

Assessment 1



32146 - Data Visualization and Visual Analytics

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VULCAN.



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Introduction

Vulcan Steel Ltd (VSL) was founded in 1995 and is a prominent industrial product distributor and value-added processor operating across Australia and New Zealand. With 69 facilities and 1300 employees, VSL specializes in steel, stainless steel and aluminum products. Its services include customer processing such as cutting, drilling, folding and cold sheeting/sitting providing tailored solutions to meet diverse industry needs.

This report provides a comprehensive analysis of Vulcan Steel Limited's stock performance using data visualization techniques to evaluate trends and price movements which ultimately help identify investment opportunities. It summarizes the data collection, dataset characterization, and key insights using excel based charts. The report also assesses various investments scenarios including single trade and multi-trade strategies to determine optimal profit opportunities.

Data Collection and Preparation

Data Collection

The stock data was sourced from DataAnalysis Premium (Morningstar) for the period covering January 1st, 2024 to December 31st 2024. The following data points were collected:-

- **Daily Open, High, Low, Close Prices (OHLC)** – To analyze stock price movement.
- **Trading Volume** – To assess liquidity and impact on stock price.
- **Dividend Payments** – To evaluate total returns.
- **Price-to-Earnings (P/E) Ratio** – To determine valuation.
- **Issued Shares & Market Capitalization** – To analyze stock supply and investor sentiment.

This dataset has 255 records and 13 columns of which columns Dividend Yield and PE are calculated columns.

Data Preparation

- **Time-Series Formatting:** Ensured consistent date format for trend analysis.
- **Calculated Key Metrics:** Dividend yield, portfolio value, return percentages, etc. Which help show meaningful comparisons to understand trends.
- **Rescaled Data:** Adjusted axes for better readability in charts.
- **Improved Readability:** Adjusted graphs design, updated axis labels and data labels
- **Clear trend visible:** Clear patterns and trends highlighted make it easier to analyze at a glance through annotations and

Dataset Characteristics and Data Types

The dataset contains:

- **Numerical Data:** Stock prices, trading volume, P/E ratio, market cap, issued shares.
- **Categorical Data:** Date
- **Time-Series Data:** Daily stock prices and trading volumes.

This makes the dataset well-suited for financial analysis and stock performance evaluation. The numerical data includes key financial metrics such as stock prices(open,high,low,close), trading volume, price-to-earnings (P/E) ratio, market capitalization and issues shares, all of which provide insight into market trends and investor behavior. The categorical data is represented by the date column which serves as a reference for tracking stock movements over time. The dataset is structured in a time-series which enables an analysis of stock fluctuations, trends, and key financial events over a specific period. By leveraging this dataset, patterns can be identified such as growth or decline phases, investor sentiment shifts and corporate actions like dividend payouts or stock issuances. Additionally, the presence of both numerical and categorical data allows for various visualization techniques such as line chart, column charts, combo charts and stock charts that help effectively interpret stock performance and market behavior.

Key Findings and Data Visualization Analysis

In order to help investors make an informed decision when trading VSL stocks, Below is a breakdown of the various important metrics that can aid investors with their trading decisions.

Stock Price vs Volume Analysis

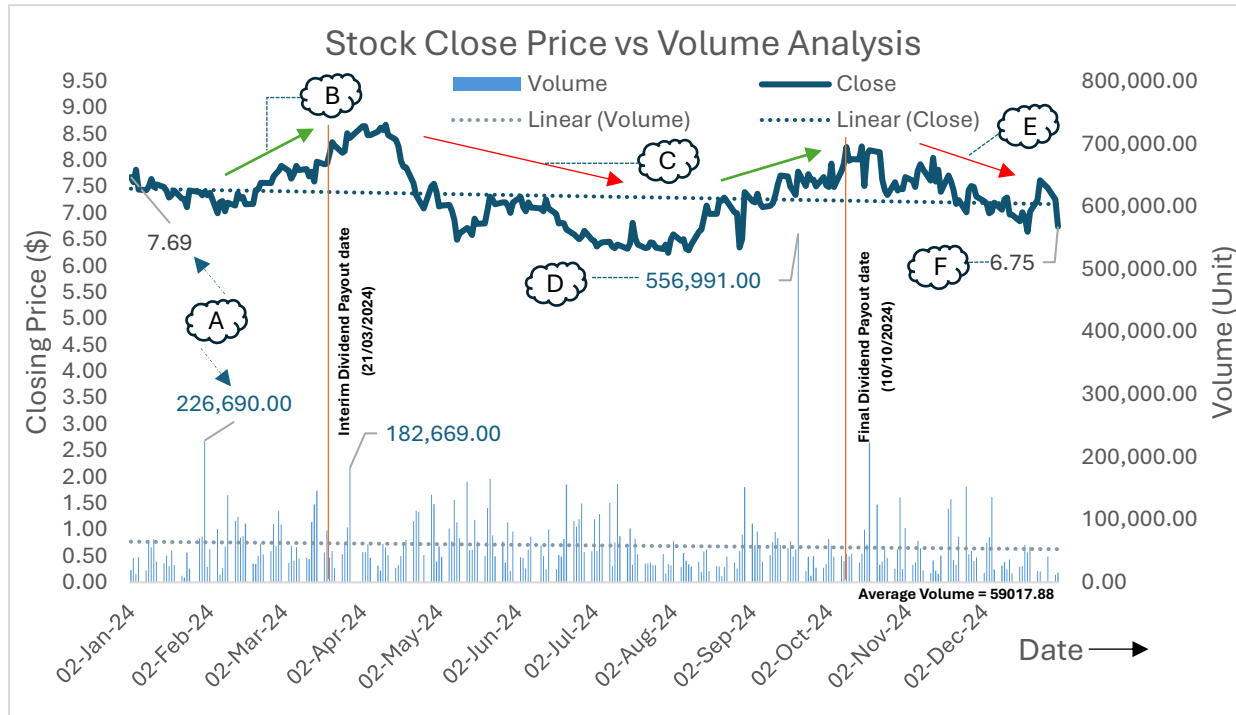


Figure 1: Chart depicting the trends from the Stock Close Price vs Volume Analysis

