

# A REVIEW OF STOCK TREND PREDICTION WITH COMBINATION OF EFFECTIVE MULTI TECHNICAL INDICATOR STRATEGY

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## ABSTRACT

*It is important for investors to understand stock trends and market conditions before trading stocks. Both these capabilities are very important for an investor in order to obtain maximized profit and minimized losses. Without this capability, investors will suffer losses due to their ignorance regarding stock trends and market conditions. Technical analysis helps to understand stock prices behavior with regards to past trends, the signals given by indicators and the major turning points of the market price. This paper reviews the stock trend predictions with a combination of the effective multi technical indicator strategy to increase investment performance by taking into account the global performance and the proposed combination of effective multi technical indicator strategy model.*

## KEYWORDS

*Combination, Market conditions, Multi technical indicator Strategy model, Performance*

## 1. INTRODUCTION

Stock trend prediction involves predicting future values of company stocks or other financial instrument traded on an exchange. Various types of trading can be done in the stock market. It could be short term trading or even long term trading but if someone can predict the value or class of that entity, it can yield very good returns for the investment done. Prior to the evolution of the digital world, various useful technical indicators like Simple Moving Average (SMA), Exponential Moving Average (EMA), Moving Average Convergence/Divergence (MACD) were found to be very useful [1].

Technical analysis is based only on stock prices or volume data. Price action is used as an indication of how market participants have acted in the past and how they may act in the future. Technical analysts use chart patterns and trends, support and resistance levels, and price and volume behavior to identify trading opportunities with positive expectancy. Technical analysis does not consider the underlying business, or the economics factor that affect the value of a company [1].

Without the help of indicators, traders would have a hard time assessing the current volatility of the markets, the strength of a trend, or whether market conditions are overbought or oversold. In fact, Brock [2] found that by using simple technical analysis (TA) trading tools, there were consistent positive returns which resulted in predictive power.

Technical Analysis is a short-term in nature method based on shorter timeframes. This allows the investor to maximize returns by determining the best timing to enter/exit a market for a particular stock. It helps to understand stock prices behavior with regards to past trends, the signals given by indicators and the major turning points of the market price. Of paramount importance, TA helps both investors and traders or even punters to forecast future direction of prices to optimize profit-making opportunities in investment decisions [3].

Therefore, the objective of this paper reviewed the stock trend predictions with a combination of the effective multi-technical indicator strategy to increase investment performance by considering the global performance and the proposed combination of the effective multi-technical indicator strategy model. Consequently, a strategy model is needed to analyze the stock market and upcoming stock trends based on historical prices and Stock Technical Indicators (STIs).

## **2. THE DEVELOPMENT AND PERFORMANCE OF THE TECHNICAL ANALYSIS**

Nowadays, there have been a lot of information circulating on the various types of investments, for example, deposits, purchase of land, and capital markets or other stock related matters. Investment is an answer to the market's uncertainty so by investing in the field of property, the risk will be minimized. Investment is putting money into financial schemes, shares or properties in hopes of achieving a profit. Devote (one's time or energy) to obtain results with valuable results. (In Invest) informal: buy (product) that is useful to refund the cost [4].

Investments in stocks have been discussed by many researchers including change in stock price di US [5]; pattern in abnormal returns [6]; Capital Investments and Stock Return [7]; and Rates of Return on Investments in Common Stocks [8].

Technical analysis was developed to simplify stocks trading. Technical analysis was first introduced by J. Welles Wilder in 1978 [9] and carried out on indicators stocks. Indicators on the stock is a mathematical calculation process which is performed on past stock prices and are useful in anticipating the changes in prices [10]. A technical indicator is an analysis of previous price movements to predict future price movements which are also related to the stock movement chart. The main component of the formation in stock movement chart consists of five parts; they are opening price, the highest price, the lowest price, the closing price, and the volume of transactions [11]. Some examples of technical analysis from past researchers include. Moving average [12], Stochastic, MACD, and Bollinger bands [13], Relative Strength Index (RSI) [14], and Sutte Indicator[11].

Technical analysis is directed to predict the safety of the price. Neely and Weller [15] revealed that technical analysis is used to identify past price movements and other market datas, such as volume as well as to assist in the decision-making process on trades in the asset markets. Furthermore, the price at which buyers and sellers set through a collective agreement that is regarded as a matter of right, weighty and reveals all the factors, rational and irrational, quantitative and non quantitative, and the only picture that should be considered [16].

