Finance Analytics
Cisco case study

Submitted by-

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Business Understanding

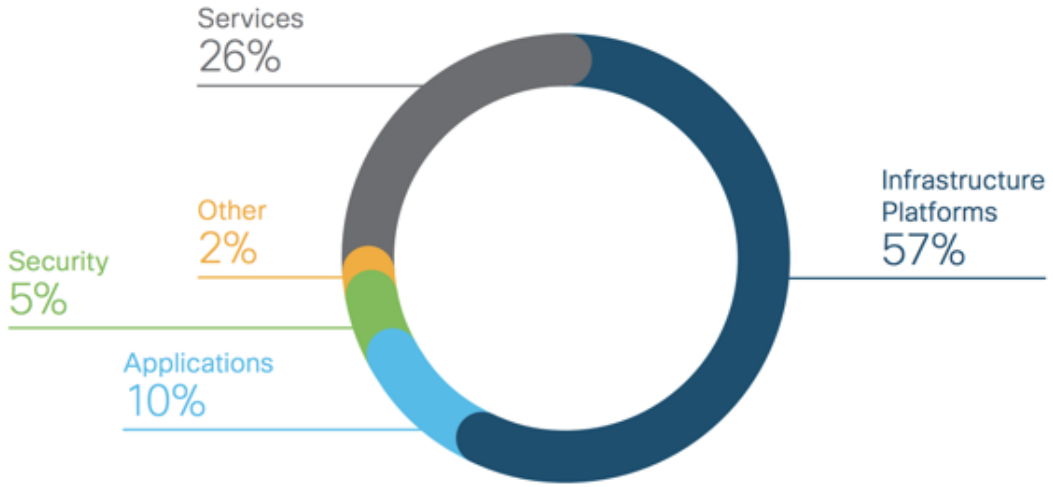
About Cisco

Cisco designs and sells broad lines of products, provides services and delivers integrated solutions to develop and connect networks around the world.

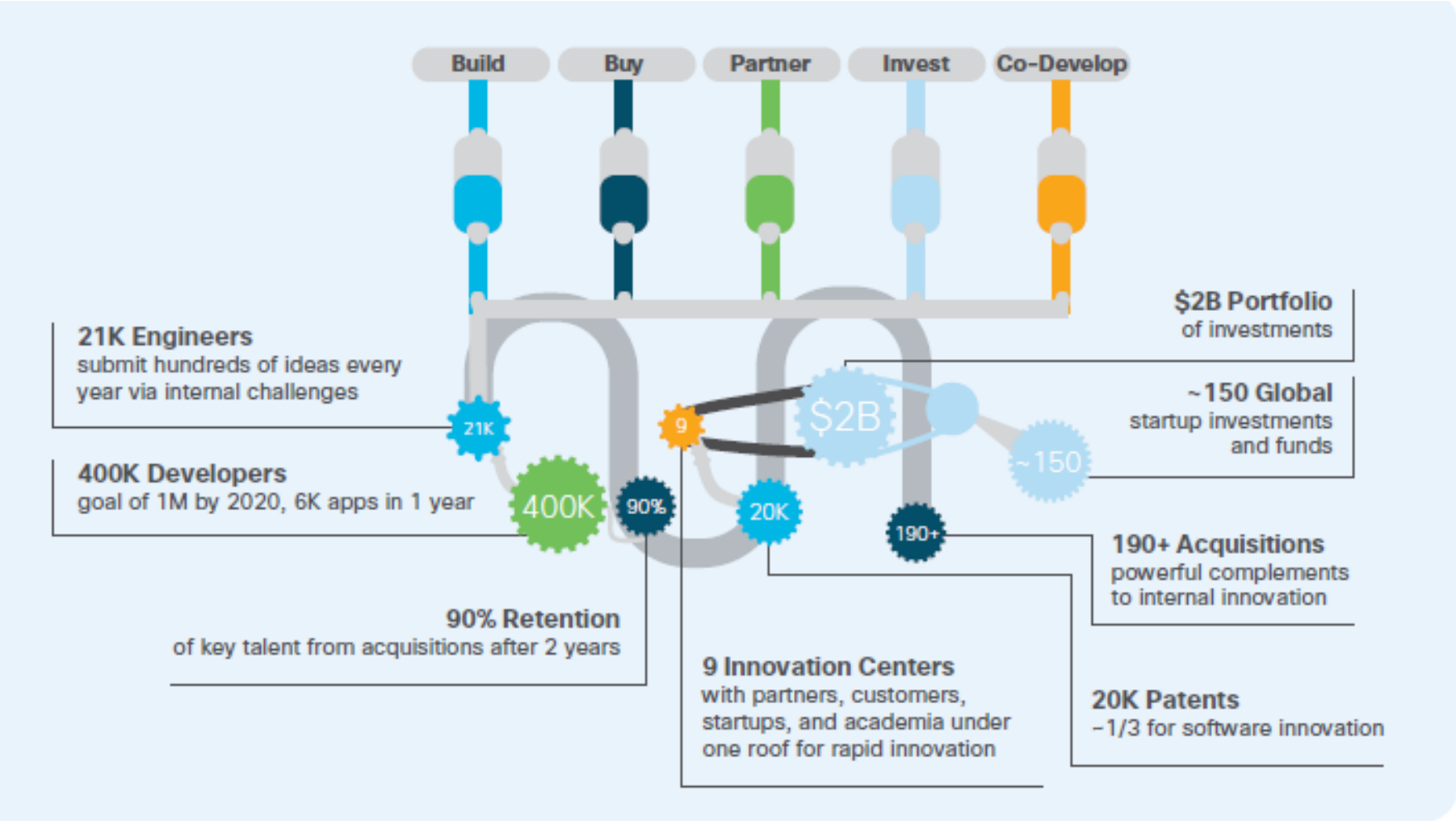
Why Cisco?

