0

Forecasts Using Double Exponential Smoothing for 20 litres Paint Bucket

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Data 20 litres Paint Bucket
Length 36

Smoothing Constants
Alpha (level) 0.695210
Gamma (trend) 0.050160

Accuracy Measures
MAPE 102
MAD 4498
MSD 52991952

Time	20 litres Paint Bucket	Smooth	Predict	Error
1	0	346.4	1136.7	-1136.7
2	0	364.9	1197.2	-1197.2
3	0	383.7	1258.9	-1258.9
4	0	401.5	1317.2	-1317.2
5	22960	16354.9	1289.1	21670.9
6	7418	10642.7	17998.2	-10580.2
7	6052	7839.6	11917.1	-5865.1
8	7926	8225.7	8909.4	-983.4
9	6134	7087.2	9261.3	-3127.3
10	11242	10258.0	8013.6	3228.4
11	18649	16408.2	11297.1	7351.9
12	21152	20101.0	17703.6	3448.4
13	15363	17238.6	21516.6	-6153.6
14	10216	12722.5	18439.7	-8223.7
15	0	4156.4	13636.8	-13636.8
16	0	1400.5	4595.1	-4595.1
17	0	511.8	1679.1	-1679.1
18	22960	16185.1	731.8	22228.2
19	0	5236.3	17180.2	-17180.2
20	0	1716.7	5632.4	-5632.4
21	6095	4821.4	1916.3	4178.7
22	3640	4105.3	5166.7	-1526.7
23	4644	4568.8	4397.4	246.6
24	2374	3134.6	4869.5	-2495.5
25	0	1020.5	3348.3	-3348.3
26	295	545.7	1117.4	-822.4
27	0	187.1	613.9	-613.9
28	37	97.0	233.9	-196.9
29	0	41.7	137.0	-137.0
30	0	23.4	76.9	-76.9
31	0	17.0	55.9	-55.9
32	0	14.5	47.6	-47.6
33	0	13.2	43.4	-43.4
34	3875	2706.3	40.6	3834.4
35	0	874.0	2867.4	-2867.4
36	0	285.0	935.0	-935.0

Forecasts

Period	Forecast	Lower	Upper
37	313.48	-10706	11333
38	341.96	-13531	14215
39	370.45	-16606	17347
40	398.93	-19815	20613
41	427.42	-23104	23959
42	455.90	-26442	27354
43	484.39	-29814	30783

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44	512.87	-33210	34235
45	541.36	-36621	37704
46	569.84	-40046	41186
47	598.33	-43480	44677
48	626.81	-46922	48175
49	655.30	-50369	51680
50	683.78	-53822	55189
51	712.27	-57278	58703
52	740.75	-60738	62219
53	769.24	-64200	65739
54	797.72	-67665	69260
55	826.21	-71131	72784
56	854.69	-74600	76309
57	883.18	-78070	79836
58	911.66	-81541	83364
59	940.15	-85013	86894
60	968.63	-88487	90424
61	997.12	-91961	93955
62	1025.60	-95436	97487
63	1054.09	-98912	101020
64	1082.57	-102388	104553
65	1111.06	-105865	108087
66	1139.55	-109343	111622
67	1168.03	-112821	115157
68	1196.52	-116299	118692
69	1225.00	-119778	122228
70	1253.49	-123257	125764
71	1281.97	-126737	129301
72	1310.46	-130216	132837