Many researchers have examined technical analysis. Vasiliou, Eriotis, and Papathanasiou [17] used the rules of the moving average, and the moving average convergence divergence for the Athens stock market and these rules provide strong support for selected technical strategy. Pring

showed that technical analysis aims at identifying trend reversals in the early stages and rising trend until the confidence level indicates that the trend has reversed [18]. Mengoli showed that the trading approach which is comprised of valuable momentum for the Italian stock market and proposed the importance of behavioral theory to help explain the profitability of technical trading [19]. Loh compared academics’ use of the technical trading rules through the practitioner approach for five Asian countries [20].

Zhu and Zhou studied the usefulness of moving the average rule of asset allocation view using data S & P 500 in 1926–2004 [21]. McKenzie tested the rules of technical trading for 17 markets of selected developing countries and concluded that there were no regular trading rules that can generate sufficient forecasting accuracy [22]. Metghalchi, Chang, and GarzaGomez studied the profitability of technical trading rules based on nine favorite technical indicators [23]. Finally Lai, Chen, and Huang analyzed technical analysis with the psychological bias for Taiwan’s stock market and gave the disposition, the information cascade, and the effect of retaining and concluded that each have a particular influence on trading signals [24].

### 3. GLOBAL COMBINATION OF EFFECTIVE MULTI TECHNICAL STRATEGY DEVELOPMENT

Casey meticulously hand-picked the momentum indicator, trend-following indicator and a volume indicator in her study which supports and complements each other as shown in Table 3.1. In fact, technical indicators make it easy to identify current price trends and predict the movement of prices in the future. A multi-indicator strategy should avoid being redundant and should use the best combination of trading indicators in a meaningful way. Relative Strength Index (RSI) indicator was used to identify possible overbought and oversold conditions in the market, while the On Balance Volume (OBV) combines both price and volume to show the total amount of funds going in and out of the market. The Ichimoku Kinko Hyo indicator is done by plotting several different lines on a chart and is used to identify future instances of strong support or resistance, besides buying and selling based on the Bollinger bands indicator and can be a very effective trading strategy especially if used in combination with any of the other technical indicator [25].

Table 3.1: Combination of stock technical indicators used by Casey [25].

Year	Author	Title	Indicators Categories	Indicators used
2020	Casey Stubbs	Best Combinationof Technical Indicators – Market Maker Methods	Trend Volatility Momentum Volume Market Sentiment	Ichimoku Kinko Hyo Bollinger Bands Relative Strength Index (RSI) On Balance Volume(OBV) -

Muruganandana exhibited results that showed the failure of the relative strength index trading rule to deliver the positive return even before deducting transaction cost. However, by moving the average convergence and divergence trading rules, sell signal outperformed the unconditional mean return and buy signal mean return, during the Bear market period before deducting transaction cost [26]. Besides that, Chong and Ng examined the effectiveness of technical analysis to produce excess return in the London stock exchange by using Moving Average

Convergence-Divergence (MACD) and Relative Strength Index (RSI) as shown in Table 3.2. The result showed that it was profitable with higher positive returns that can be generated in comparison to the buy and hold strategy. Another study also proposed that positive significant returns can be produced by using technical analysis (moving average and relative strength as indicators) in Singapore [27]. Wong, Manzur & Chew and Swart studied the ability of technical analysis to generate risk-adjusted return by using individual model. Based on their findings, they found that technical analysis and risk-adjusted returns were positively related to each other, which meant that positive economic and significant risk-adjusted portfolio return can be generated [28][29].

Table 3.2: Combination of stock technical indicators used by [26][27][28][29].