Cisco brings integrated solutions that span network, data center, cloud, security, collaboration, analytics and IoT for faster business transformation with reduced risk.

Revenue by product category and services



Cisco's Innovation engine



Case understanding

- To have the business understanding of Cisco Systems Inc. and to understand wither to , Adam Stark decided to invest in analysing in Cisco's cash flow.

- With the fluctuations in the company's cost structure Adam Starks' Analytics team decides to do Time Series – Linear trend to capture the cash flow for the future data, however depending on the forecast error Stark has plotted the historic sales revenue to see any emerging trends (which we will see the forthcoming slides).

- Looking as the spikes & fluctuations Stark was unsure if it was wise to invest in Cisco Systems Inc. as the reported cash flow may not repeat in the future. Hence decided to take Six years data from Cisco's website and contemplate the future performance.

Let's take the coffee in hand and let our questions get answered in the forthcoming slides

Data Understanding

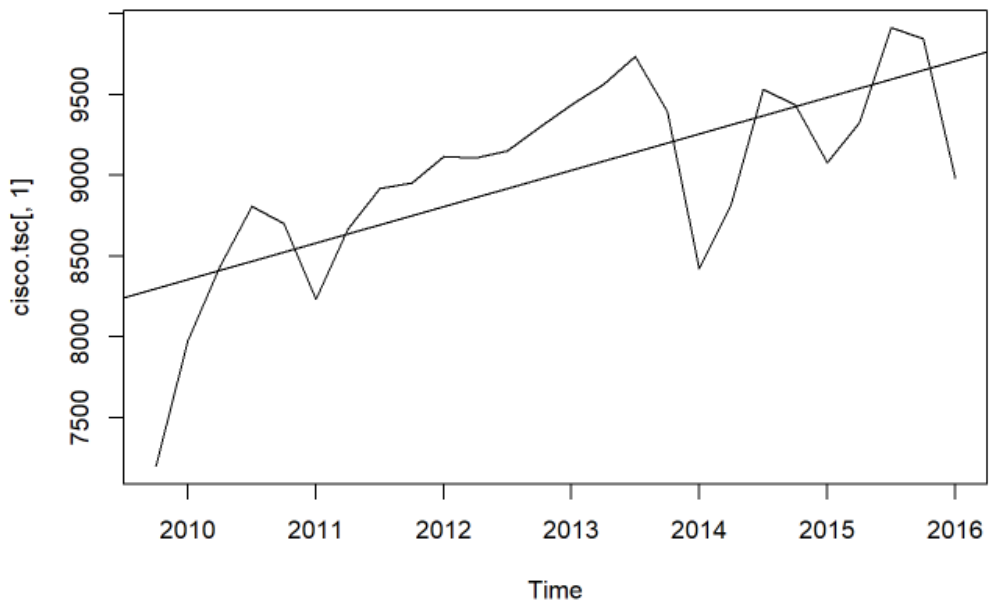
- Data consists of statement of operations from the year 2009 to Q2 of FY2015-16. A total of 26 quarters.
- It consists of 22 variables

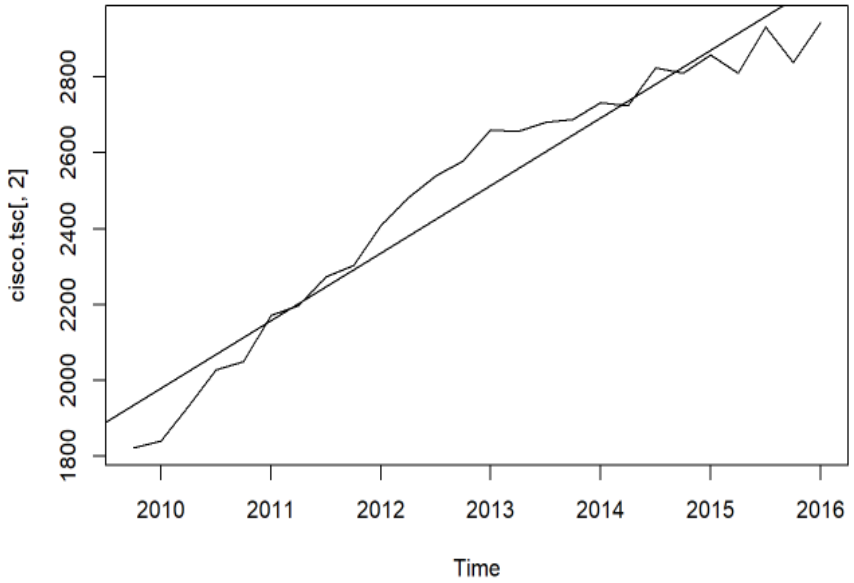
NET SALES:		
Product	(+)	Revenues earned by a company for selling its products
Service	(+)	Revenues earned by a company for rendering its services
Total net sales	(+)	Sum of revenues earned from product and service sales
COST OF SALES:		Also known as COST OF GOODS SOLD
Product	(+)	Direct costs attributable to the production of the goods sold by a company
Service	(+)	Direct costs attributable to delivering services sold by a company
Total cost of sales	(+)	Sum of costs from product and service sold by a company
GROSS MARGIN		A company's total sales revenue minus its cost of sales
OPERATING EXPENSES:		Expenditure as a result of performing normal business operations
Research and development	(+)	Costs associated with the research and development activities of a company
Sales and marketing	(+)	Costs associated with the sales and marketing activities of a company
General and administrative	(+)	Expenditures related to the day-to-day operations of a company include rent, utilities, insurance, and managerial salaries
Amortization of purchased intangible assets	(+)	Amortization of intangibles is a tax term relating to the practice of deducting the cost of an investment in a qualifying non-tangible asset over the projected life of the asset
Restructuring and other charges	(+)	A restructuring charge is a one-time cost that must be paid by a company when it reorganizes
Total operating expenses	(+)	Sum of all operating expenses
OPERATING INCOME		Operating income is the amount of profit realized from a business's operations after accounting for operating expenses
Interest income	(+)	Revenues generated from a company's assets
Interest expense		Interest payable on any type of borrowings—bonds, loans, convertible debt, or lines of credit
Other income, net		A company's income made outside of its core operations
Interest and other income, net		Sum of interest income, interest expense, and other income
INCOME BEFORE PROVISION FOR INCOME TAXES		An indicator of a company's profitability, calculated as revenue minus expenses, excluding tax
Provision for income taxes		A company's total income tax liability
NET INCOME		Net income is calculated by taking revenues and adjusting for the cost of doing business, depreciation, interest, taxes, and other expenses

