

Time Series Analysis for IT Hardware Inventory Forecasts

Chance Robinson

10/26/2021

Contents

1	Dell Optiplex	2
1.1	Original Data	2
1.2	Filtered Data	8
1.3	Model Performance	12
1.4	Forecast	13

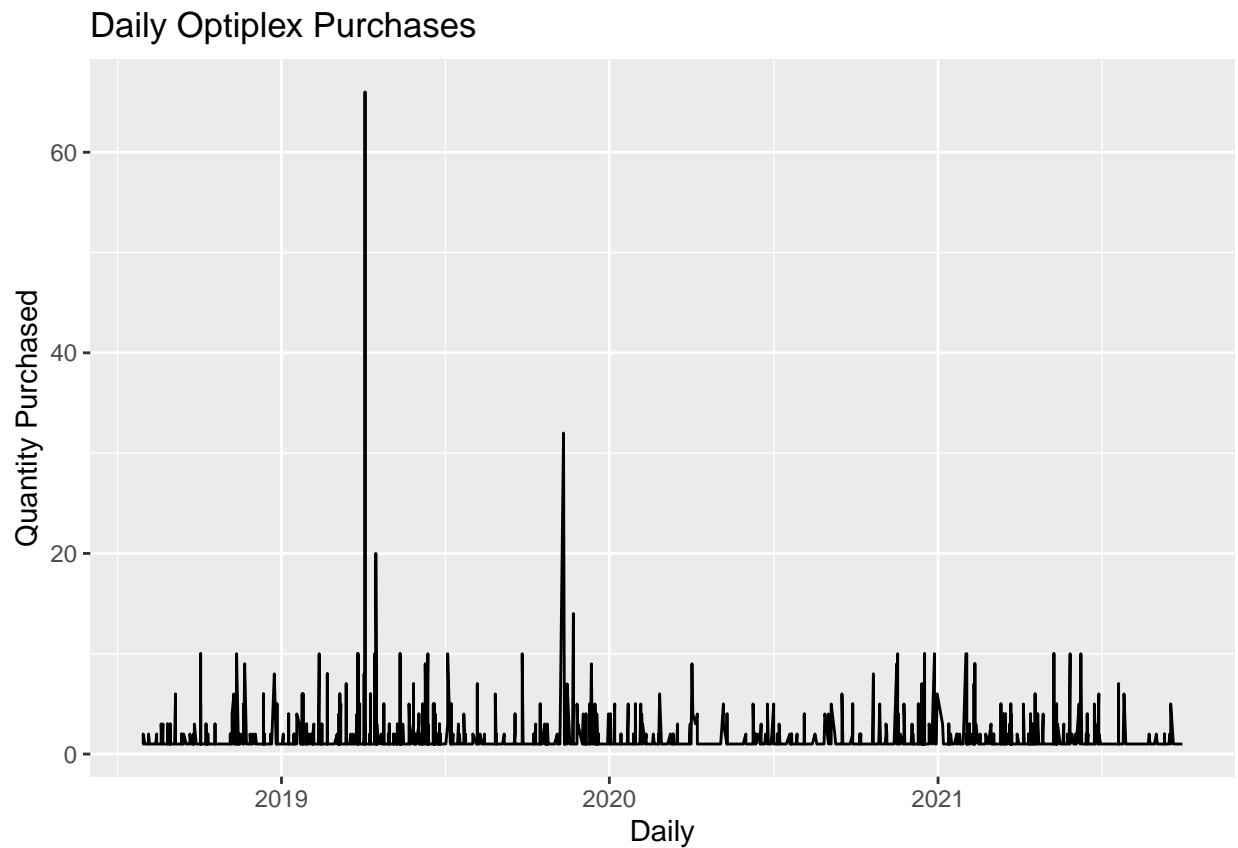
1 Dell Optiplex

1.1 Original Data

Includes only requests created after July, 28th 2018 and before October 21st, 2021 that are in a state of Work in Progress, Pending Verification or Closed Complete. This is due to the fact that a high percentage of orders are cancelled before being fully approved in PeopleSoft, which should not necessarily be included for inventory estimation purposes.