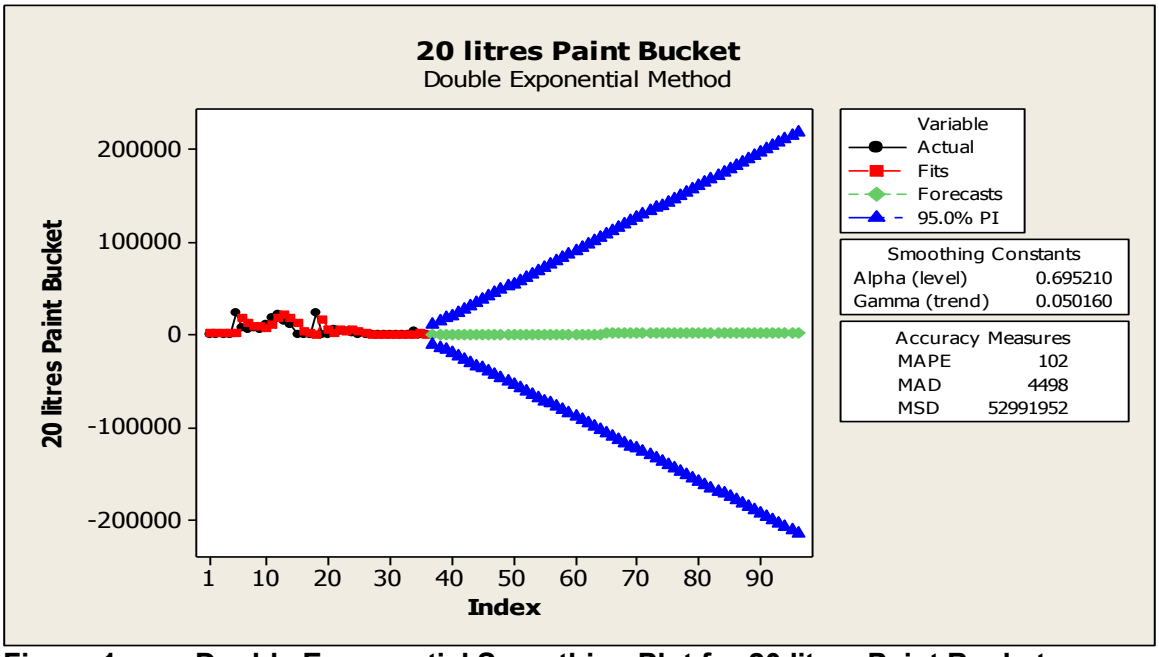

Figure 1: Double Exponential Smoothing Plot for 20 litres Paint Bucket

Forecasts Using Double Exponential Smoothing for 4 litres Paint Bucket

Data 4 litres Paint Bucket
Length 36

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Smoothing Constants
Alpha (level) 0.772032
Gamma (trend) 0.010000

Accuracy Measures
MAPE   159
MAD   10094
MSD   191180985

Time	4 litres Paint Bucket	Smooth	Predict	Error
1	0	3056.7	13408.3	-13408.3
2	0	644.4	2826.6	-2826.6
3	0	89.5	392.5	-392.5
4	0	-37.7	-165.5	165.5
5	0	-66.4	-291.4	291.4
6	19429	14927.4	-317.8	19746.8
7	0	3380.4	14828.4	-14828.4
8	13100	10835.6	3167.0	9933.0
9	15882	14700.4	10698.8	5183.2
10	27605	24641.1	14603.7	13001.3
11	22328	22856.1	24644.7	-2316.7
12	9676	12677.4	22841.9	-13165.9
13	18384	17056.7	12561.5	5822.5
14	16652	16728.1	16985.7	-333.7
15	51133	43273.0	16654.6	34478.4
16	20328	25602.6	43465.7	-23137.7
17	8359	12293.2	25616.7	-17257.7
18	15407	14670.0	12174.0	3233.0
19	19523	18395.2	14575.7	4947.3
20	0	4180.7	18339.1	-18339.1
21	18992	15570.5	3983.1	15008.9
22	0	3530.9	15488.7	-15488.7
23	32070	25518.1	3329.6	28740.4
24	12657	15593.6	25538.7	-12881.7
25	28062	25201.6	15514.7	12547.3
26	1559	6952.9	25219.6	-23660.6
27	28411	23481.7	6788.2	21622.8
28	22632	22826.2	23483.9	-851.9
29	0	5202.7	22821.9	-22821.9
30	771	1740.1	5022.1	-4251.1
31	0	348.1	1526.8	-1526.8
32	0	28.0	122.9	-122.9
33	0	-45.2	-198.1	198.1
34	0	-61.5	-269.7	269.7
35	0	-64.7	-284.0	284.0
36	0	-65.0	-285.0	285.0