Chart Explanation:

This Stock Price vs Volume Analysis was created with a combo chart using a secondary axis where closing price is described using a line chart on the primary Y-axis with a dark blue color line while trading volume is described on the secondary Y-axis using a light blue color column chart and this time series data contains daily data points from January 2nd 2024 to December 31st 2024 on the X-Axis. The closing price and trading volume was used to build this graph with the date field being used to explain the stock behavior with respect to time. There is a linear trend line for both Closing price and Volume that is slightly decreasing over time. However, the variation in stock closing price is only by \$2-\$3 for the entire calendar year which is very negligible, highlighting a low Beta value (volatility measure) leading this stock to be categorized as a low volatility stock. All points with unusual market activity have been annotated to be further explained and dividend payout dates have been marked for reference. Axis titles have been added to clearly measure change in various characteristics with time and Axis range has been altered to prevent overlap yet ensure clear comprehension of change in behavior.

Key Findings from visualization:

A – While the closing price started at \$7.69 per share which is higher than the opening price for Jan 2nd 2024, the general trend shows that the closing price continued to drop well into

the month of January most likely due to the Earning and Revenue figures released in the month of February for the last period which showed a 3.63% lower earnings than estimated and 0.44% lower revenue than estimated. However, there was a sudden increase in the number of trades being done all the way up to 226,690 trades of VSL stocks on the market much higher than the average trading volume of 59,017.88 units per day.

B – Here we see that there was an interim dividend payout at 11.53 cents per share scheduled for 21/03/2024. We see that an announcement was made in February about the release of this dividend which led to the sudden increase in trading volume of this stock during the month of February. We see a steady increase in the closing price day after day as we close in on the dividend payout date as anticipation of the payout bring in many investors who buy VSL stocks.

C – After the Payout date, some investors decide to book their profits and steadily sell their shares while some continue to hold out. This is why we do not see the trading volume increase as high as they did during the announcement, however an increase to 182,669 units of shares traded on the day is still observed. This leads to a drop in stock price as market as many investors pull out. Another reason for the drop is the release of the mid-year Earnings and revenue figures which showed 19% lower earnings than estimated and a 3.14% lower revenue than estimated which may have caused some investors lose faith and sell their shares to prevent a loss.

D – There is a second dividend payout announcement which leads to a massive increase in anticipation of the profit causing a record high jump of 556,991 VSL stocks being traded. This leads to the market price increasing as investors anticipate good returns closer to the Final dividend payout date on 10/10/2024.

E – We see a similar trend again where post the Dividend Payout date, the stock price drops as investors book profits and sell stocks leading to an increase in average trading volumes over this period of time which in turn supports the reason for a downturn in stock price growth trends.

F –A cyclic trend can be observed here where the stock price drops towards the end of year on year as opposed to its opening price on January 1st which has happened year over year. This year, the drop in stock price which can attributed to the decrease of revenue by 13% compared to last year and a fall of 30% in Earnings Before Interest, Taxes, Depreciation, and Amortization(EBITDA) that was announced for the financial half year ending on December 31st 2024.

Trends:-

Overall Price Trend: The linear trend line for price shows a mild upwards trajectory in the early months of the year, with some volatility mid-year. There are a few notable periods after dividend payout dates suggesting short-term sell offs after dividend eligibility passes.

Volume Fluctuations: Higher Trade volumes coincide with earning announcements or dividend payout periods. The Extreme spike (point D) usually reflects trading activity triggered by significant news. Its also clear that there is a relationship between trading volume and price as we see price fluctuate when trading volume spikes unusually.

Outliers: Some sudden short-lived spikes or dips may indicate speculative trading or reactions to news e.g. Point D.