1.1.1 Daily

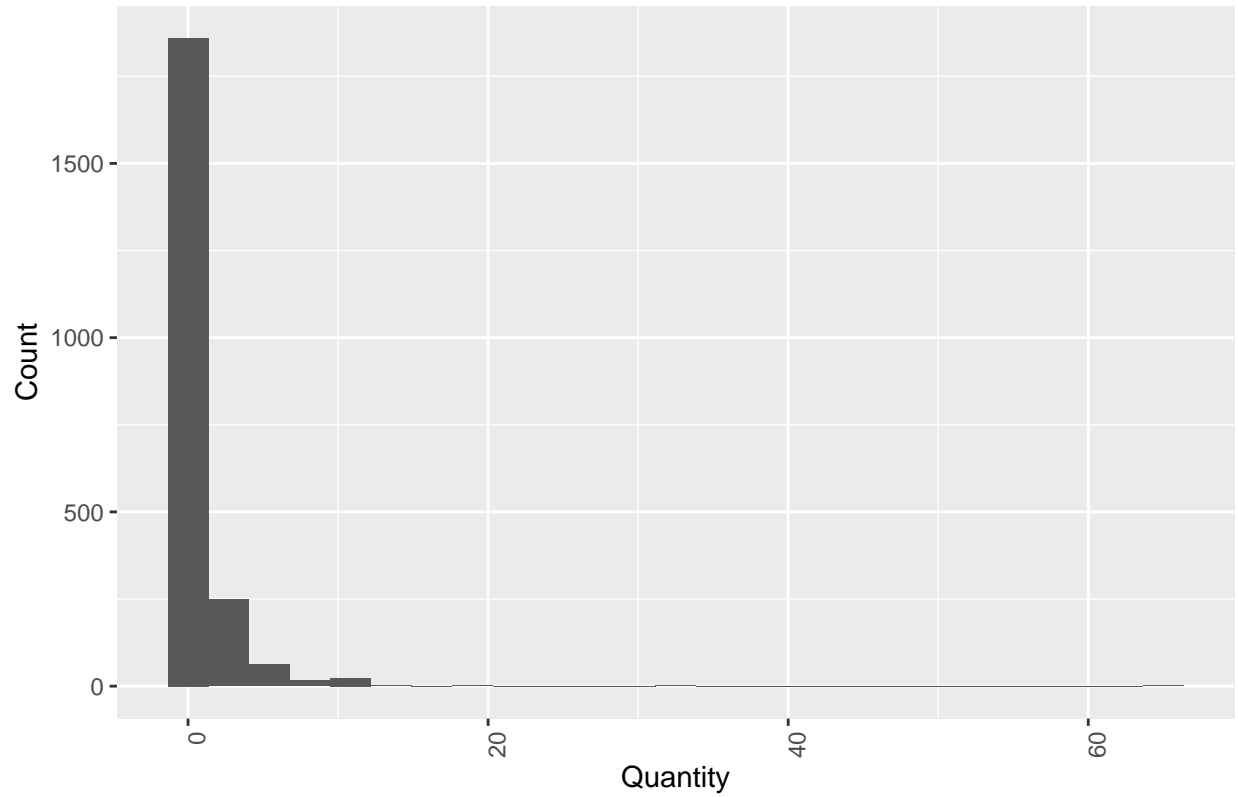
The average amount of products requested for the period was **1.52**.



1.1.1.1 Histogram of Counts by Quantity

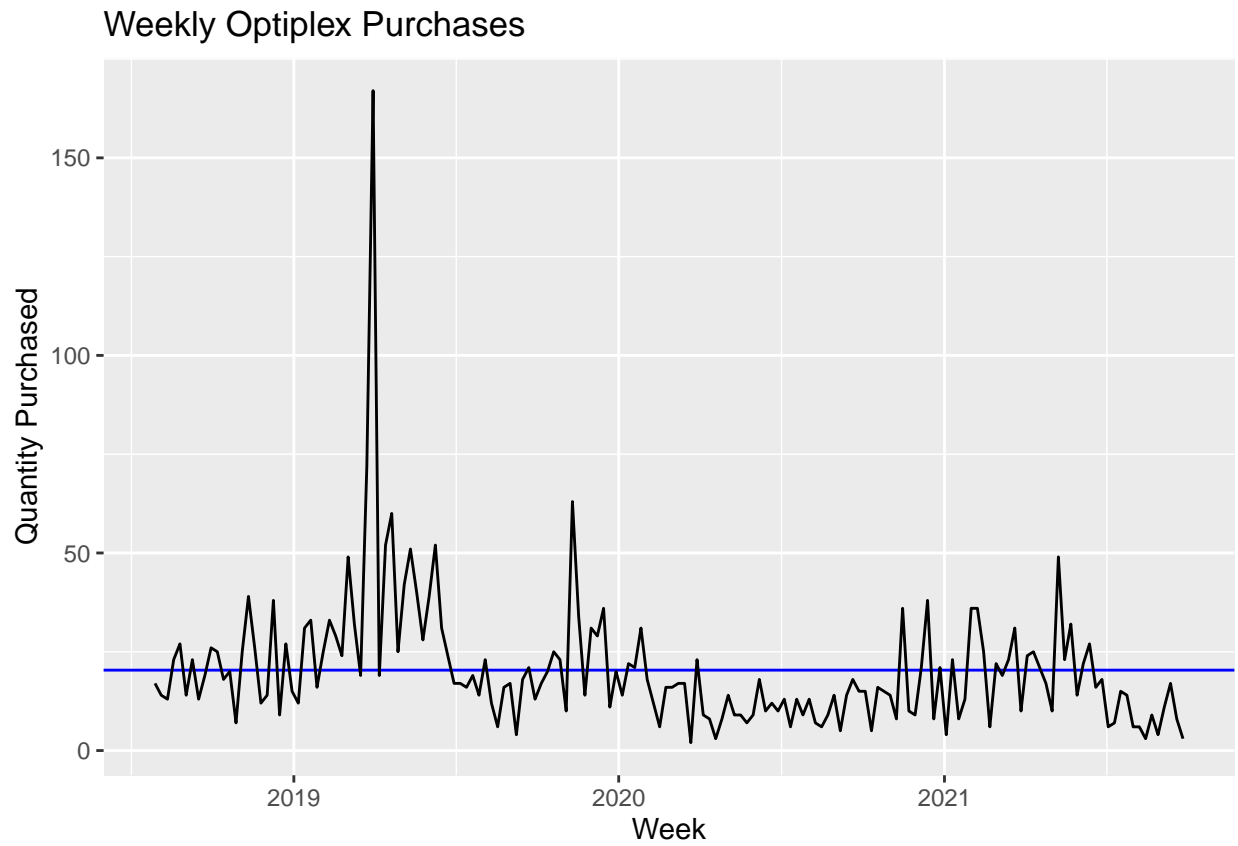
- There are a few purchases where a single order had more than 5 items (i.e..the quantity)
- We will assume that these would normally go through the normal PeopleSoft purchasing lifecycle.

