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Walker & Sons Plumbing Forecast Year 4

**Executive Summary:**

J.P. Walker & Sons Plumbing has a seasonal pattern and linear pattern in annual sales. Multiple models were tested until the optimal one was found. To find the optimal prediction model, mean square error was used. Mean square error is a common forecasting method used in supply chain. The model with the lowest MSE (Mean square error) is the best choice. Though there is a remarkable up and down pattern to our sales over a 12 month period, an upward trend slowly occurs over time. It is reasonable to believe that Walker & Sons can use this monthly data to reduce costs by maintaining proper monthly inventory levels. Considering the volatility in sales over 12 months in a reoccurring pattern, proper future inventory levels should significantly reduce costs. The prediction equation which can be used for next year and some charts are given in the appendix of this report.

**Appendix**

**Sales Predictive equation:**

(please note that month continues past 12; month 13 is the first month of year 2)

**Sales =**

**199+1\*month+49\*Q1+29\*Q2+33\*Q3-23\*Q4-21\*Q5-68\*Q6-62\*Q7-57\*Q8-101\*Q9-86\*Q10-59\*Q11**

**Note the similarity in the actual graph above and the graph below used from the sales prediction equation.**

**MSE with no time variable: 116.13 MSE with time variable: 11.28**

**A Brief Example of Sales Growth Year over Year:**

|  |  |
| --- | --- |
| Year 1 Month 1 | 240 |
| Year 2 Month 1 | 263 9.5% gain |
| Year 3 Month 1 | 282 7.2% gain |

Predicted Month 1 for year 4 is 287 (1.8% predicted gain)

**Correct Regression plot used for predictive equation:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Observations | 36 |  |  |  |
|  |  |  |  |  |
| ANOVA |  |  |  |  |
|  | *df* | *SS* | *MS* | *F* |
| Regression | 12 | 76882.5 | 6406.875 | 306.6766 |
| Residual | 23 | 480.5 | 20.8913 |  |
| Total | 35 | 77363 |  |  |
|  |  |  |  |  |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* |
| Intercept | 198.8333333 | 3.231973418 | 61.52072 | 5.01E-27 |
| Time | 1.034722222 | 0.077749197 | 13.30846 | 2.73E-12 |
| Q1 | 49.38194444 | 3.828703917 | 12.89782 | 5.17E-12 |
| Q2 | 28.68055556 | 3.812089977 | 7.523578 | 1.21E-07 |
| Q3 | 33.3125 | 3.796995678 | 8.773384 | 8.5E-09 |
| Q4 | -23.38888889 | 3.783439208 | -6.18191 | 2.63E-06 |
| Q5 | -20.75694444 | 3.77143715 | -5.50372 | 1.35E-05 |
| Q6 | -67.79166667 | 3.761004385 | -18.0249 | 4.6E-15 |
| Q7 | -62.49305556 | 3.752154004 | -16.6552 | 2.5E-14 |
| Q8 | -57.19444444 | 3.744897226 | -15.2726 | 1.57E-13 |
| Q9 | -101.2291667 | 3.739243329 | -27.0721 | 6.03E-19 |
| Q10 | -85.59722222 | 3.735199591 | -22.9164 | 2.44E-17 |
| Q11 | -58.63194444 | 3.732771245 | -15.7074 | 8.68E-14 |