Note: The (+) sign in front of the item indicates that the value is non-negative.

Revenue

Product sales data shows uptrend and also have seasonality in recent years.

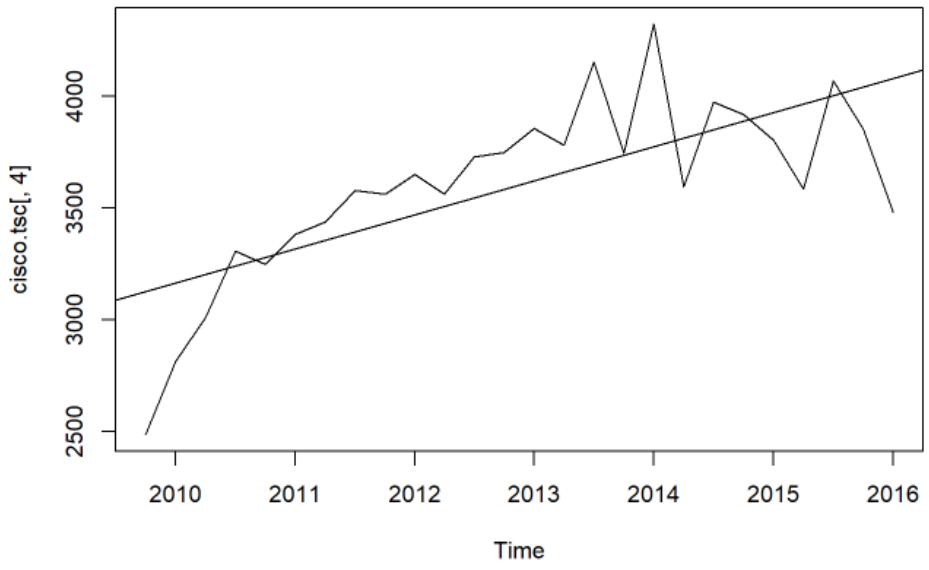


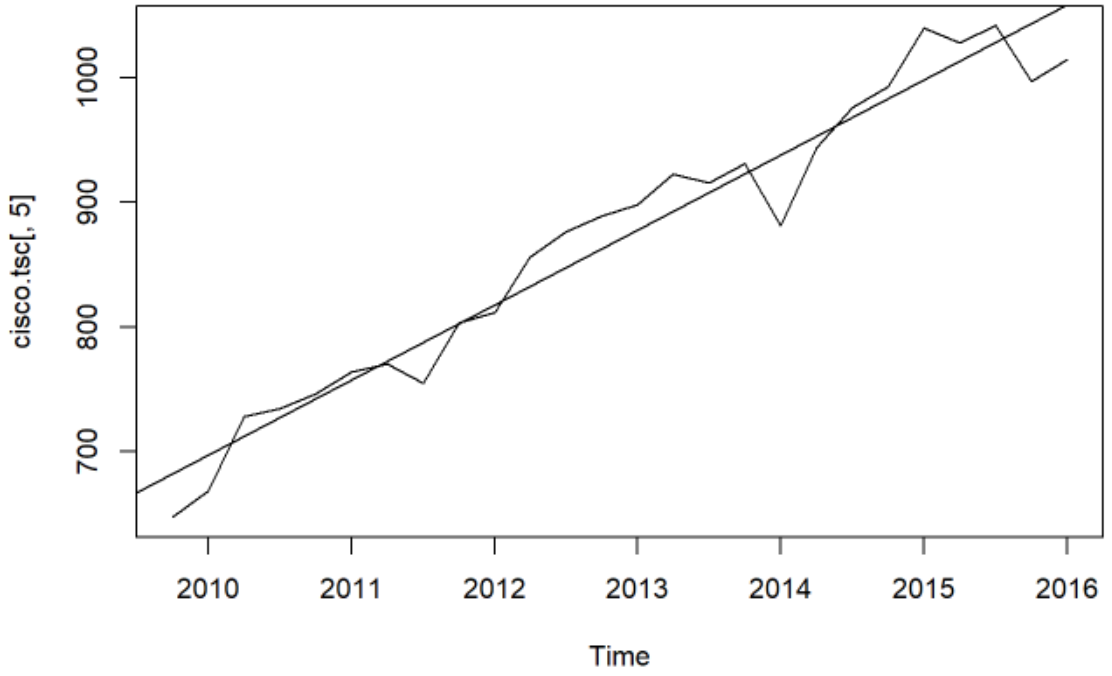


Service sales data shows uptrend but there is little seasonality in recent years.