Histogram of Optiplex Purchases by Quantity



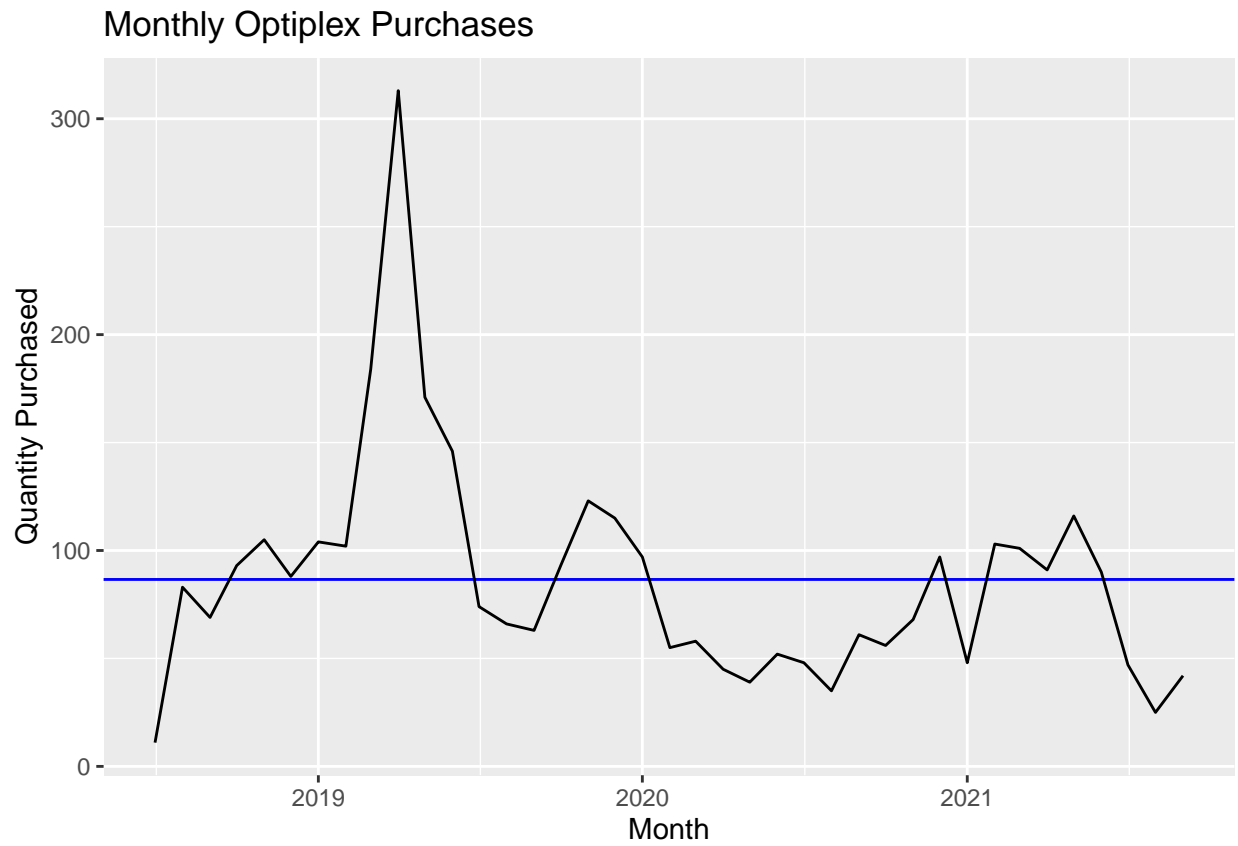
1.1.2 Weekly

The average amount of products requested for the period was **20.34**.