Stock Chart Analysis

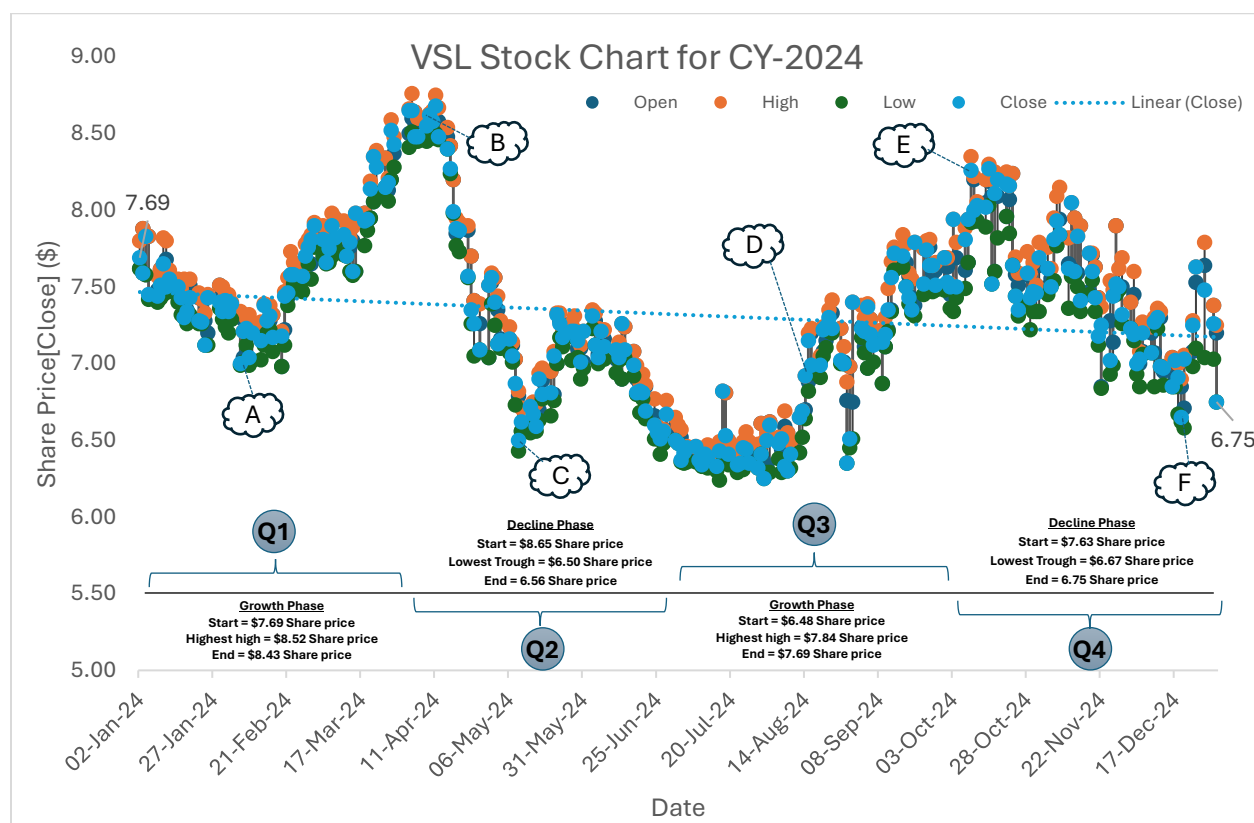


Figure 2: VSL Stock Chart for Calendar Year 2024

Q1



Q2



Q3



Q4



Figure 3: VSL Stock Chart CY 2024 by Quarter

Chart Explanation

The VSL Stock Chart provides a comprehensive view of price movement throughout 2024 which are segmented into four quarters (Q1 – Q4) each with its own growth and decline phase. The charts were made using the open-high-low-close data to create a candlestick or stock chart. Due to the nature of the report, print year's worth of candlestick data makes the graph very difficult to read which was resolved by adding markers for various parts of the candlestick for easy comprehension. A zoomed in quarter wise breakdown was also created for a more in-depth analysis with gradient style color variation in order to mimic a

real candlestick chart color where up-bars are made green and down-bars are made red to make it easier to comprehend the close and open points of the candlestick. Each of the zoomed in charts were made by range restricting the date axis on the original chart by quarter. Open price which is the price at which the stock opened is highlighted in light blue dot, High price for that day is highlighted with an orange dot, lowest price for that day is highlighted using green dot and close prices are highlighted using dark blue dot. On the Y axis is the variation of share price starting from \$6.00 to \$9.00 instead of from \$0.00 which is done to increase the clear sense of growth and decline of the stock for the user's easy interpretation. The dotted blue trendline represents the general stock price movement over time showing a clear picture of the long-term trend. Key price movements (A-F) are marked to indicate unusual market activity. Growth and Decline phases each provide insight into market trends for that quarter.

Key Findings

In Q1, the stock opened at \$7.69 but faced a downward trend in January likely due to lower-than-expected earnings (~3.63%) and revenue (~0.44%) in February. However, after the interim dividend was announced (11.53 per share) in February, investors demand increased driving stock price up towards March 21st payout date. In Q2, the stock declined as investors booked profits post dividend payout in March. This was worsened by mid-year earnings revealing a 19% drop in earnings and 3,14% revenue shortfall, eroding market confidence and pushing prices lower. In Q3, a market recovery was observed fueled by anticipation of the final dividend payout (10/10/2024). This mirrored Q1 where dividend expectations boosted demand and led to a price rise. In Q4, stock prices fell after the final dividend payout in October as investors locked in profits. The decline continued into the year-end coinciding with the December financial report which reported a 13% YoY revenue drop and 30% EVITDA decline, reinforcing the downward trend. The stock closed the year at \$6.75, continuing a historical year end decline pattern.

Trends

The VSL stock experienced two major growth phases (Q1 and Q3) and two decline phases with each quarters starting, peak/trough and ending stock prices highlighted, The Highest share price recorded was in Q1 at \$8.52 indicating strong early year performance, the lowest trough was \$6.50 in Q2. The overall volatility is very low however due to the fact that the price variation is between \$2-\$3 which means that when calculated the Beta value (Volatility measure) for this stock is 0.74 which is why it is categorized as a low volatility stock. The trendline helps smoothen these fluctuations to reveal an overall downward trend which has been seen to repeat YoY.

Capital vs Issued Shares Analysis

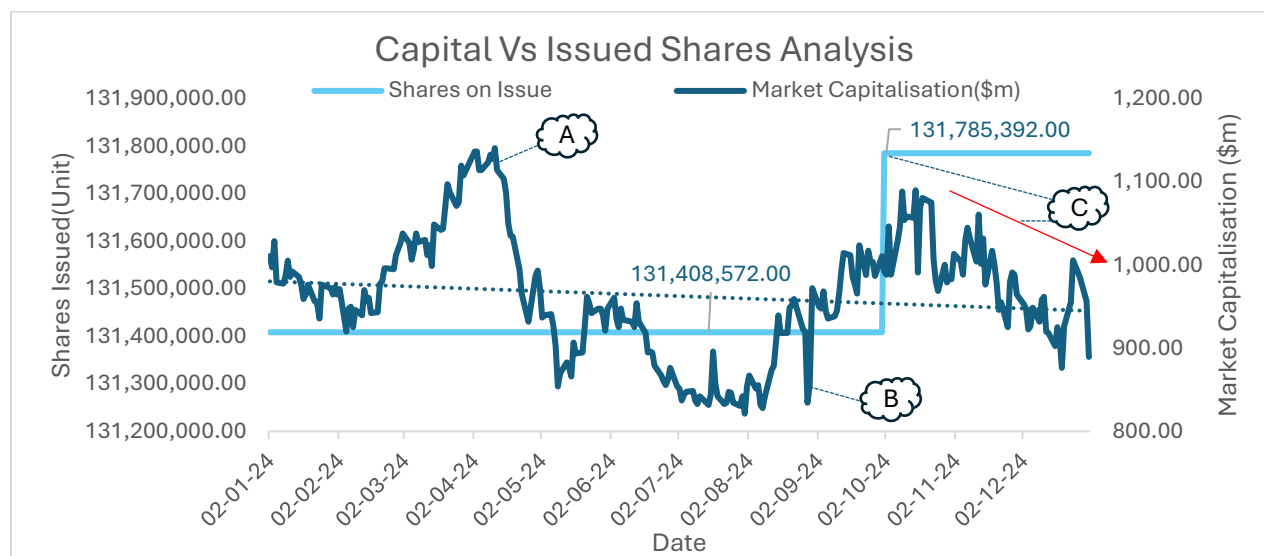


Figure 4: Market Capitalization Vs Issues Shares Analysis

Chart Explanation:

The Capital vs Issues Shares Analysis combo chart uses two line charts to provides a comparatives view of the relationship between shares on issue and market capitalization through 2024. The chart uses a light blue line to represent Issues shares on the primary Y axis and dark blue to represent market capitalization scaled down in \$m per tick on the secondary Y-Axis and date on the X- axis. Both Y- Axis have range adjusted to make it easy for the user to identify trends and check if there are any impacts on one's behavior from the other's trends. The trend line for Market Capitalization corroborates the general trend in the VSL stock price which is slightly trending downwards YoY. A few points of interest have been annotated (A-C) to explain the unusual activity seen on the graph. The combination of dual axis representation, strategic annotation and trend analysis allows viewers to quickly grasp the interplay between issues shares and market capitalization which allows investors to clearly observe fluctuations correspond with market capitalization movements helping identify patterns, outliers and key financial impact as part of the storytelling approach of visualization design.

Key Findings:

A – At the start of the year issued shares remained constant while market capitalization fluctuated within a limited range which suggests that changes in market value were primarily driven by stock price fluctuations rather than changes in issued shares.

B – Around Mid Q2, market capitalization drops significantly before recovering later in Q3 which can be attributed to weaker financial results as well as investor sell-offs as discussed before. Since the number of shares issues remained unchanged, the drop in market capitalization can be directly linked to a decrease in stock price.

C – A noticeable increase in shares on issue occurs towards the end of the year evident from the step change in the light blue line. This increase is most likely from capital raising efforts as well as stock-based compensation or secondary offerings. Following this increase, while the market capitalization did increase initially, suggesting that the additional shares were absorbed positively by the investors potentially due to strong reinvestment strategy, the downturn at the end of the year indicates that the market may have reacted negatively to external factors such as weaker than expected financial results, economic conditions or investor sentiment shifts.

Trends:

Overall, the general trend for Market capitalization seems to match that of the stock closing price which means that most of the variations in market capitalization can be correlated with the stock price. The end-of-year increase in issues shares aligns with a temporary rise in market capitalization but the subsequent drop suggests that external factors counteracted any positive effect from the capital infusion.

Dividend Yield Analysis

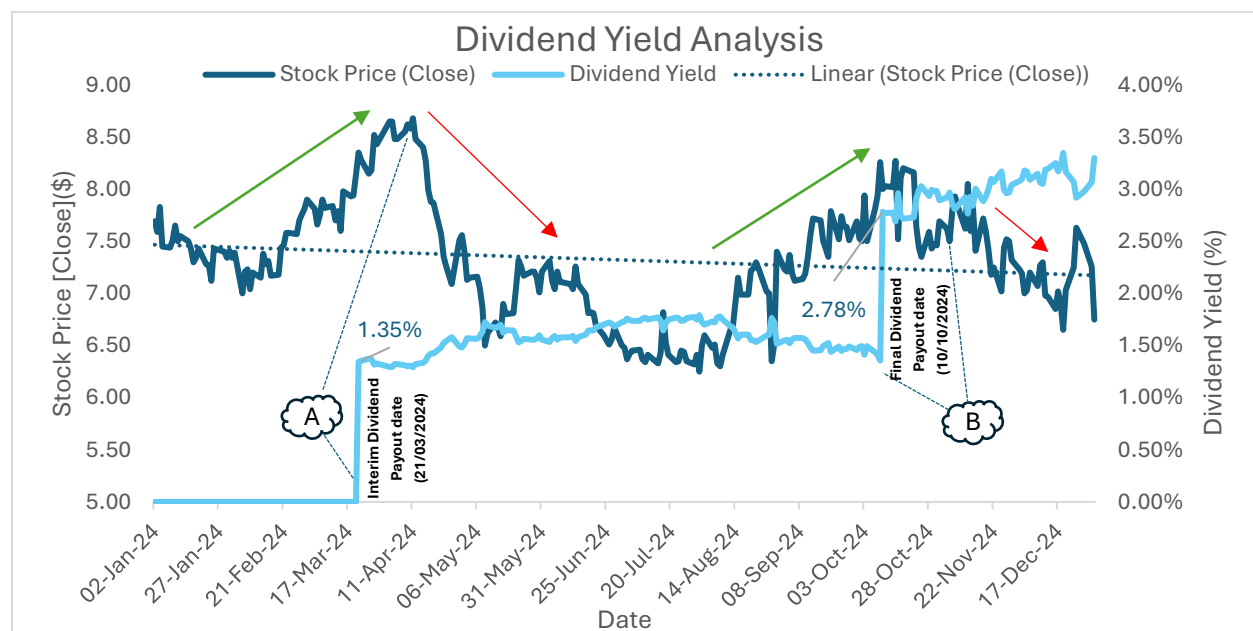


Figure 5: Dividend Yield Analysis

Chart Explanation:

The Dividend yield chart analysis chart visually represents the relationship between VSL's stock price(closing price) and dividend yield over the course of 2024. This analysis is crucial for investors to evaluate how stock price fluctuations influence dividend yield, thereby determining the potential return on investment. The combo line chart using a secondary axis has the primary Y axis describing stock price in dollars and is represented by a blue line which plots daily closing price of the VSL stock. The secondary Y axis is used to show dividend Yield growth over 2024 which is represented by an orange line. It is calculated using the formula:-

$$\text{Dividend Yield} = \left(\frac{\text{Annual Dividend per share}}{\text{Closing Stock price}} \right) \times 100 .$$

The axis tracks the daily performance of both stock price and dividend yield through 2024. The overall trendline shows the downward nature of the closing stock price which is in line with historical data. Key points and trends have been annotated for further explanation. The Stock price axis range has been amended to give a more dramatic variation of high and lows of the stock price for easier readability.