Year	Author	Title	Indicators Categories	Indicators used
2020	S. Muruganandana	Testing the Profitability of Technical Trading Rules across Market Cycles: Evidence from India	Trend	MACD
2011	Forbes, B. M., & Basu, A. K.	Are fundamental & technical analysis able to generate Significant Strength risk-adjusted returns on European Government Bonds?	Volatility	-
2008	Chong and Ng	Technical Analysis and the Testing the MACD and RSI	Momentum	Relative Index (RSI)
2003	Wong, Manzur & Chew	How rewarding is technical analysis? Evidence from Singapore stock market.	Volume	-Londo
			Market Sentiment	-

Vezeris, Kyrgos & Schinas examined various strategies which were added to a simple Moving Average Convergence-Divergence (MACD) automated trading system and used on selected assets from Forex, Metals, Energy, and Cryptocurrencies categories. The authors concluded that using profit strategies based on faster take profit signals on MACD are not better than a simple MACD strategy and of the different Stop Loss strategies based on Average True Range (ATR), the sliding and variable ATR window has the best results for a period of 12 and a multiplier of 6. For the first time, to the best of our knowledge, we implement a combination of an adaptive MACD Expert Advisor that uses back-tested optimized parameters per asset with price levels defined by the ATR indicator, used to set limits for Stop Loss as shown in Table 3.3 [30].

Table 3.3: Combination of stock technical indicators used by Vezeris, Kyrgos & Schinas [30]

Year	Author	Title	Indicators Categories	Indicators used
2018	Vezeris, D., Kyrgos, T., & Schinas, C.	Take Profit and Stop Loss Trading Strategies Comparison in Combination with an MACD Trading System	Trend	(MACD)
			Volatility	(ATR).
			Momentum	-
			Volume	-
			Market Sentiment	-

One way to simplify trading is through a trading plan that includes chart indicators and a few rules as to how to use those indicators. Palombizio discovered there are four easy indicators you

should become familiar with by using one or two at a time to identify trading entry and exit points: as shown in Table 3.4. The moving average is a plotted line that simply measures the average price of a currency pair over a specific period of time, like the last 200 days or year of price action to understand the overall direction that allows us to see and trade off of momentum by entering when the currency pair moves in the direction of the moving average, and exiting when it begins to move opposite. Relative Strength Index (RSI) is an oscillator that is plotted

with values between 0 and 100. The value of 100 is considered overbought and a reversal to the downside is likely whereas the value of 0 is considered oversold and a reversal to the upside is commonplace. If an uptrend has been discovered, it is important to identify the RSI reversing from readings below 30 or oversold before entering back in the direction of the trend. However, the slow stochastic are an oscillator like the RSI to locate overbought or oversold environments, likely making a reversal in price. The unique aspect of trading with the stochastic indicator is the two lines, %K and %D line to signal our entry. Lastly, MACD can be used well in trending or ranging markets due to its use of moving averages to provide a visual display of changes in momentum [31].

Table 3.4: Combination of stock technical indicators used by Palombizio [31].

Year	Author	Title	Indicators Categories	Indicators used
2018	Palombizio, E.	Discover The Best Forex Indicators For A Simple Strategy	Trend	200days Moving Average(MA200) and (MACD)
			Volatility	-
			Momentum	(RSI) and Stochastic oscillator(STO)
			Volume	-
			Market	-
			Sentiment	-

Ahmar has developed a new technical analysis which is the Sutte Indicator as shown in Table 3.5. The Sutte Indicator was developed by considering the opening and the closing price, the highest price as well as the lowest price on the stock. Core indicators used in the Sutte Indicator is the modified Moving Average indicator that takes into consideration the stock price at the time of opening, closing, highest and lowest. Sutte Indicator forms two graphs that show when investors are looking for suitable stocks to buy and sell. This figure is intended to provide a signal to investors to get maximum profit with minimal losses [11].

Table 3.5: Combination of stock technical indicators used by Ahamar [11].

Year	Author	Title	Indicators Categories	Indicators used
2017	Ahmar	Predicting movement of stock of “Y” using Sutte Indicator	Trend	Sutte Indicator
			Volatility	-
			Momentum	-
			Volume	-
			Market	-
			Sentiment	-

Ghobadi evaluated the profitability of technical analysis indicators in obtaining abnormal returns using Stochastic Oscillator (STO), Relative Strength Index (RSI), Money Flow Index (MFI), Commodity Channel Index (CCI), Simple Moving Average (SMA) indicators as shown in Table 3.6. Therefore, trading signal returns done by these five have been evaluated. Sample prices data include copper, palladium, oil, gold, silver, wheat, sugar and dollar index “between the beginning of 2008 to the end of 2013” by referring to transaction costs. The results revealed that the positive returns according to technical analysis and indicator returns of technical analysis is significantly more than London Interbank Offered Rate. According to the results, STO, RSI, CCI, SMA, MFI have, in sequence, more returns and all their returns were more than London Interbank Offered Rate [32].