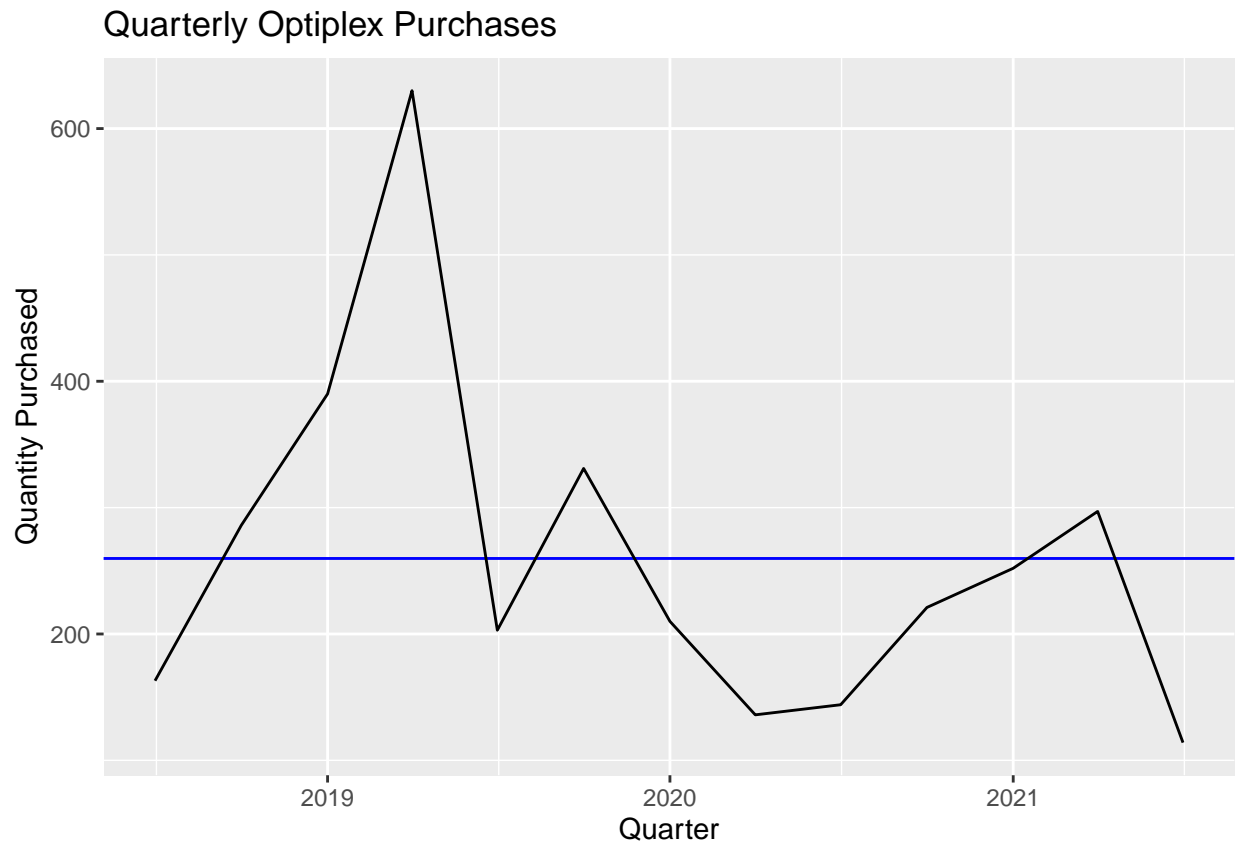
1.1.3 Monthly

The average amount of products requested for the period was **86.59**.



1.1.4 Quarterly

The average amount of products requested for the period was **259.77**.



1.1.5 Quarterly Pivot Table

Note that the first and last quarters are incomplete and do not represent full quarters.