Key Findings and Trend:

While the graph does verify the key findings of Stock chart, its clear that from **(A)** as stock prices rise there is a slight decline in dividend yield. Investors buying shares at higher prices receive lower yield on their investment. A sharp decline in stock price mid-year resulted in an increase in dividend yield making the VSL dividends more attractive to investors again which is why during **(B)** after a significant drop in stock price, there is a sharp increase in dividend yield as lower price makes dividend returns more appealing. The general trend is that the stock price has exhibited volatility throughout the year with two distinct growth phases (Early and mid-year) and two decline phases (post dividend payout and year-end). This clearly establishes an inverse relationship between stock price and dividend yield helping investors find the best time to invest for divided returns.

P/E Ratio Analysis

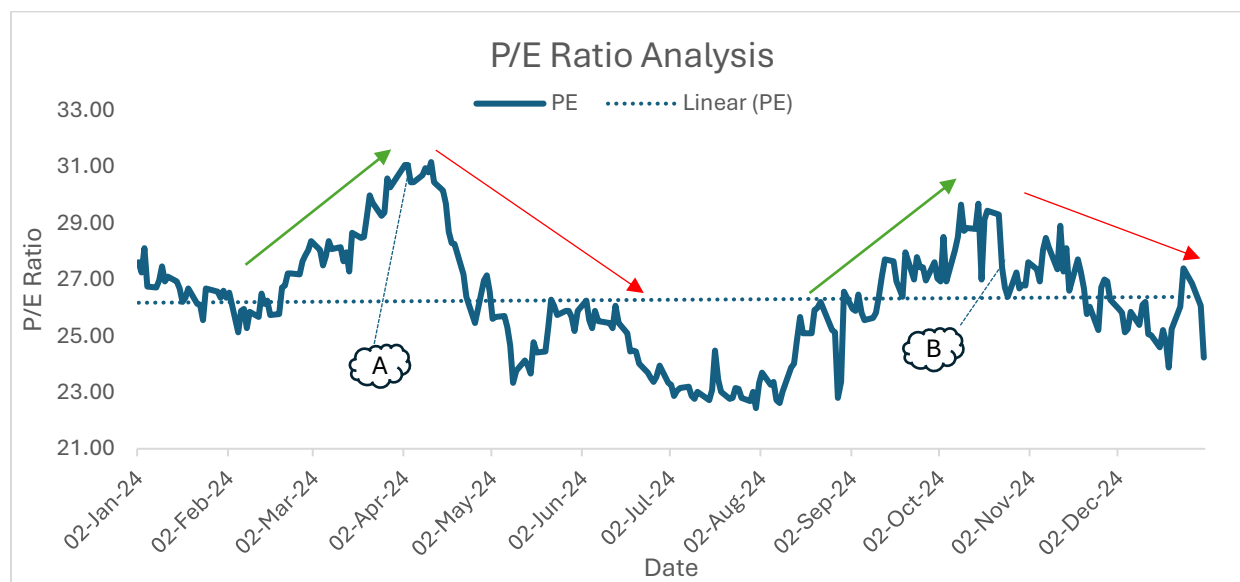


Figure 6: P/E Ratio Analysis

Chart explanation

P/E Ratio analysis is a simple line chart that illustrates the fluctuations in VSL's Price -to-earnings(P/E) ratio over the course of 2024. The P/E Ratio is a crucial valuation metric used by investors to assess whether a stock is overvalued or undervalued simply by comparing its market price to its earnings per share (EPS). Visualization presents key trends, showing periods of increasing and decreasing P/E ratios which are indicative of investor sentiment, earnings reports and market conditions. The P/E Ratio formula is :

$$\frac{P}{E} = \frac{\text{Stock Price (Close)}}{\text{Earnings Per Share (EPS)}}$$

This chart uses daily P/E ratio values computed from stock price and earnings data, plotted against time(date) to show trends and anomalies. The Solid blue line represents the daily fluctuations of the P/E Ratio, the dotted blue trendline provides an overview showing an overall stability of the P/E ratio. Points of unusual behaviour have been annotated for further explanation and trends have been indicated using green arrows for growth phases and red arrows for declining phases. The primary Y-axis range has been reduced allowing clear visibility of fluctuations without excessive compression. The X-axis represents time(date) from January to December 2024 showing revolution of the P/E ratio.

Key Findings and Trends:

A sharp increase in P/E ratio around March-April (A) suggests rising stock prices without significant earnings growth as EPS is constant. This could indicate investor optimism or speculative trading. A gradual drop in P/E ratio follows the peak, likely due to stock price

corrections. This suggests investor reassessing valuations and market expectations stabilizing. Around September -October(B), another upwards trend in the P/E ratio is visible, whose variation is majorly due to change in stock closing price which increased in anticipation of dividends as explained above. A downward trend in the last quarter suggests that investors booking profits or bad financial performance may cause stock prices to drop which in turn causes the PE to drop.