Table 3.6: Combination of stock technical indicators used by Ghobadi [32].

Year	Author	Title	Indicators Categories	Indicators used
2014	Ghobadi	Profitability of technical analysis indicators to earn abnormal returns in International Exchange Market.	Trend Volatility Momentum  Volume Market Sentiment	Simple Moving average(SMA)  Stochastic oscillator(STO) and Relative strength index(RSI) and Commodity channel index(CCI)  Money flow index -

Rosillo, Fuente and Brugos examined the result of the application of the indicators Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD), Momentum and Stochastic in different companies of the Spanish continuous market as shown in Table 3.7. By using these indicators, it is intended to give purchase and sale recommendations to small investors. The generation of great capital gains depends on the type of Stock Exchange Company and the indicator which is being used. In addition, this research solves the problems in the case of ambiguity, in the indicators, for the traders [33].

Table 3.7: Combination of stock technical indicators used by Rosillo, Fuente and Brugos [33].

Year	Author	Title	Indicators Categories	Indicators used
2012	R. Rosillo, D. de la Fuente & J. A. L. Brugos	Technical analysis and the Spanish stock exchange: testing the RSI, MACD, momentum and stochastic rules using Spanish market companies	Trend Volatility Momentum  Volume Market Sentiment	Moving Average Convergence-Divergence (MACD) - Momentum, Relative Strength Index (RSI) and Stochastic oscillator(STO) - -

Metghalchi, Chang, and Garza Gomez employed the technical indicators in this article which are the Moving Averages (MA), Relative Strength Index (RSI), Parabolic Stop and Reverse (PSAR), Directional Moving System (DMS), Histogram, Stochastic, Money Flow Index (MFI), and On Balance Volume (OBV) as shown in Table 3.8. They established 13 trading models based on one indicator, 25 models based on two indicators, and 28 models based on three indicators. The empirical results show that 58 out of 66 models reject the null hypothesis of equality of the mean returns between buy days and sell days. Their findings provide support for the predictive power of technical trading rules. Finally, the authors applied Superior Predictive Ability to investigate data snooping problems and observed an inverse association between the numbers of technical indicator combinations and trading profitability [22].

Table 3.8: Combination of stock technical indicators used by Metghalchi, Chang, and Garza Gomez [22].

Year	Author	Title	Indicators Categories	Indicators used
2011	Metghalchi, Chang, and Garza-Gomez	Technical analysis of the Taiwanese stock market.	Trend	50days Moving Average(MA50), Parabolic Stop and Reverse (PSAR) and Directional Moving System (DMS),
			Volatility	
			Momentum	Relative Strength Index (RSI) and Stochastic
			Volume	Histogram Money Flow Index (MFI) and On Balance Volume (OBV).
			Market Sentiment	-

Metghalchi , Chang and Marcucci found that the techniques of moving average is significant to the research as shown in Table 3.9, because the setup of the trading rules of the selected variant of moving average was very straightforward. The test can be done by formulating the preferred rules in a spreadsheet such as Microsoft Excel and then applying them on a selected stock data set such as the Dow Jones index for a specific time period. This will result in a simulated return if an investor would have followed the selected trading strategy, which is then compared to the buy-and-hold return of the same stock/index. In order to compare the graphical chart analysis to spot patterns as head and shoulder, using the moving average is not so ambiguous although it follows the trading rules of the selected moving average [23].

Table 3.9: Combination of stock technical indicators used by Metghalchi, Chang and Marcucci [23].

Year	Author	Title	Indicators Categories	Indicators used
2008	Metghalchi, M., Chang, Y. & Marcucci, Y	Is the Swedish Stock Market Efficient? Evidence from Some Simple Trading Rules.	Trend	Variable length moving average(VMA, fixed length moving average rule, (FMA)
			Volatility	-
			Momentum	-
			Volume	-
			Market Sentiment	-

Balsara, Chen and Zheng found that the Autoregressive Integrated Moving Average (ARIMA) forecasting model generates more accurate forecasts as compared to the naïve model based on the random walk assumption. They also observed significant positive returns for individual stocks after transaction costs on buy trades generated by the contrarian version of three commonly used technical trading rules: the moving average crossover rule, the channel breakout rule, and the Bollinger band breakout rule as shown in Table 3.10 [34].