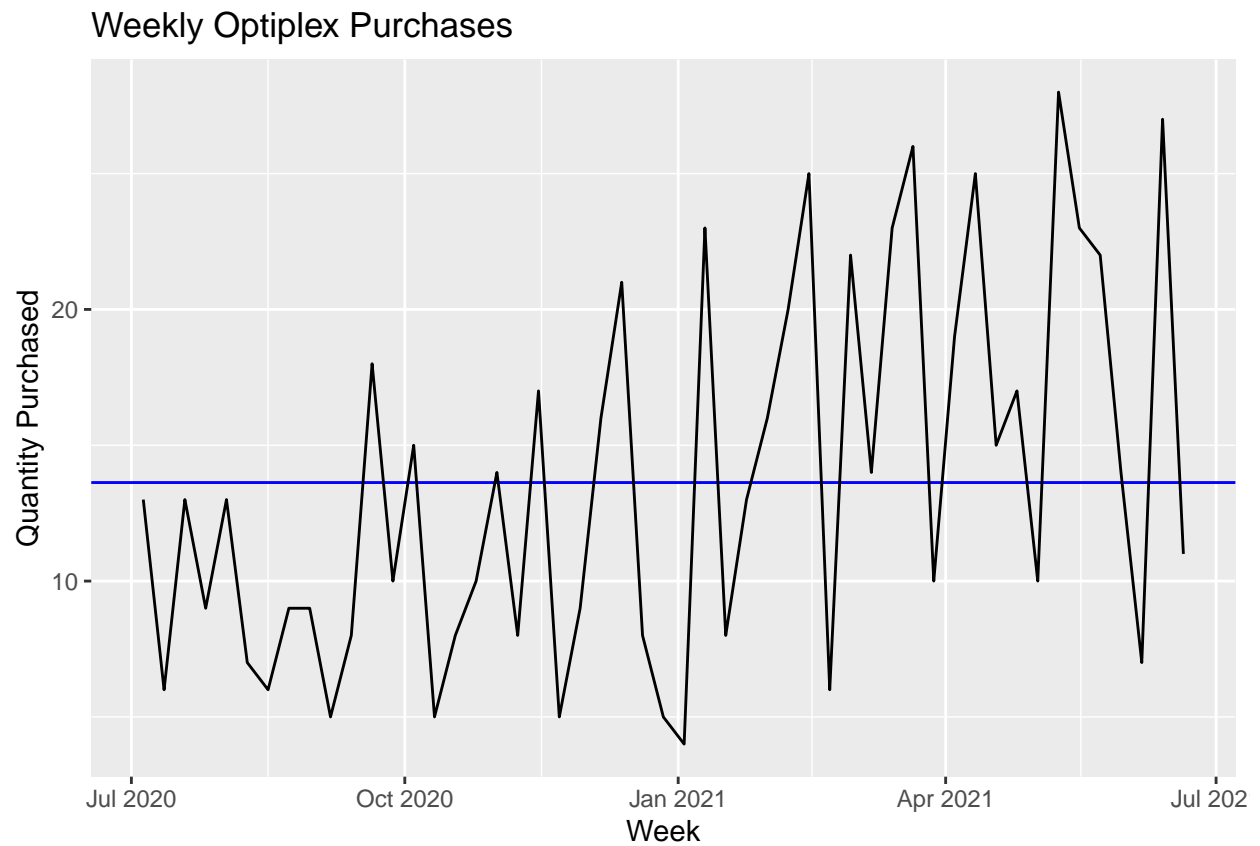
quarter	summary_variable
2018-07-01	163
2018-10-01	286
2019-01-01	390
2019-04-01	630
2019-07-01	203
2019-10-01	331
2020-01-01	210
2020-04-01	136
2020-07-01	144
2020-10-01	221
2021-01-01	252
2021-04-01	297
2021-07-01	114

1.2 Filtered Data

- Excluding requested items that had a quantity of less than five.
- Only looking at records created at or after July 5th, 2021 and before June 27, 2021 as the recent trend behaviour seems to behave differently to that of prior years.
- Also, there is a higher percentage of items yet to be processed in PeopleSoft which would skew our numbers if the more recent purchases were to be included.