Cost of sales

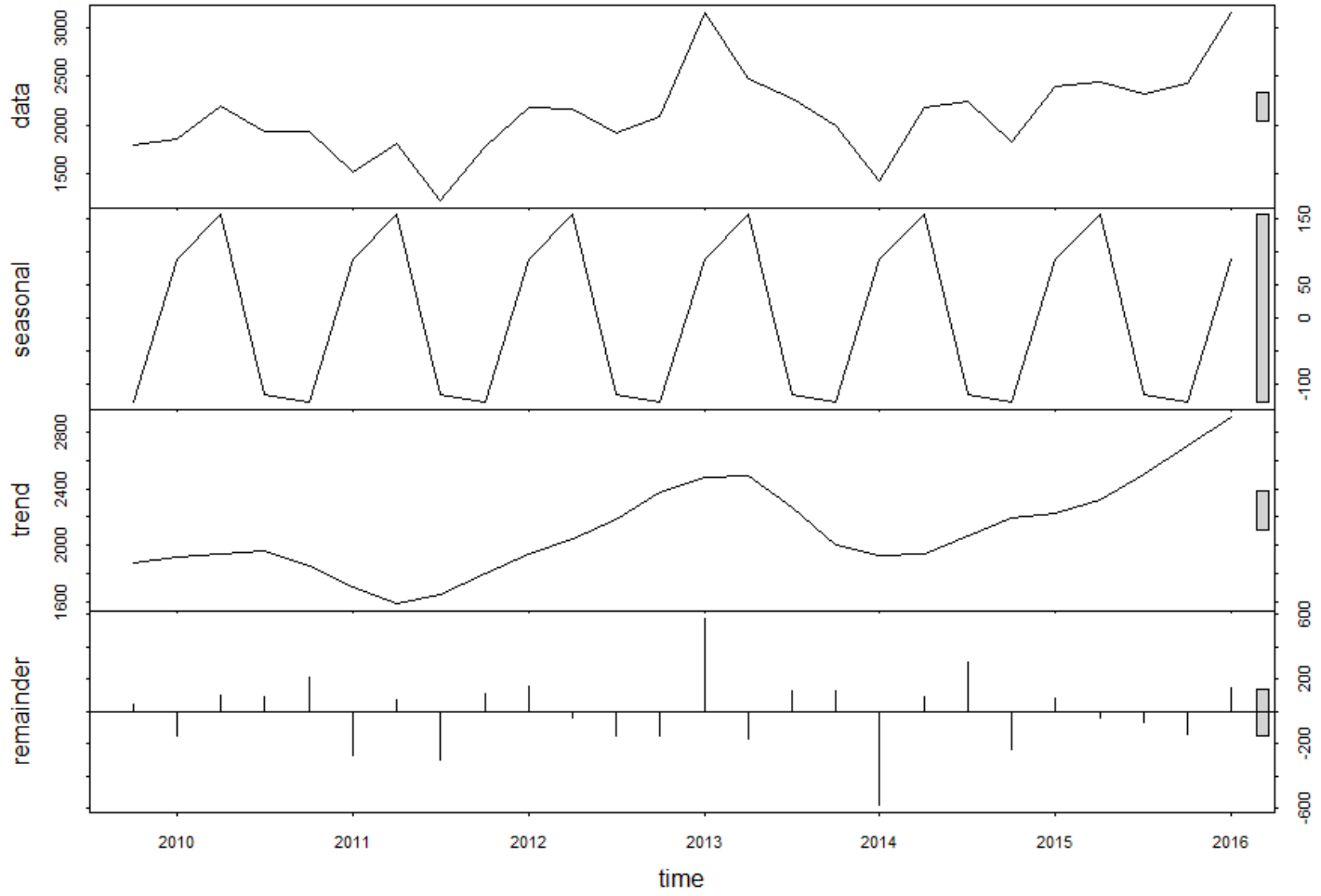
Sales Cost data shows uptrend but there is more seasonality in recent years.





Service cost data shows uptrend but there is more seasonality in recent years.