Table 3.10: Combination of stock technical indicators used by Balsara, Chen and Zheng [34]

Year	Author	Title	Indicators Categories	Indicators used
2007	Balsara, N. J., Chen, G. & Zheng, L.	The Chinese stock market: An examination of the random walk model and technical trading rules	Trend Volatility Momentum Volume Market Sentiment	Moving Average (MA), Bollinger Band and Channel breakout - - -

Vasiliou, Eriotis, and Papathanasiou investigated the performance of various technical trading rules in the Athens Stock Market to test two of the simplest and most popular trading rules- Moving Averages and MACD Indicator as shown in Table 3.11. They evaluated how these simple forms of technical analysis can predict stock price movements in the Athens Stock Exchange. This study investigated these effects for the most important index of the Athens market, the Athens General Index. Overall, their results provide strong support for the examined technical strategies [17].

Table 3.11: Combination of stock technical indicators used by Vasiliou, Eriotis, and Papathanasiou [17].

Year	Author	Title	Indicators Categories	Indicators used
2006	Vasiliou, Eriotis, and Papathanasiou	How rewarding is technical analysis? Evidence from Athens Stock Exchange	Trend Volatility Momentum Volume Market Sentiment	Simple moving averages and moving average convergence divergence(MACD) - - -

Sehgal and Garhyan proposed that generally technical analysis produces positive significant mean return in Indian capital market by using several technical indicators. On Balance Volume is the most powerful among other technical indicators which can be used in different phases of the market (bull or bear) as shown in Table 3.12 [35].

Table 3.12: Combination of stock technical indicators used by Sehgal and Garhyan [35].

Year	Author	Title	Indicators Categories	Indicators used
2002	Sehgal and Garhyan	Abnormal Return Using Technical Analysis: The Indian Experience.	Trend Volatility Momentum Volume Market Sentiment	- - - On Balance Volume -



## **4. PROPOSED COMBINATION OF EFFECTIVE MULTI TECHNICAL INDICATOR STRATEGY MODEL**

From previous studies, it can be concluded that there are many other types of technical indicators that need to be studied. However, the perfect combination of indicators is not the one that always points in the same direction, but the one that shows complimentary information. Knowing the right indicators for different circumstances is an important part in trading. Combining indicators that calculate different measurements based on the same price action, and then combining that information with chart studies will quickly have a positive effect on trading. Therefore, Figure 4.1 highlights the six technical indicators in order to successfully trade. These indicators include the Hull Moving Average, Keltner Channel, Narrow Range 4, Momentum Oscillator, Volume Profile, SKEW and VVIX. Collectively, these indicators account for the trend, volatility, momentum, volume and market sentiment aspects of trading that all traders should pay close attention to support and complement each other.

This proposed model is needed in this study because it is important to combine technical indicators prudently to generate good trading signals. Knowing which indicator belongs to which category is not enough, must know how to combine indicators in a meaningful way to make better trading decisions. Combining various indicators in the wrong way can lead to misleading signals. For example, combining indicators belonging to the same class such as MACD, RSI leads to redundancy and doesn't add any value in the price prediction. Essentially both indicators provide the same signal because they examine momentum in price behaviour. This can further induce wrong decisions and significant losses.

### **4.1. Trend prediction with the Crossover of Hull Moving Average and Keltner Channel (Kelhull)**

The Kelhull trading strategy is based on the crossover of Keltner Channel and Hull Moving Average (HMA). Crossover in the slope of the hull moving average and Keltner Channel indicators will predict the uptrend or downtrend.

Signals for downtrend prediction can be seen when the sloping is downward (in this case red) between the HMA crossover with the Keltner Channel, whereas for the uptrend prediction can be seen when the sloping is upward (in this case green) between the HMA crossover with the Keltner channel. This is a purposefully binary representation of bearishness or bullishness.

### **4.2. Volatility prediction with Straddle 4B Range**

#### **4.2.1. Narrow Range 4(NR4)**

Narrow Range 4(NR4) is a volatility indicator. However, a combination of the Kelhull indicator and NR4 called Straddle Figure 4.2: Crossover of Hull Moving Average and Keltner Channel (Kelhull) 4B Range, enables the prediction of the trend volatility. Traditionally, NR4 is able to predict the volatility of stock but is unable to predict the volatility for uptrend or downtrend. Therefore, when combined with the Kelhull, traders are able to predict the trend and volatility for uptrend or downtrend, which increases the probability of the investment's performance.