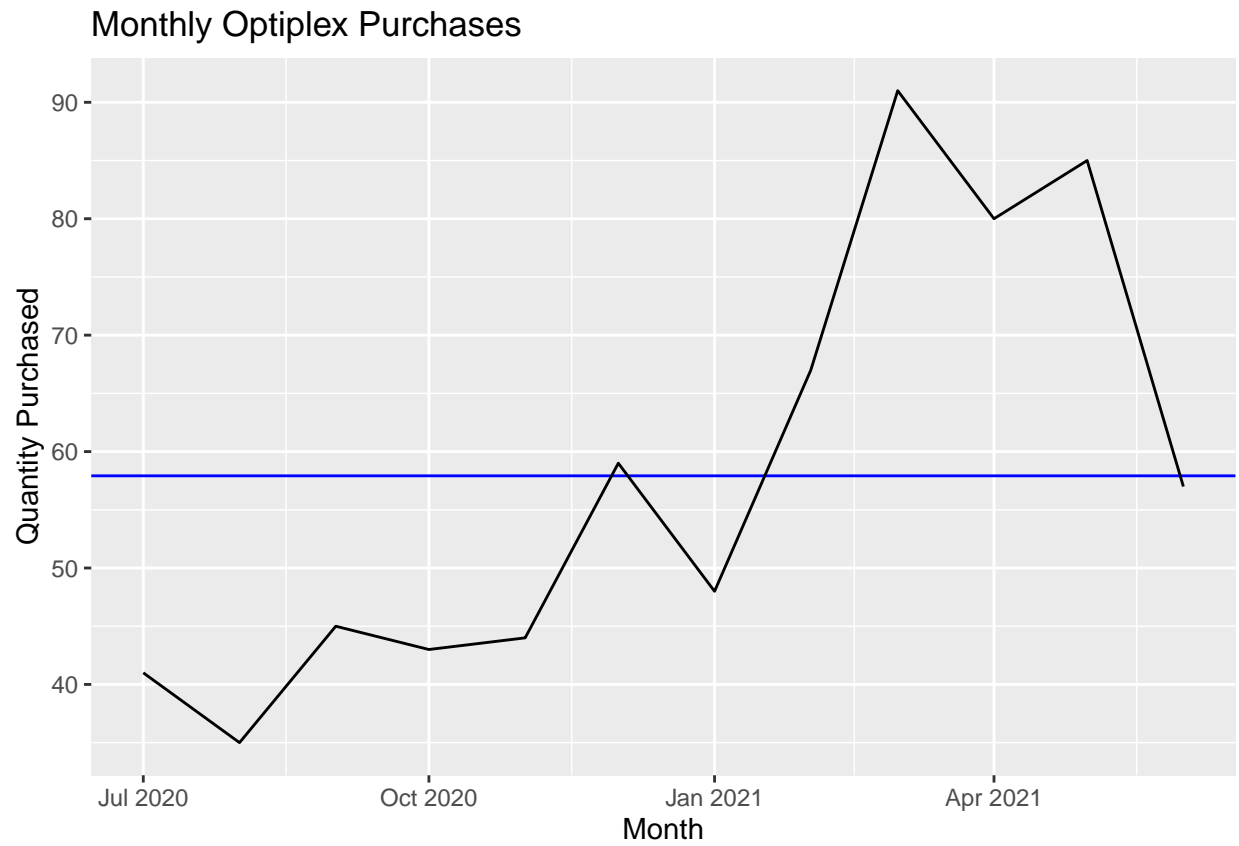
1.2.1 Weekly

The average amount of products requested for the period was **13.63**.



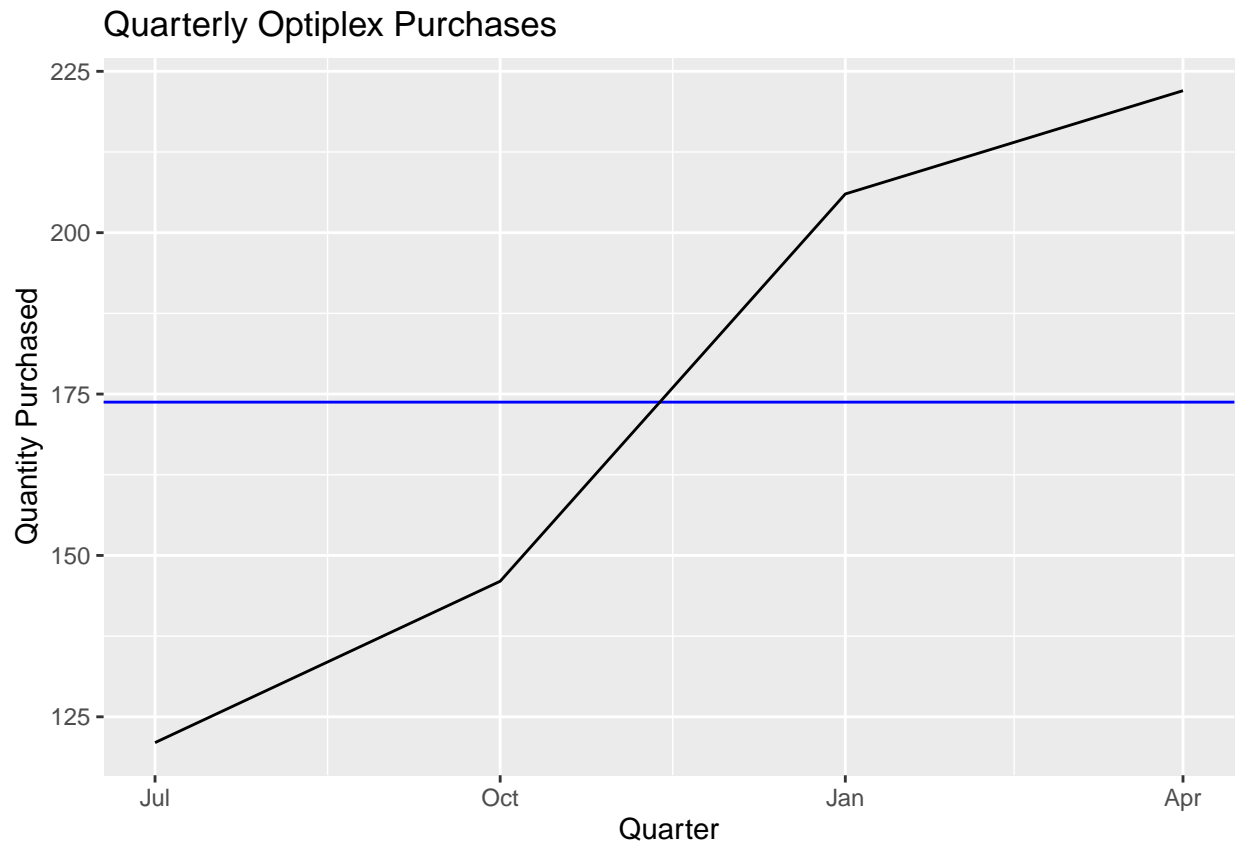
1.2.2 Monthly

The average amount of products requested for the period was **57.92**.