Portfolio and Profitability Analysis

Yearly Portfolio Analysis

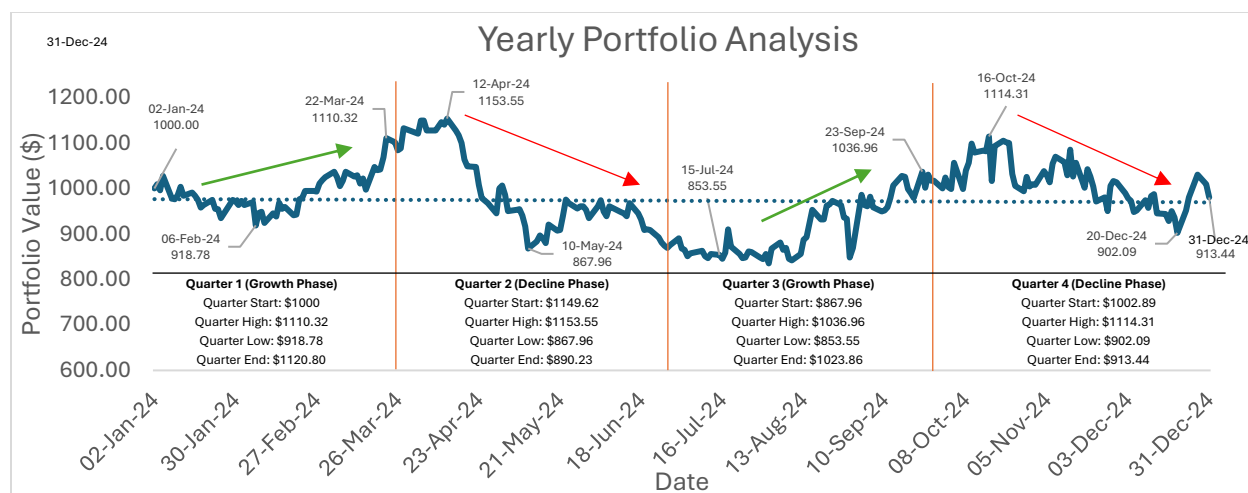


Figure 7: Yearly Portfolio Analysis

Chart Explanation:

The Yearly Portfolio Analysis chart provides a visual representation of how an initial investment of \$1000 in VSL stock evolved throughout 2024 which incorporates price movements and dividend payouts. The investments strategy assumed that a whole number of shares was purchased at the closest possible open price leaving a small remaining balance which was added at the end of the year along with dividends. The initial open price closest to \$1000 was \$998.25, which determined the number of shares. The remaining \$1.75 was added back to the portfolio at the end of the year. The dividends were reinvested into the portfolio as well to reflect the total value. Data used to calculate this was stock price close and open as well as Dividend Payout dates and prices. The X-Axis represents the portfolio value in dollars and the X-Axis represents the measurement of time which is Date that helps analyze the variation across 2024. The blue line shows daily fluctuations in portfolio value incorporating stock price changes and a dotted trendline that provides a smoother view of the trend. Quarterly performance breakdown is annotated with growth and decline phases. Key points are marked for explanation and arrows and labels highlight sharp price movements and quarter-end values. Quarter wise division has been added for

better story telling each with its own growth and decline phase. Quarter summaries have been annotated at the bottom to provide detailed insights into the quarter. The Y axis has been scaled to ensure price movements are clearly visible and to fit the quarter summaries in the graph. The Date axis has been reversed to show the correct flow of time from the year start date on the left to the year end date on the right to follow standard visualization convention.

Key Findings and Trends:

Quarter 1, which was a growth phase showcased strong early year performance with the portfolio peaking at \$1110.32 before stabilizing. The first decline phase of the year started in quarter 2 where the lowest portfolio value observed was \$867.96, However there was growth again in quarter 3 where the portfolio peaked at \$1036.96. Quarter 4 brought about another decline phase with the portfolio dropping to \$913.44 by year end, impacted by poor financial results. The visualization effectively tells the portfolio performance story over the course of 2024 helping investors analyze market trends and assessing investment decisions.