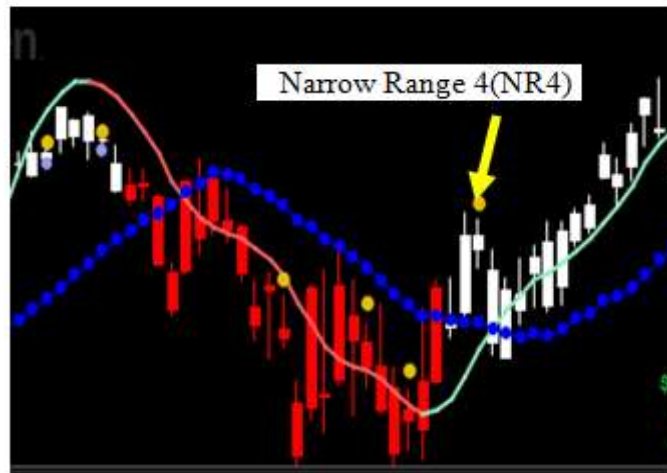


Figure 4.3: Straddle 4B Range

### 4.3. Momentum Observation with Momentum Oscillator

#### 4.3.1. Momentum Oscillator

The momentum study measures the velocity of price changes over a fixed time period. However, the momentum oscillator does not have an upper and lower boundary, therefore the overbought and oversold are pre-set to 80 and 20. If the Momentum Oscillator is more than 80, then it is assumed to have a high momentum in uptrend. These are the exact opposite to the uptrend, if the momentum oscillator is lower than 20, then the high momentum is assumed to be in downtrend.

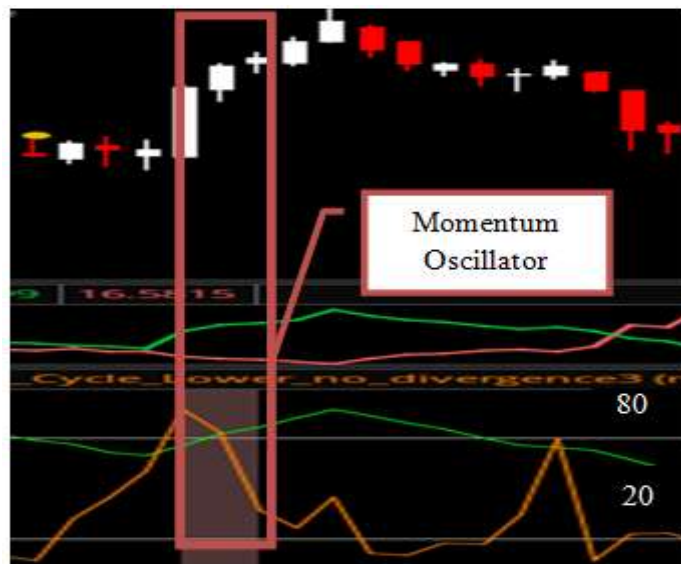


Figure 4.4: Momentum Oscillator

#### 4.4. Volume Indication with Volume Profile

##### 4.4.1. Volume Profile

**Low Volume Nodes** - The low volume nodes signify a drop in the volume around a price level. The low volume nodes are created as a result of a breakout in price after consolidation. During a breakout, you can often observe that price breaks with an initial burst of volume which later drops. These drop off levels imply that the price of the security is at an unfair value. **Point of Control** - the point of control takes into account only the price level which has seen the most consolidation. The point of control, from a trading set up perspective is said to be the level where you could place your stops or entry levels for a trade. The price also tends to revisit the previous point of control levels. This tends to act as both support and resistance.

**High Volume Nodes** - In the high volume nodes, you can commonly see a high level of both buying and selling activity. Prices also remain the same at this level for a long period of time. The high volume nodes imply the fair value for the security in question. When the price approaches a previously established high volume node, you can expect the price to consolidate or move sideways. It is less likely that the market will immediately break past a previous high volume node. Due to the high amount of activity that takes place at the high volume nodes, the price tends to gravitate back to these levels. The high volume nodes are also seen as levels where there is a high amount of institutional buying and selling taking place.