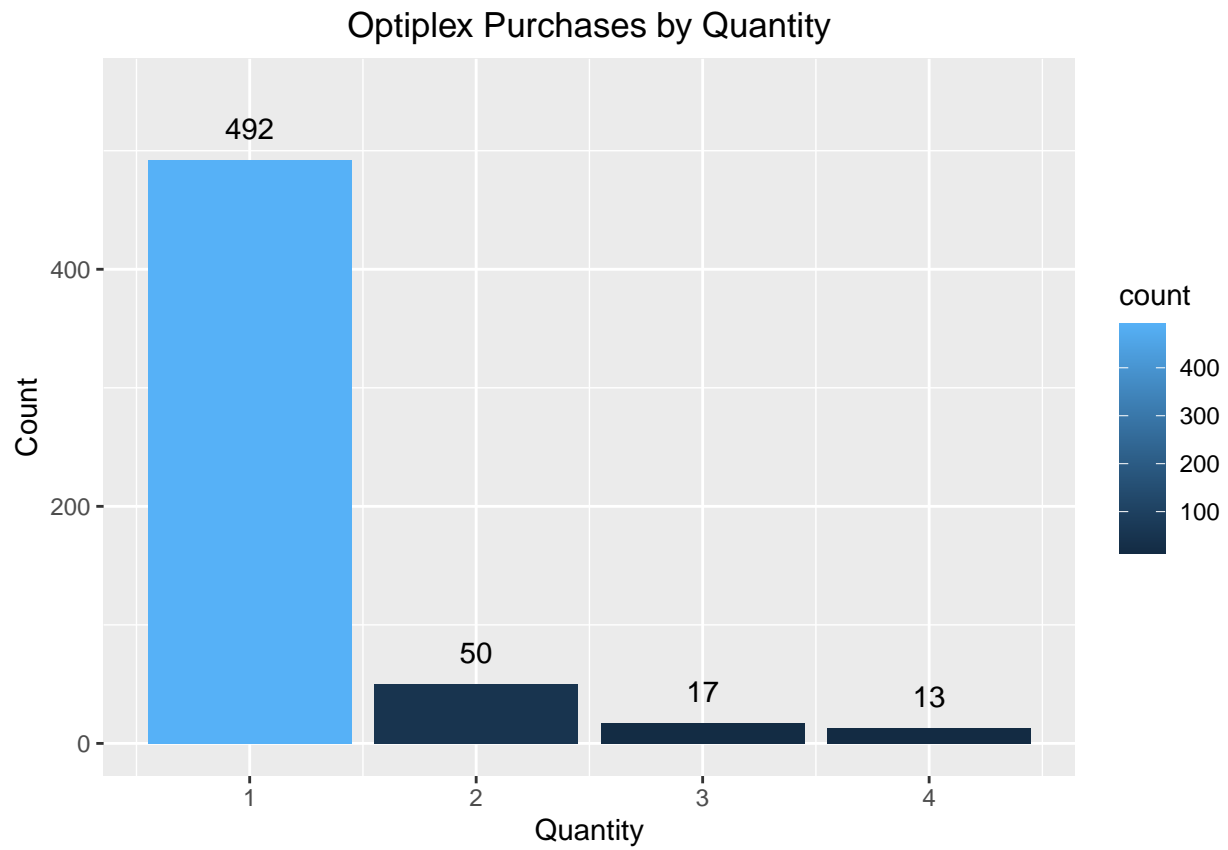
1.2.3 Quarterly

The average amount of products requested for the period was **173.75**.



1.2.3.1 Bar Chart by Quantity Purchased

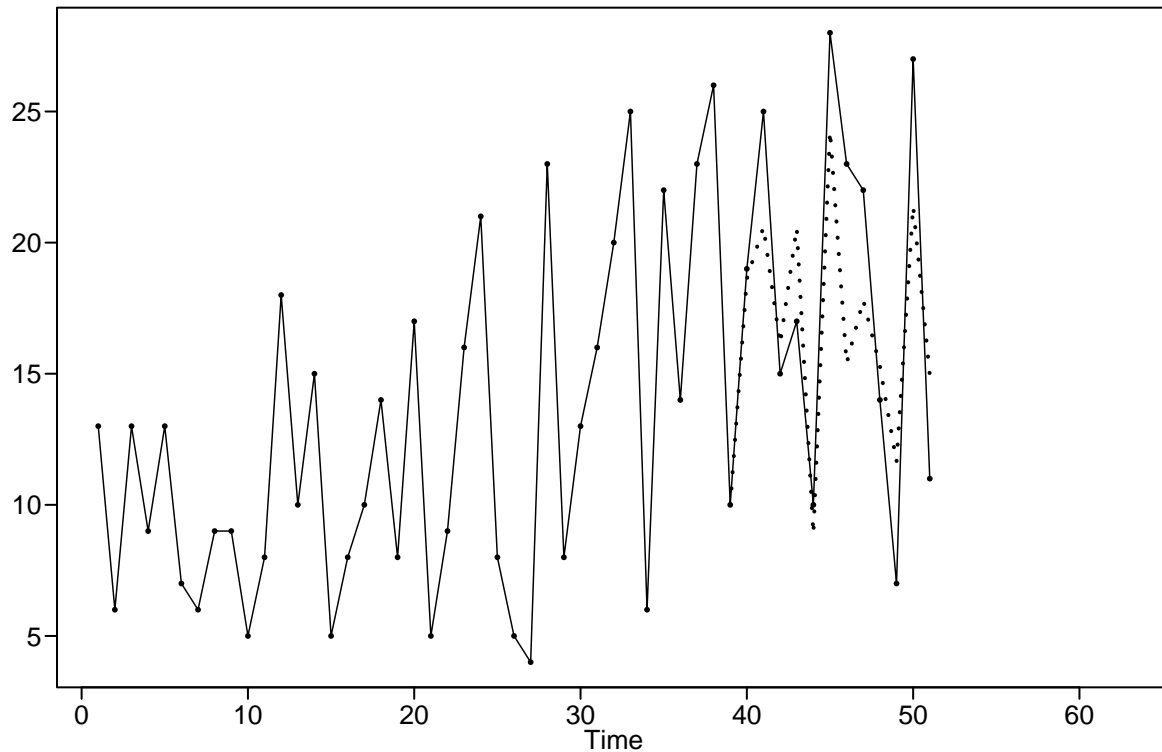
- Note that all purchases with quantities exceeding 4 have been filtered.