Forecasts

Period	Forecast	Lower	Upper
37	-283.1	-25012	24446
38	-501.1	-33108	32105
39	-719.2	-41819	40381
40	-937.3	-50833	48958
41	-1155.4	-60013	57703
42	-1373.5	-69295	66548
43	-1591.6	-78642	75459
44	-1809.7	-88033	84414
45	-2027.7	-97456	93401
46	-2245.8	-106902	102411
47	-2463.9	-116367	111439

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48	-2682.0	-125844	120480
49	-2900.1	-135333	129533
50	-3118.2	-144830	138594
51	-3336.2	-154335	147662
52	-3554.3	-163845	156736
53	-3772.4	-173360	165815
54	-3990.5	-182879	174898
55	-4208.6	-192402	183985
56	-4426.7	-201928	193074
57	-4644.8	-211456	202167
58	-4862.8	-220987	211261
59	-5080.9	-230520	220358
60	-5299.0	-240054	229456
61	-5517.1	-249590	238556
62	-5735.2	-259127	247657
63	-5953.3	-268666	256759
64	-6171.3	-278206	265863
65	-6389.4	-287746	274968
66	-6607.5	-297288	284073
67	-6825.6	-306831	293179
68	-7043.7	-316374	302286
69	-7261.8	-325918	311394
70	-7479.9	-335462	320502
71	-7697.9	-345007	329611
72	-7916.0	-354553	338721

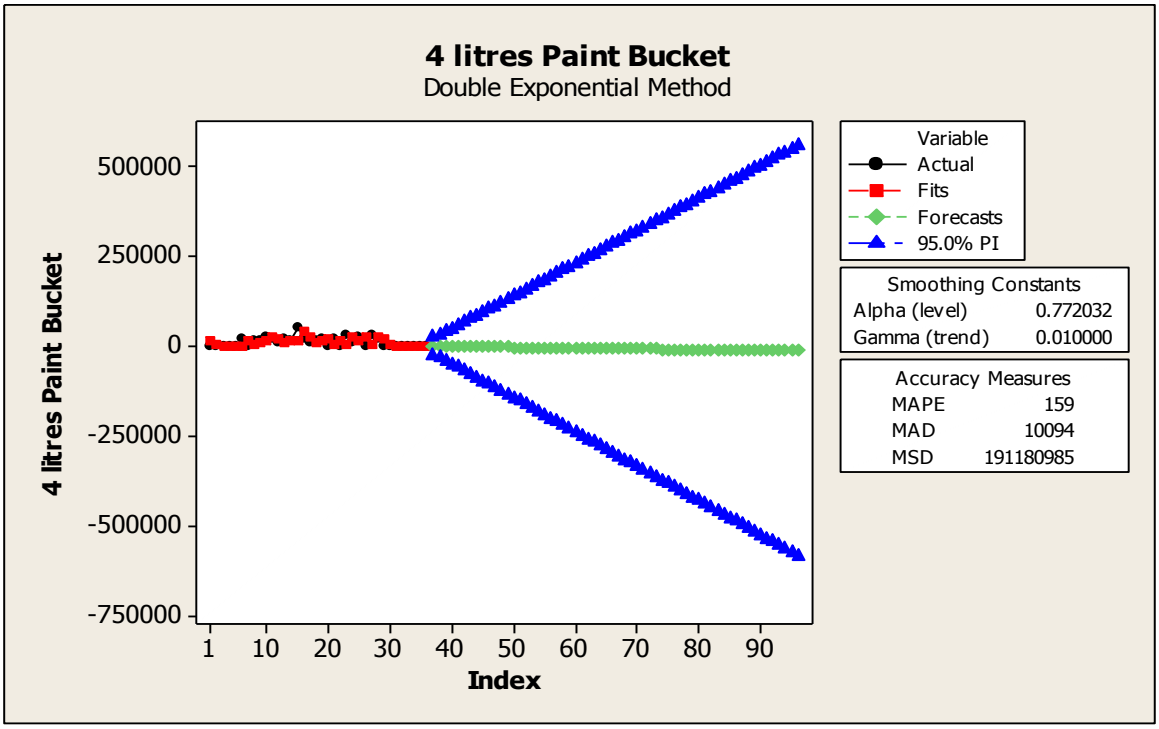

Figure 2: Double Exponential Smoothing Plot for 4 litres Paint Bucket

Double Exponential Smoothing for Dust Pan (Parker)