Net Income - decomposed



Data Preparation

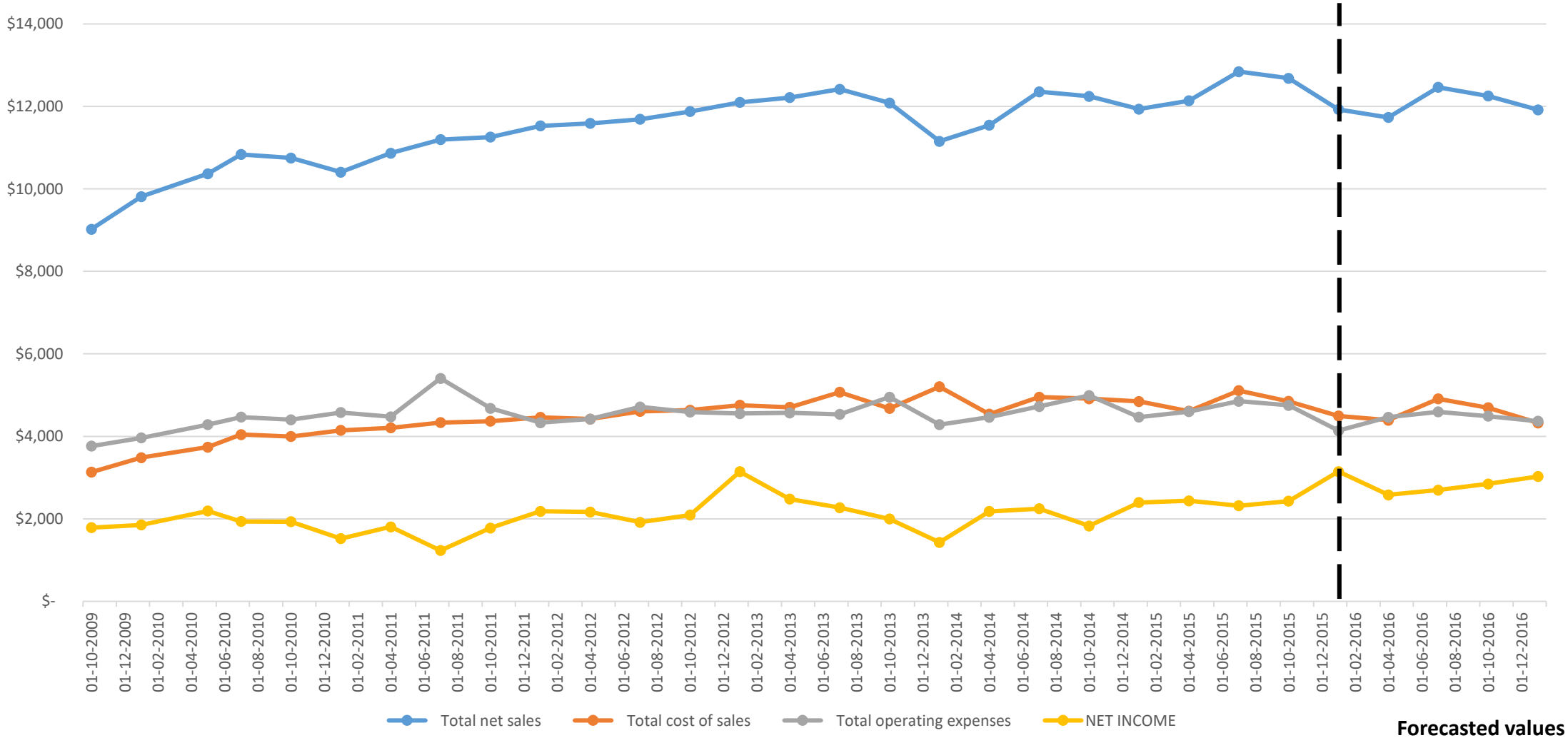
- Initially we imported dataset as data Frame.
- Converted the data set into Timeseries data.
- Opex _ restructuring has few null values and we have imputed with 1. Since imputation with mean / median/mode is not appropriate in this context.
- Since ARIMA Model would not accept negative values, we converted as non-negative values

```
## 'data.frame':    26 obs. of  25 variables:
##  $ time                          : chr  "24-10-2009" "23-01-2010" "01-05-2010" "31-07-2010" ...
##  $ net_sales_product             : int  7200 7976 8436 8808 8700 8236 8669 8921 8952 9118 ...
##  $ net_sales_service             : int  1821 1839 1932 2028 2050 2171 2197 2274 2304 2409 ...
##  $ total_net_sales               : int  9021 9815 10368 10836 10750 10407 10866 11195 11256 11527 ...
##  $ cost_product                  : int  2486 2815 3010 3309 3249 3382 3437 3579 3563 3650 ...
##  $ cost_service                  : int  647 668 728 734 746 764 770 755 803 812 ...
##  $ total_cost_of_sales           : int  3133 3483 3738 4043 3995 4146 4207 4334 4366 4462 ...
##  $ gross_margin                  : int  5888 6332 6630 6793 6755 6261 6659 6861 6890 7065 ...
##  $ opex_rd                       : int  1224 1247 1411 1391 1431 1478 1430 1484 1375 1339 ...
##  $ opem_sm                       : int  2010 2126 2278 2368 2402 2444 2446 2520 2452 2395 ...
##  $ opex_ga                       : int  425 451 479 578 458 452 466 532 552 497 ...
##  $ opex_amort                    : int  105 138 117 131 113 203 103 101 99 97 ...
##  $ opex_restructure              : int  1 1 1 1 1 1 1 768 202 3 ...
##  $ total_opex                    : int  3764 3962 4285 4468 4404 4577 4476 5405 4680 4331 ...
##  $ operating_income              : int  2124 2370 2345 2325 2351 1684 2183 1456 2210 2734 ...
##  $ int_income                    : int  168 155 158 154 160 156 161 164 164 158 ...
##  $ int_exp                       : int  114 158 182 169 166 161 153 148 148 150 ...
##  $ income_other                  : int  61 -12 82 108 80 51 12 -5 19 7 ...
##  $ sub_tot_income_net            : int  115 -15 58 93 74 46 20 11 35 15 ...
##  $ income_before_provision_of_tax: int  2239 2355 2403 2418 2425 1730 2203 1467 2245 2749 ...
##  $ prov_taxes                    : int  452 502 211 483 495 209 396 235 468 567 ...
##  $ net_income                    : int  1787 1853 2192 1935 1930 1521 1807 1232 1777 2182 ...
##  $ X                             : logi  NA NA NA NA NA NA ...
##  $ X.1                           : logi  NA NA NA NA NA NA ...
##  $ X.2                           : int  -114 -158 -182 -169 -166 -161 -153 -148 -148 -150 ...
```

Analytical Model

- We have forecasted using MS Excel variable wise and predicted the Net _ Income.
- SPSS Stats – used expert modeler
- Auto Regressive and Integrated Moving Average (ARIMA) is applied and predictions made.
- ARIMA & Simple seasonal model has given better predictions when compared to linear regression model in Excel (Base Model).