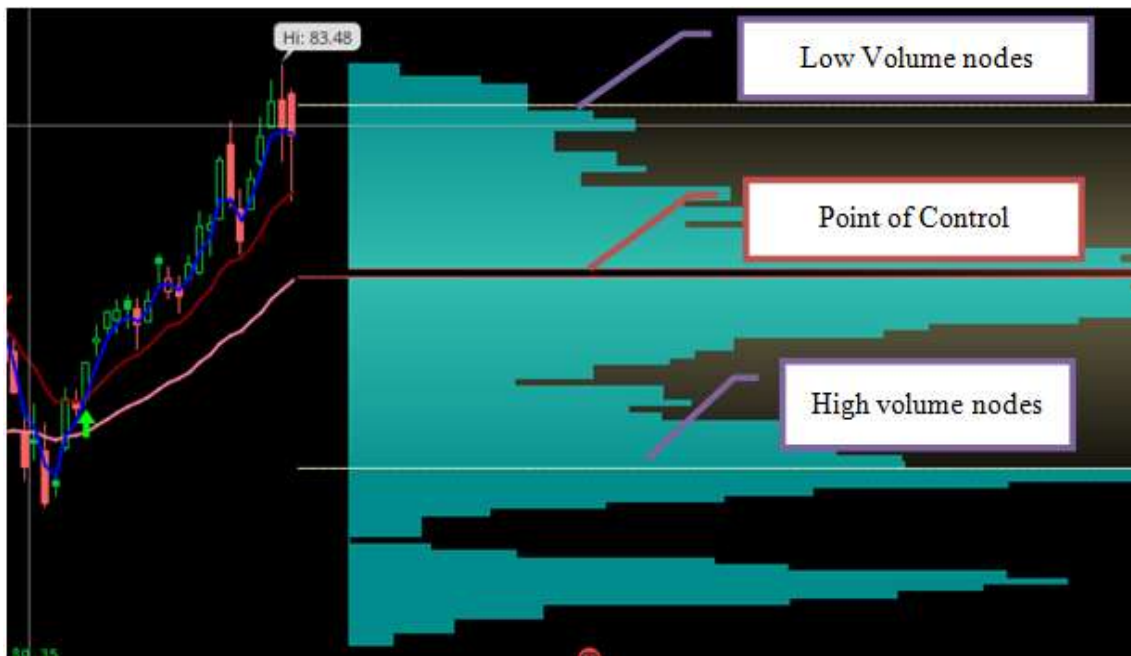


Figure 4.5: Volume Profile

#### 4.5. Market Sentiment Analysis with VVIX and SKEW

##### 4.5.1. VVIX

VVIX is a measure of the volatility of the S&P 500 index and alludes to how quickly market sentiment changes. VVIX levels above 30 generally tend to indicate high volatility and indicate that the stock will be more on downtrend; those below 20 tend to indicate low volatility.

#### 4.5.2. SKEW

The SKEW index is calculated using S&P 500 options that measure tail risk — returns two or more standard deviations from the mean — in S&P 500 returns over the next 30 days. SKEW can thus be used to help determine risk. In this research, if the SKEW index is more than 135, it is an indication that high volatility and downtrend will occur.

### 5. CONCLUSIONS

This paper reviews the stock trend prediction with a combination of effective multi technical indicator strategies to increase investment performances by taking into account various factors such as the performance, the global performance and proposed model of combination of effective multi technical indicator strategy. Technical analysis (TA) to this day, has been largely ignored by academicians, particularly in the Malaysian context. There is not much evidence being documented on technical analysis although it is widely used by practitioners. Investors usually makes the decision of buying or selling t stocks by evaluating a company's performance and other unexpected global, national & social events. Although, such events eventually affect stock prices instantaneously in a negative or positive way, these effects are not permanent most of the time. So, it is not viable to predict stock prices and trends on the basis of fundamental analysis. As a consequence, a model of strategy, to analyze the stock market and upcoming stock trends based on historical prices and Stock Technical Indicators (STIs), is needed.

### 6. CONTRIBUTION AND LIMITATION

A significant contribution of this study is providing reviews to the future researcher due to a clear methodology that includes an extensive explanation of the method and a discussion of the results. This proposed model is focusing on short-term price trend prediction.

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