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Data    Dust Pan (Parker)
Length  36
Smoothing Constants
Alpha (level)  0.520489
Gamma (trend)  0.089912
Accuracy Measures
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MAPE	76
MAD	3955
MSD	37498660

Time	Dust Pan (Parker)	Smooth	Predict	Error
1	0	312.6	651.8	-651.8
2	0	363.1	757.2	-757.2
3	0	432.9	902.9	-902.9
4	0	536.4	1118.6	-1118.6
5	0	560.9	1169.7	-1169.7
6	700	910.7	1139.5	-439.5
7	0	704.3	1468.8	-1468.8
8	0	572.3	1193.6	-1193.6
9	0	482.3	1005.8	-1005.8
10	0	416.5	868.7	-868.7
11	0	365.5	762.3	-762.3
12	0	323.9	675.6	-675.6
13	1160	892.6	602.4	557.6
14	0	574.0	1197.1	-1197.1
15	0	394.4	822.5	-822.5
16	5275	3035.4	604.4	4670.6
17	0	1661.0	3464.0	-3464.0
18	7670	4916.4	1927.5	5742.5
19	0	2614.1	5451.6	-5451.6
20	7670	5380.0	2894.2	4775.8
21	22185	14368.3	5883.5	16301.5
22	0	7497.0	15634.7	-15634.7
23	0	3851.4	8031.8	-8031.8
24	0	1923.0	4010.3	-4010.3
25	0	908.3	1894.2	-1894.2
26	0	379.2	790.9	-790.9
27	0	107.8	224.8	-224.8
28	992	488.9	-57.1	1049.1
29	0	178.9	373.1	-373.1
30	18	31.2	45.6	-27.6
31	8719	4488.6	-103.4	8822.4
32	17515	11402.1	4766.9	12748.1
33	0	5887.0	12277.0	-12277.0
34	15582	11077.1	6187.3	9394.7
35	10535	11149.8	11817.1	-1282.1
36	0	5672.5	11829.8	-11829.8

Forecasts

Period	Forecast	Lower	Upper
37	5798.9	-3891	15489
38	5925.3	-5172	17022
39	6051.6	-6597	18701
40	6178.0	-8121	20477
41	6304.4	-9712	22321
42	6430.7	-11352	24213
43	6557.1	-13026	26141
44	6683.5	-14727	28094
45	6809.8	-16448	30068
46	6936.2	-18185	32057
47	7062.6	-19934	34059
48	7189.0	-21693	36070
49	7315.3	-23460	38090
50	7441.7	-25233	40117
51	7568.1	-27013	42149
52	7694.4	-28797	44186
53	7820.8	-30585	46227