Performance Metrics with Forecast (ARIMA)

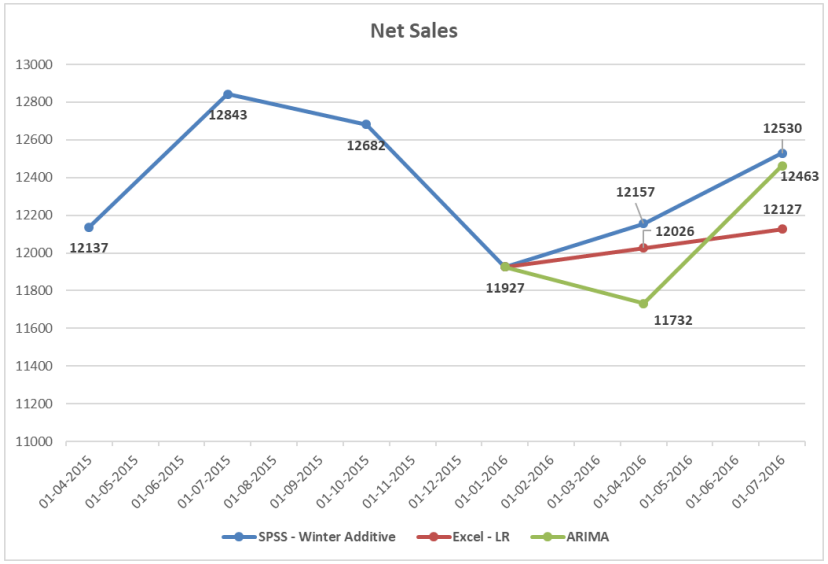


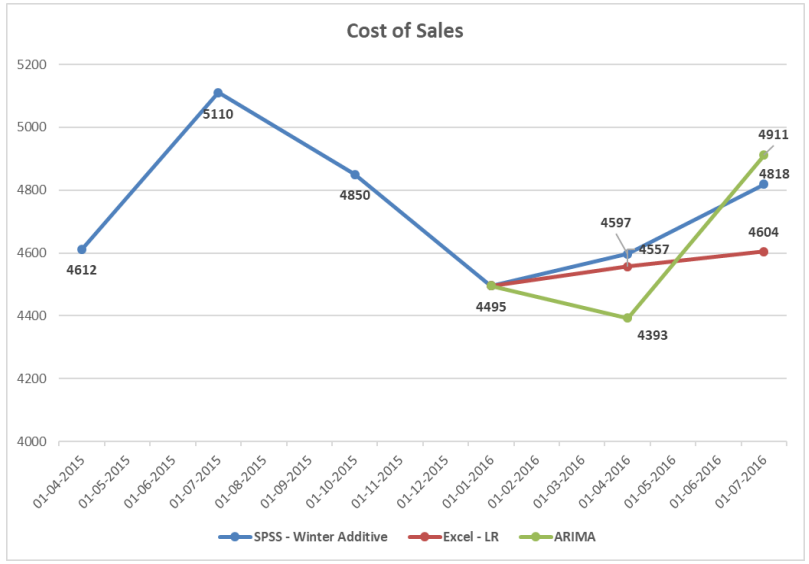
Forecasted values

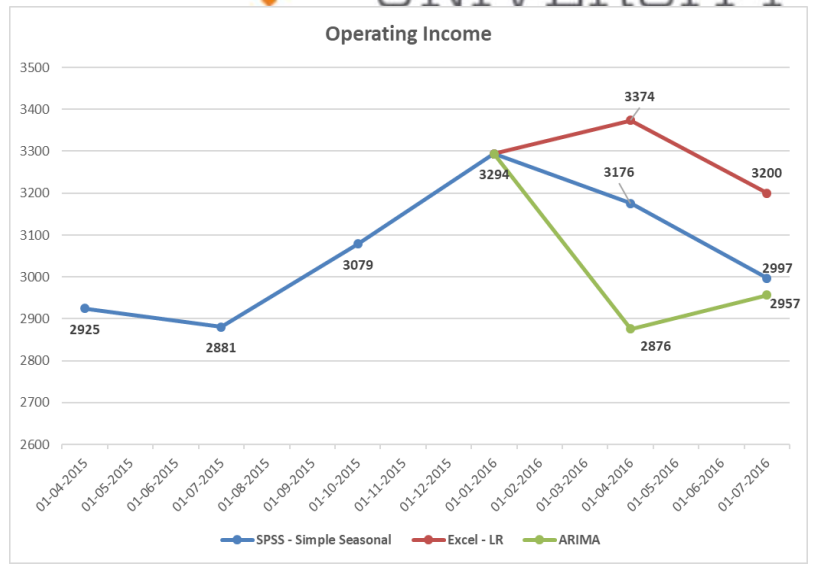
Observations from Analysis

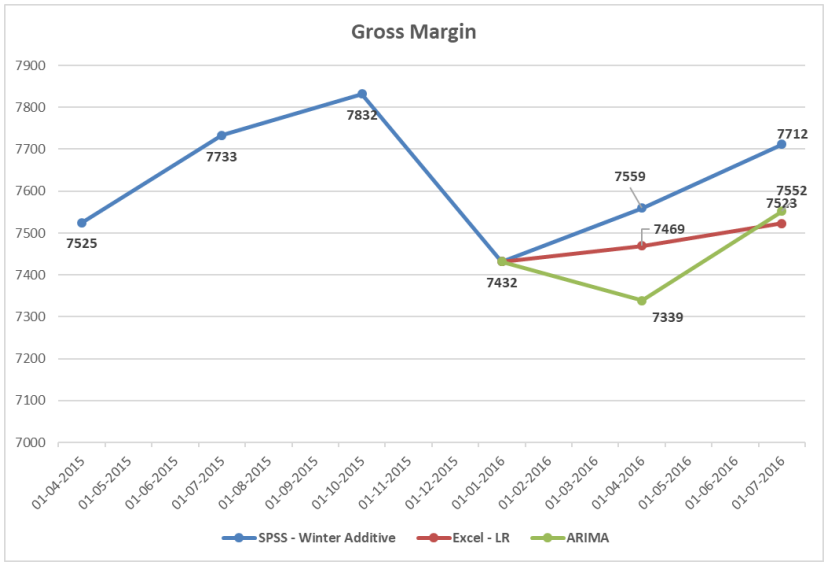
- Revenue generated from service sales is increasing in recent years.
- Amortisation is reduced recently and hence costs are reduced.
- Amortisation, restructuring costs, G&A are highly random
- Net income is not grown the way it is appearing.

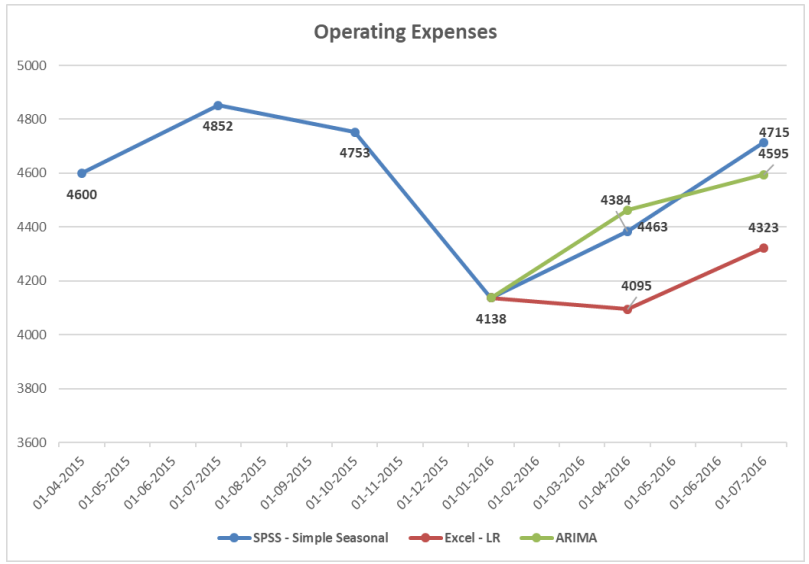
Model Forecasted Output for next 2 quarters

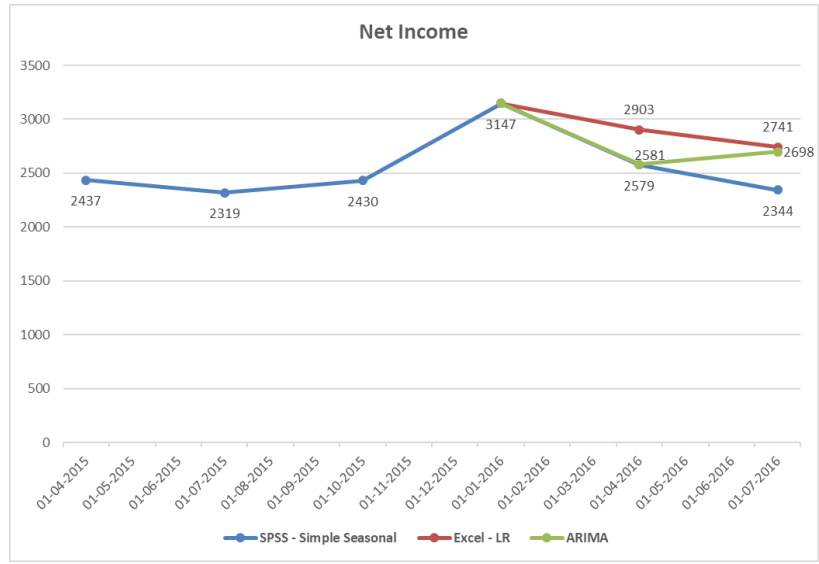












Error metrics of model

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Variable Description	Forecasted Q2	Forecasted Q3	ME	RMSE	MAE	MPE	MAPE	MASE
Net_sales_product	8865	9321	26.5	358.6	269.5	0.31	3.03	0.60
Net_sales_service	2867	3142	-3.69	37.5	30.7	-0.11	1.21	0.17
Cost_product	3391	3895	-82.1	215.18	168.81	-2.48	4.58	0.62
Cost_service	1002	1016	0.02	26.26	18.2	0.03	2.07	0.28
Opex_R&D	1520	1585	17.28	81.52	57.32	1.05	1.05	0.59
Opex_sales and dist	2362	2416	14.65	74.68	62.78	0.58	2.66	0.66
Opex_General & Admin	493	493	8.74	88.42	57.27	-5.91	15.51	0.80
Opex_amortisation	69.94	83.81	-4.48	28.97	21.58	-10.40	21.37	0.87
Opex_restructure	17.86	17.86	-2.45	157.40	94.34	-2887	2912.0	0.81
Int_income	252	279	0.84	5.11	4.11	0.44	0.44	0.36
Int_exp	155	145	0.38	7.97	5.96	0.06	3.99	0.56
Income_other	45.6	45.3	2.81	2.81	35.30	124.51	159.65	0.55
Income tax provision	438.9	438.9	3.49	208.92	143.64	1.25	40.83	40.83