Single Trade Analysis

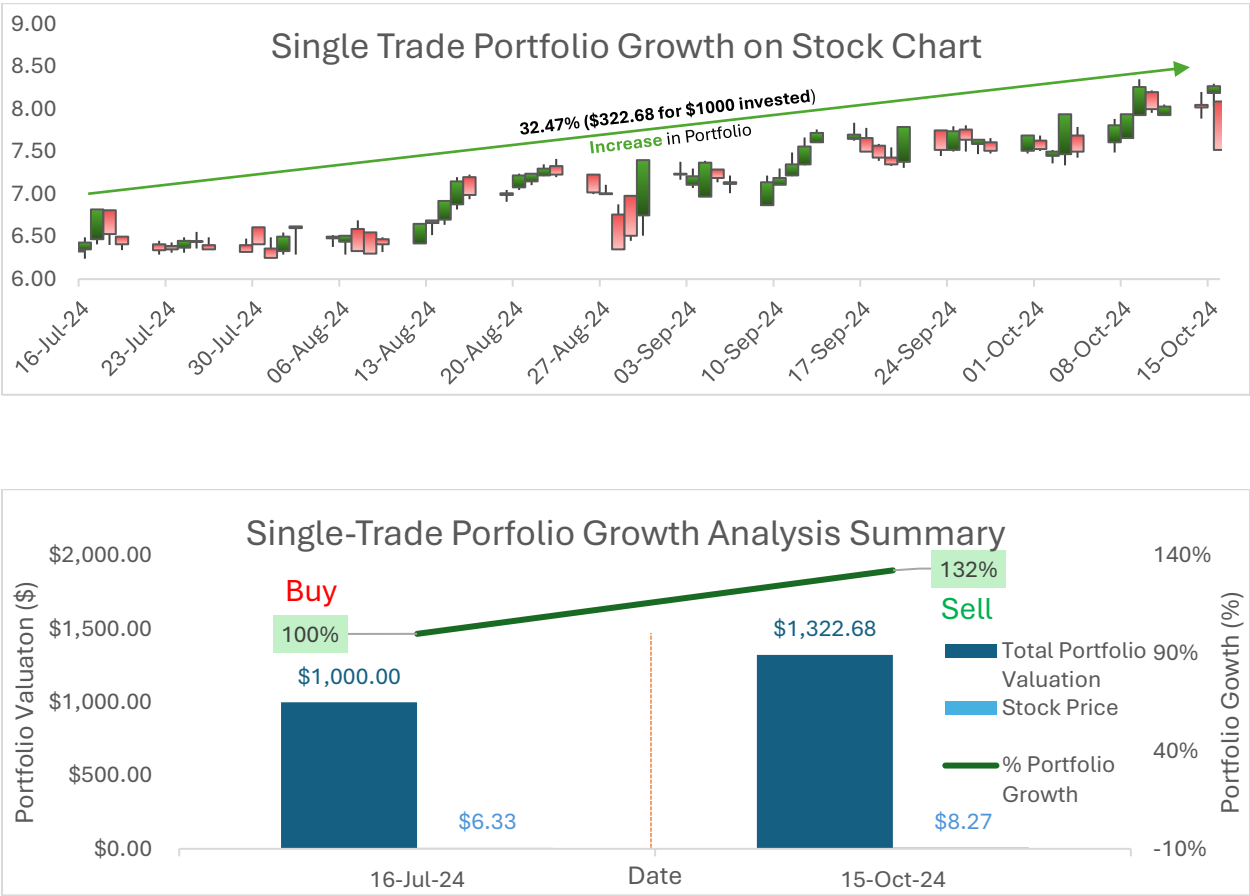


Figure 8: Single Trade Portfolio Analysis Stock Chart and Summary

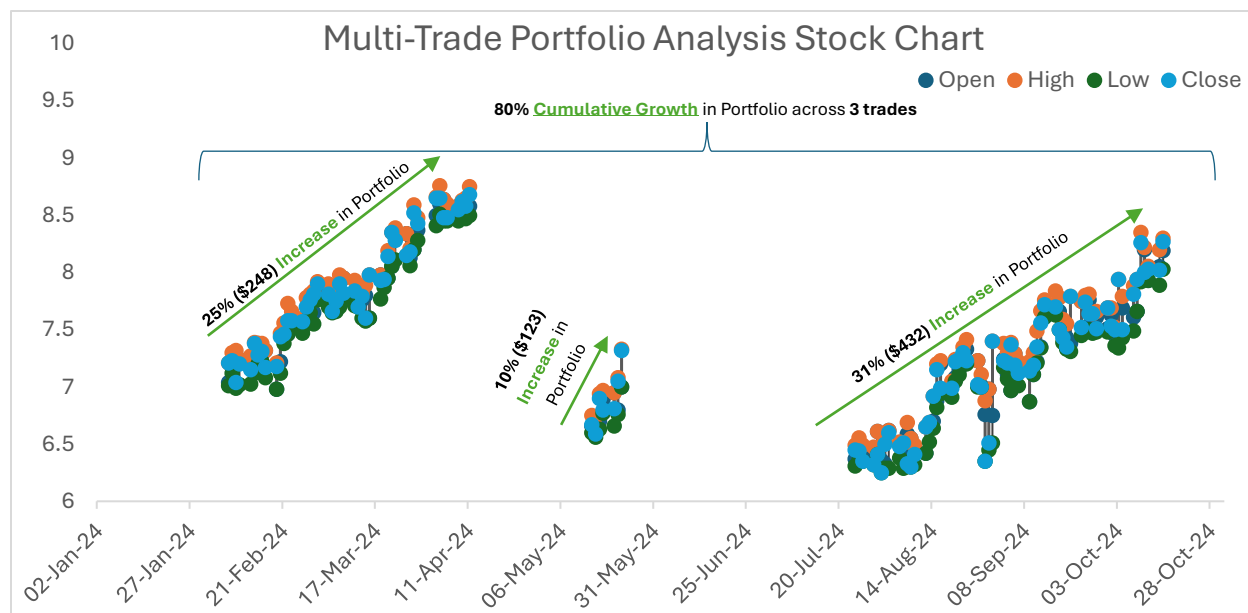
Chart Explanation:

This chart provides a visual representation of a single stock VSL where an initial \$1000 investment was made on 16-Jul-2024 at a stock of \$6.33 and later sold on 14-Oct-24 at \$8.27 leading to a portfolio valuation of \$1,322.68 at the time of sale while also including dividend. The percentage portfolio growth of 132% is also depicted. The initial investment of \$1000 was divided by the stock price at purchase to determine the number of shares bought. After this we used the same number of shares and multiplied that with stock price at time of sale to find the latest portfolio value. Portfolio Growth was also then calculated. The chart created is a combo chart where portfolio value and buying price are measured against selling price and capital while the line graph is depicting a percentage growth in capital. Buy and Sell have been annotated in red and green respectively for clarity and a dotted reference vertical line visually separated the two time periods.

Key Findings and Trends:

The portfolio experienced a 32.3% absolute increase in value within three months. The stock price increased from \$6.33 to \$8.27 driving the portfolio growth and also supported by the dividend payout released per share. Despite the short holding period, timing the market effectively resulted in a strong return on investment. The dual axis approach (portfolio valuation vs Percentage growth) effectively communicates the profitability of the trade. That is why this analysis demonstrates how a well-timed stock trade can generate significant portfolio gains and effectively communicate the impact of the stock price movements on investment returns.