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54	7947.2	-32377	48271
55	8073.6	-34172	50319
56	8199.9	-35969	52369
57	8326.3	-37768	54421
58	8452.7	-39570	56475
59	8579.0	-41373	58531
60	8705.4	-43178	60589
61	8831.8	-44985	62648
62	8958.2	-46792	64708
63	9084.5	-48601	66770
64	9210.9	-50410	68832
65	9337.3	-52221	70896
66	9463.6	-54032	72960
67	9590.0	-55845	75025
68	9716.4	-57658	77090
69	9842.8	-59471	79157
70	9969.1	-61285	81224
71	10095.5	-63100	83291
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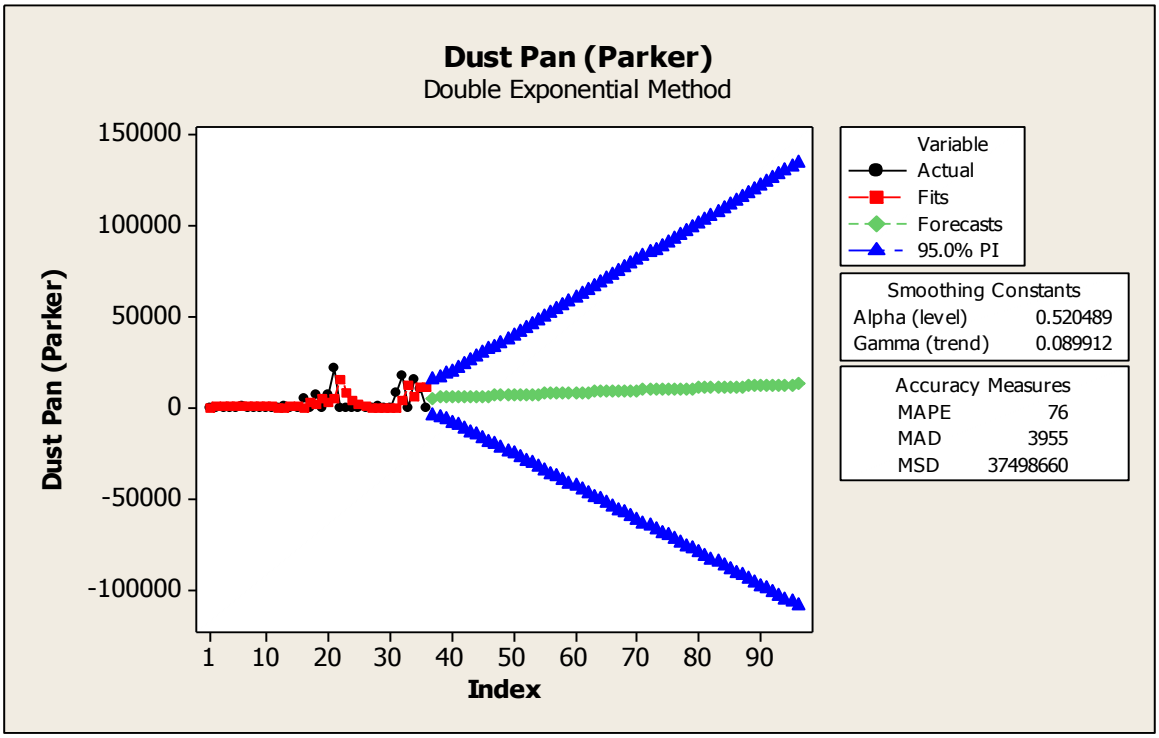

Figure 3: Double Exponential Smoothing Plot for Dust Pan (Parker)

Table 2: Quarterly Production Demand Data

Year	Quarterly	20 litres Paint Bucket	4 litres Paint Bucket	Dust Pan (Parker)
2010	Quarter:1	0	0	0
	Quarter:2	30378	19429	700
	Quarter:3	20112	28982	0
	Quarter:4	51043	59609	0
2011	Quarter:1	25579	86169	1160
	Quarter:2	22960	44094	12945

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	Quarter:3	6095	38515	29855
	Quarter:4	10658	44727	0
2012	Quarter:1	295	58032	0
	Quarter:2	37	23403	1010
	Quarter:3	0	0	26234
	Quarter:4	3875	0	26117

Winters' Method for 20 litres Paint Bucket (Quartly

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Multiplicative Method

Data    20 litres Paint Bucket (Quartly
Length  12

Smoothing Constants
Alpha (level)     0.2
Gamma (trend)     0.2
Delta (seasonal)  0.2
Accuracy Measures
MAPE       12014
MAD        31868
MSD   1404629720