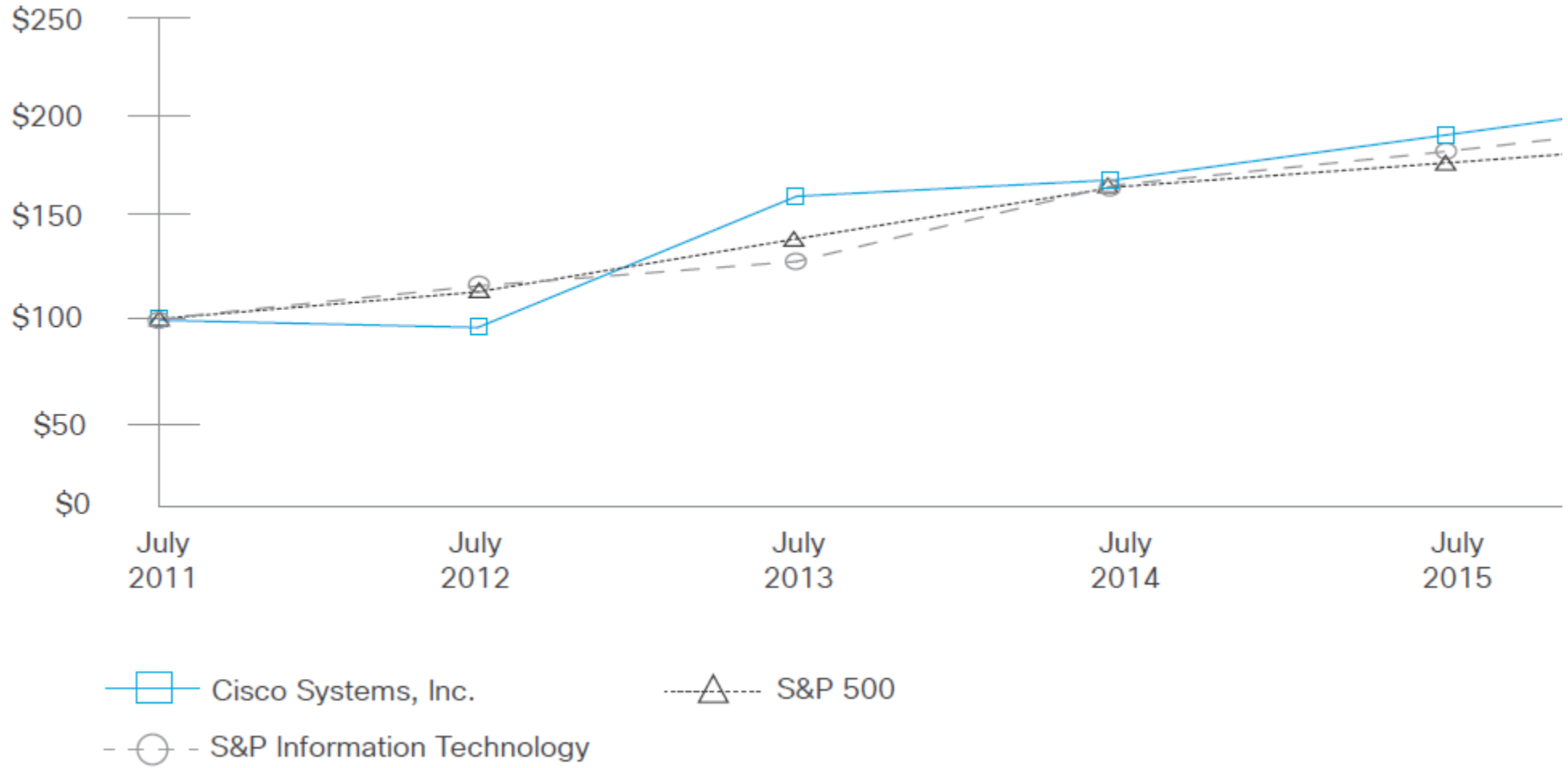
Cisco - Financials

Year	Revenue	Net income	Total Assets	Price per Share	Employees
	in mil. USD$	in mil. USD$	in mil. USD$	in USD$	
2006	28,484	5,580	43,315	17.45	49,930
2007	34,922	7,333	53,340	23.07	61,560
2008	39,540	8,052	58,734	18.15	66,130
2009	36,117	6,134	68,128	16.14	65,550
2010	40,040	7,767	81,130	18.74	70,700
2011	43,218	6,490	87,095	14.1	71,830
2012	46,061	8,041	91,759	15.34	66,640
2013	48,607	9,983	1,01,191	19.2	75,049
2014	47,142	7,853	1,05,070	21.22	74,042
2015	49,161	8,981	1,13,373	25.09	71,833
2016	49,247	10,739	1,21,652	26.83	73,700

Insights –

- Assets and Revenue increasing consistently in last 10 years.

Comparison of 5-Year Cumulative Total Return



The above graph shows a five-year comparison of the cumulative total shareholder return on Cisco common stock with the cumulative total returns of the S&P 500 Index and the S&P Information Technology Index. The graph tracks the performance of a $100 investment in Cisco's common stock and in each of the indexes (with the reinvestment of all dividends) on the date specified.

Conclusion

With a goal of 2 quarter, we are not recommending to invest.

Cisco shown a consistent performance and would be good investment option for long term and conservative investor.

Tax provision was made very low in 2nd quarter which eventually would end up with higher provisions in subsequent quarters