Multi-Trade Portfolio Analysis



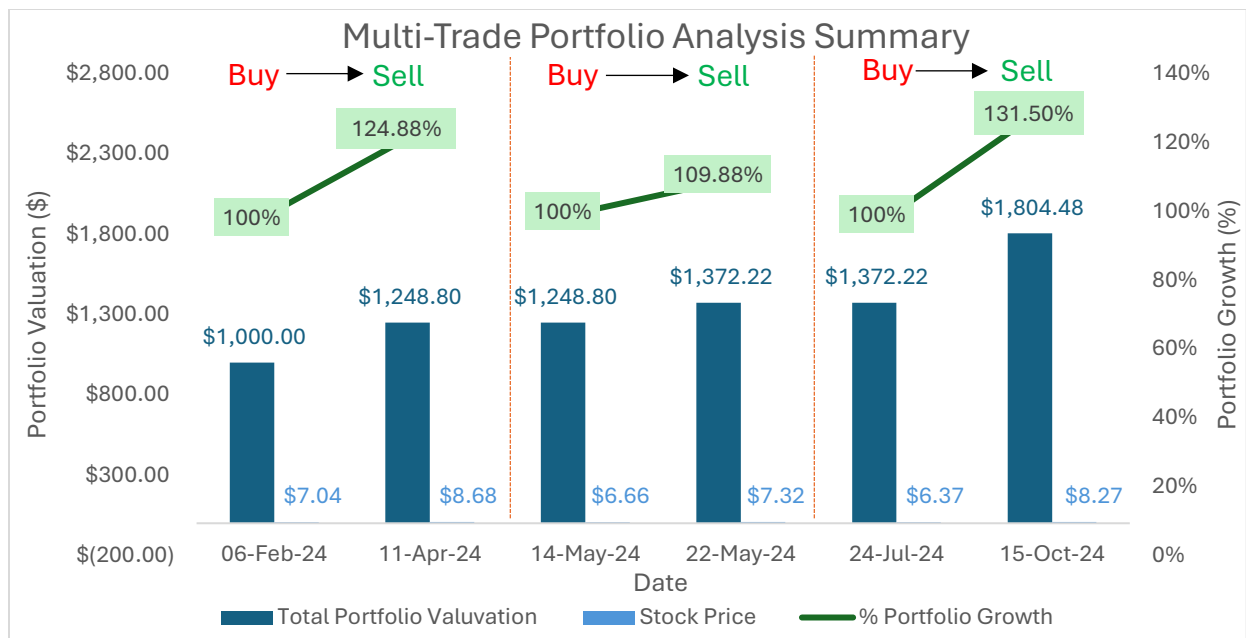


Figure 9: Multi-Trade Portfolio Analysis Stock and Summary Chart

Chart Explanation:

The multi-trade portfolio analysis illustrates how multiple sequential trades were executed within 2024 tracking portfolio valuation and percentage growth over time. The total portfolio valuation is represented by dark blue bars stock prices by light blue bars and captures three buy and sell transactions where profits are realized. The first trade used \$1000 starting capital to buy shares at the opening stock price of \$7.04. Formula for number of shares bought is Investment divided by stock price at the time of purchase. Portfolio valuations at sale were derived from multiplying the shares owned with stuck price at the time of sale. % portfolio growth was calculated for each trade and cumulative growth % was also calculated. The visualizations were made using a combo chart where Dark blue bars show the total portfolio valuation after each trade and light blue bars show stock price at the time of investment action such as buying or selling. A green percentage growth trend visually demonstrates increasing profits over time. Buy and Sell are annotated to highlight transaction points and a dotted vertical reference line separates the different trade periods. The original % portfolio growth line continues line across 2024 however to give it a feeling of individual separate transactions, the lines connecting each buy point from the last sell point has been made white to be effectively invisible during the visualization. In the stock chart, stock prices for those dates for which trades weren't happening have been deleted to focus only on dates for which trade action was taken giving a more selective zoomed in nuance to the graph.

Key Findings and Trends:

The portfolio grew steadily with each successful trade leading to an end valuation of \$1804.48 from an initial \$1000 investment. The trades were strategically executed at price fluctuations, ensuring that each sale occurred at a higher value than the purchasing price. While individual percentage gains varied the compounded growth significantly increased the portfolio value by 80%. The combination of bar charts line charts, column charts, stock charts annotations and dual axis labelling makes it easy to understand how multiple trades impact total portfolio value.

Advantages of Various Charts

Line Chart:

The Line chart shows stock movement trends over time highlighting key turning points peaks and dips in the P/E chart and portfolio value. This helped analyze growth and decline phases. Another advantage is that annotating on line charts can sometimes vastly increase the amount of information that can be communicated at a glance for examples directional arrows, linear trend lines and labelled annotations made it much easier to identify breakout and correction phases improving storytelling clarity.

Combo Chart:

Combining bar charts and line charts provides a comprehensive view of data allowing apple to apple comparisons while also helping visualize overall behavior. Another advantage is that using the secondary axis allows for a whole new set of visualization possibilities as non-scalable data can now be quantically compared through visualization for deeper understanding. This makes sure that both absolute and relative performance are well- represented.

Stock Chart:

A stock chart capture market behaviour, volatility and trading well can show open high low and close prices providing traders with all the essential price details in one view helping identify optimal entry and exit points. Another advantage is that stock charts work well with technical indicators and can be enhanced with trendlines, volume bars and moving averages, making them a powerful tool for technical analysis in investment decision-making. By leveraging these charts effectively, anyone can improve data visualization, enhance storytelling and provide actionable insights for investors and analysts.

Visualization Challenges And Solutions

S. No	Challenge	Solution
1	Plotting extensive time-series data led to overlapping data points making trend identification difficult.	Implemented Trend lines and annotations to clearly explain concepts
2	Incorrect scale for certain graphs made it invisible.	Fixed using a secondary axis.
3	Data crossing or overlapping with other graphs.	Fixed with Axis formatting and increasing axis range.

Recommendations for potential buyers or investors

The key findings indicate that timing buy and sell decisions based on market trends and stock performance plays a crucial role in maximizing returns. Investors should consider strategic entry and exit points as proven from the multi-trade portfolio analysis which demonstrated that entering the market at a lower point and selling at peaks maximize profitability compared holding a single trade over a longer time period. The yearly portfolio value analysis highlights how dividend reinvestment contributes to portfolio growth which is why investors should consider reinvesting during dividend payout periods. The P/E ratio analysis revealed important shifts in valuation. A rising P/E ratio may indicate overvaluation whereas a decline P/E ratio can signal a potential buy opportunity. The multi-trade strategy performed better than a single trade strategy by nearly 50% for this particular instance because the stock was declining YoY and short-term multiple trade strategy was more profitable than a long-term hold strategy. From this it is clear that, Investors must use a combination of technical analysis as well as visual analytics in portfolio monitoring to improve decision making, enhance risk management and optimize investment returns.

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