Forecasts

Period  Forecast    Lower   Upper
13       16412.0   -61663   94487
14       20591.4   -58707   99889
15       13135.6   -67526   93797
16       14539.5   -67620   96699
17       18149.2   -65634  101933
18       11513.6   -74013   97040
19       12667.0   -74715  100049
20       15707.0   -73636  105050
21        9891.5   -81510  101293
22       10794.5   -82758  104347
23       13264.8   -82525  109054
24        8269.5   -89836  106375
25        8922.0   -91575  109419
26       10822.6   -92134  113779
27        6647.4   -98833  112128
28        7049.6  -101015  115114
29        8380.4  -102324  119085
30        5025.4  -108371  118421
31        5177.1  -110959  121313
32        5938.2  -112982  124858
33        3403.3  -118343  125149
34        3304.6  -121306  127916
35        3496.0  -124016  131008
36        1781.3  -128666  132229
```


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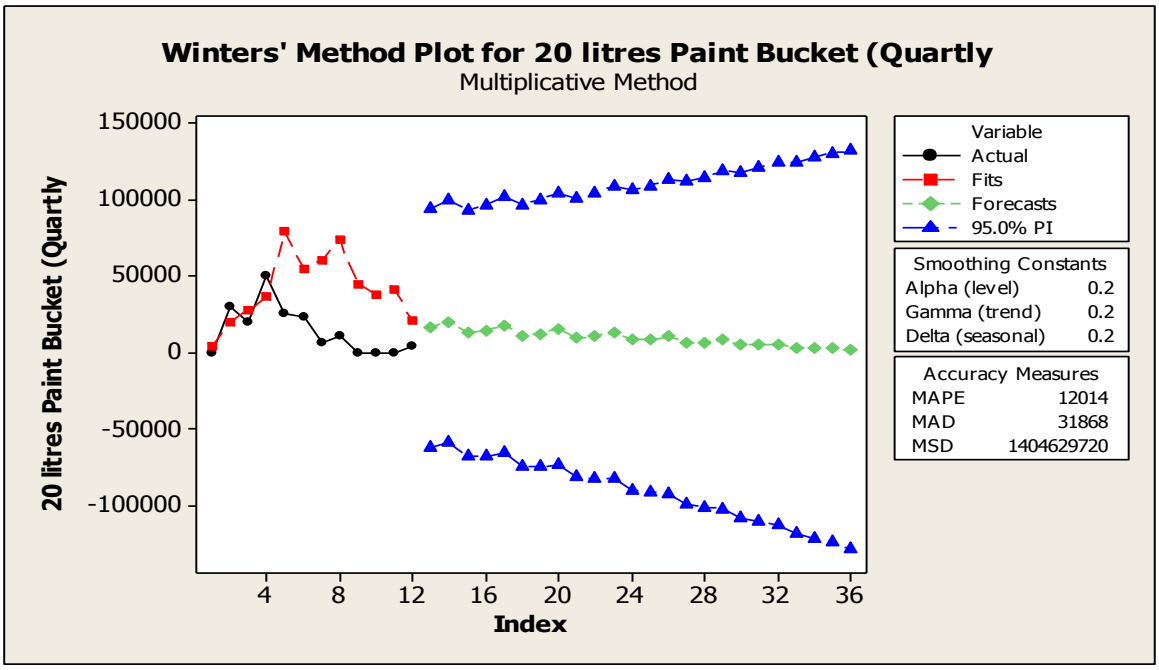

Figure 4: Winters' Method Plot for 20 litres Paint Bucket (Quartly

Winters' Method for 4 litres Paint Bucket(Quartly)

```
Multiplicative Method
Data    4 litres Paint Bucket(Quartly)
Length  12

Smoothing Constants
Alpha (level)     0.2
Gamma (trend)     0.2
Delta (seasonal)  0.2
Accuracy Measures
MAPE           84
MAD         38483
MSD    2504528758

Forecasts
Period  Forecast    Lower   Upper
13       42482.9   -51799  136765
14       54453.6   -41305  150213
15       44728.8   -52677  142135
16       42853.4   -56361  142068
17       54927.2   -46248  156103
18       45116.7   -58164  148397
19       43224.0   -62297  148745
20       55400.7   -52488  163290
21       45504.5   -64871  155880
22       43594.5   -69378  156567
23       55874.3   -59799  171548
24       45892.4   -72579  164363
25       43965.0   -77393  165323
26       56347.8   -67981  180677
27       46280.3   -81097  173657
28       44335.5   -86162  174833
29       56821.4   -76864  190507
30       46668.1   -90267  183603
```


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```
31       44706.1   -95537  184950
32       57294.9   -86311  200901
33       47056.0   -99963  194075
34       45076.6  -105402  195555
35       57768.5   -96213  211750
36       47443.8  -110083  204970
```