1.3 Model Performance

The chart below represents predictions made on observations that we already had actual counts for. This will allow us to gauge performance for future predictions.

1.3.1 Predictions Plot



1.3.2 Predictions ASE

Average Squared Error

We were able to achieve an ASE of **16.2**. In this case, we overestimated the quarterly counts by about **16** items.

1.4 Forecast

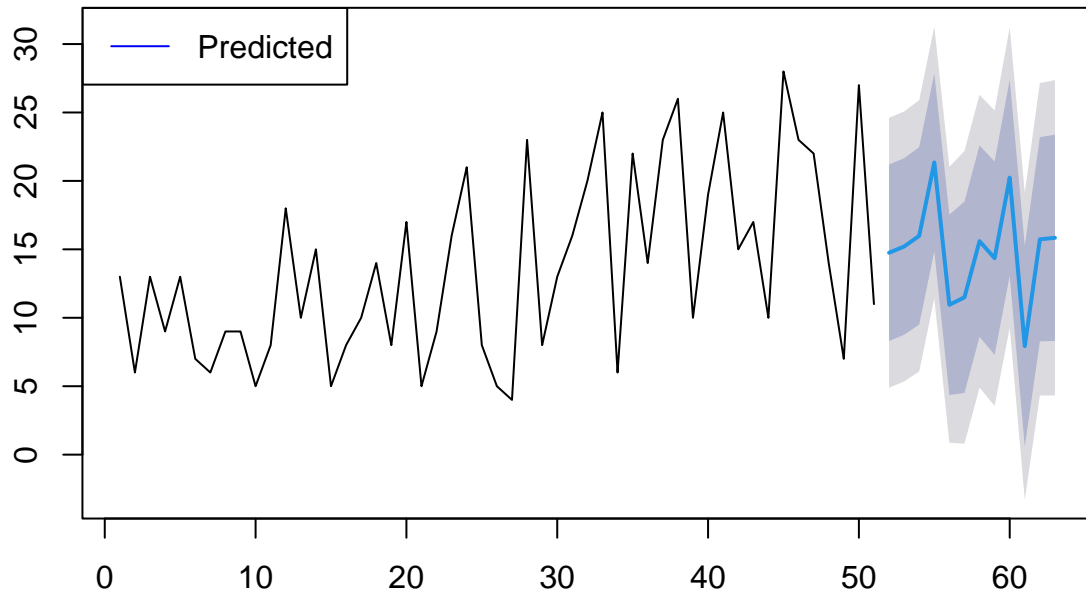
1.4.1 Actual Counts vs. Predicted

This table shows a comparison of the model's predictions vs. those of the known weekly counts from the prior 12 periods.

week	actual	predictions	diff	abs.diff
2021-04-04	19	19	0	0
2021-04-11	25	21	4	4
2021-04-18	15	16	-1	1
2021-04-25	17	21	-4	4
2021-05-02	10	9	1	1
2021-05-09	28	24	4	4
2021-05-16	23	15	8	8
2021-05-23	22	18	4	4
2021-05-30	14	15	-1	1
2021-06-06	7	12	-5	5
2021-06-13	27	21	6	6
2021-06-20	11	15	-4	4

1.4.2 Future Predictions Plot

Forecasts from ARIMA(13,0,1) with non-zero mean



1.4.3 Future Prediction Estimates Table

	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
52	14.751895	8.303460	21.20033	4.8898649	24.61392
53	15.207313	8.757696	21.65693	5.3434751	25.07115
54	15.989360	9.507807	22.47091	6.0766802	25.90204
55	21.348968	14.864806	27.83313	11.4322982	31.26564
56	10.945939	4.357118	17.53476	0.8692066	21.02267
57	11.495610	4.503717	18.48750	0.8024327	22.18879
58	15.596899	8.601940	22.59186	4.8990318	26.29477
59	14.353810	7.296653	21.41097	3.5608194	25.14680
60	20.241000	13.072304	27.40970	9.2774250	31.20458
61	7.925772	0.594501	15.25704	-3.2864394	19.13798
62	15.734378	8.272010	23.19675	4.3216707	27.14709
63	15.843394	8.311167	23.37562	4.3238462	27.36294