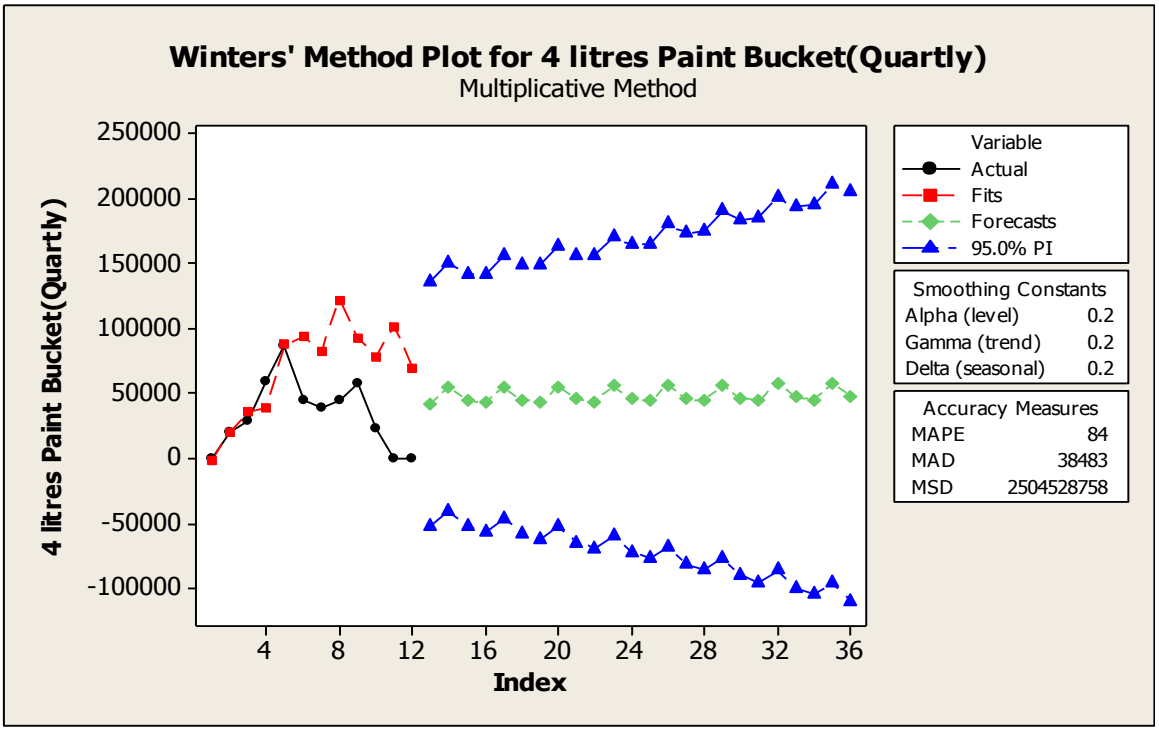

Figure 5: Winters' Method Plot for 4 litres Paint Bucket(Quartly)

Winters' Method for Dust Pan (Parker) (Quartly)

```
Multiplicative Method

Data    Dust Pan (Parker) (Quartly)
Length  12
Smoothing Constants
Alpha (level)     0.2
Gamma (trend)     0.2
Delta (seasonal)  0.2
Accuracy Measures
MAPE        215
MAD       10279
MSD   210732234

Forecasts
Period  Forecast     Lower   Upper
13       12494.6  -12688.9   37678
14       28468.0    2890.0   54046
15       25419.6    -598.4   51438
16       15606.6  -10894.3   42108
17       35015.0    7990.1   62040
18       30849.2    3262.1   58436
19       18718.7   -9467.0   46904
```


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20	41561.9	12743.9	70380
21	36278.9	6796.7	65761
22	21830.7	-8345.3	52007
23	48108.9	17211.4	79006
24	41708.5	10063.9	73353
25	24942.7	-7473.1	57358
26	54655.8	21446.5	87865
27	47138.2	13114.7	81162
28	28054.7	-6802.3	62912
29	61202.7	25494.3	96911
30	52567.8	15991.3	89144
31	31166.7	-6293.5	68627
32	67749.7	29391.3	106108
33	57997.5	18727.6	97267
34	34278.8	-5915.3	74473
35	74296.6	33166.8	115427
36	63427.2	21350.5	105504

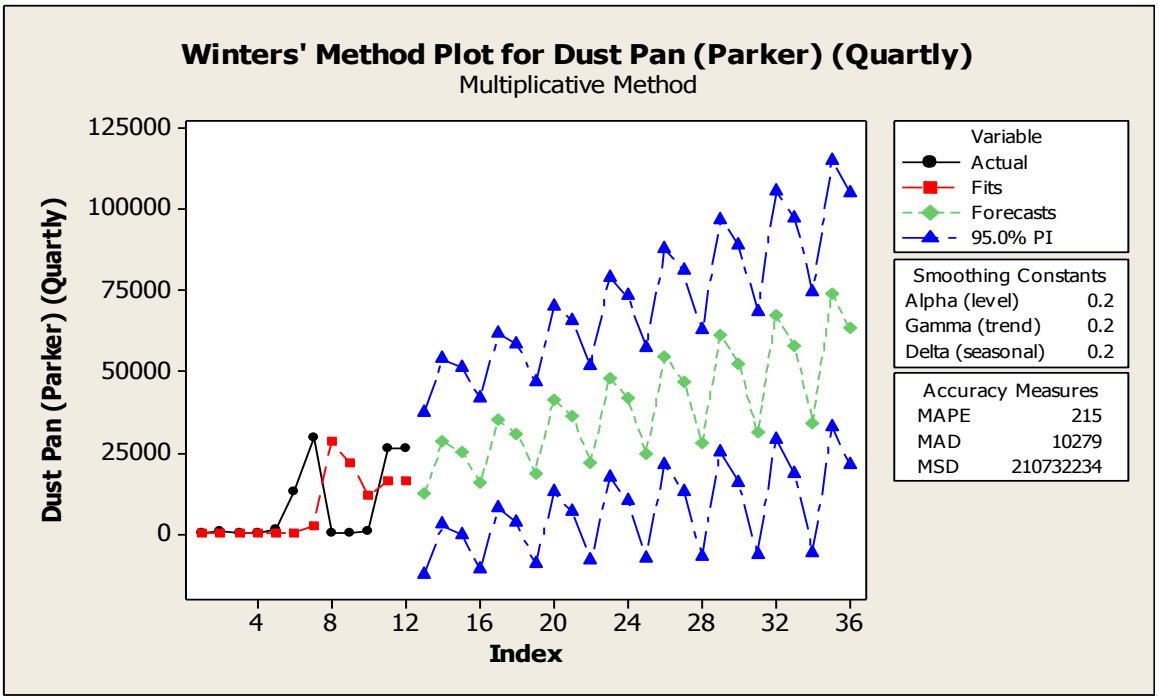

Figure 6: Winters' Method Plot for Dust Pan (Parker) (Quartly)

Discussion of Results: The discussion was based on the analysis and the results developed. The data were analyzed with a statistical tool called Mintab and forecasting tools namely; Double Exponential Smoothing and Winters' methods of forecasting. From the analysis, the researcher observed that the 20 litres Paint Bucket and Dust Pan (parker) forecasts were increasing over the months while the 4 litres Paint Bucket forecast was decreasing. For the quarterly forecasts, the Winters' forecasting method was used to forecast their production demand. Furthermore, the model shows that the Dust Pan (parker) production demand increases quarterly as was shown in figure 6 above. However, the 4 litres Paint Bucket result shows that the forecasted production

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demand were almost suitable while the 20 litres Paint Bucket were decreasing. This results show that there is a need to always analyze their production yield in other to understand the current status or problems of the production activities facing the company.

Conclusion: The result analysis and the discussion of the results have made us to understand the current status and problems of the company. This shows that the company has to make some serious decisions either to stop the production of the products that were going to decrease in the future or to reorganize their activities in other to compete better in the competitive market or improve in the quality of their products during production planning.

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