



A STUDY ON TECHNICAL ANALYSIS OF IT COMPANIES LISTED IN NATIONAL STOCK EXCHANGE

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Abstract

Stock market prediction is a difficult task but technical analysis helps a lot to an investor by making it easier to predict the market accurately to a certain extent, also it helps to understand the sentiments of the market which is based on human psychology. This paper aims at carrying out a technical analysis of 9 IT companies listed on the National Stock Exchange (NSE). The objective of the study is to analyze the performance of IT companies listed in the National Stock Exchange and to predict the future trends in the share prices through Technical Analysis like Exponential Moving Average, Relative Strength Index, and Moving Average Convergence and Divergence. The secondary data was collected from the NSE website for the period of 1st December 2020 to 30th November 2021. Daily Closing Price of 9 IT Companies shares were considered and the future price movements were analyzed using Technical Analysis. With the right amount of knowledge on technical indicators, a technical analyst can predict the future share prices and trends of the selected companies in the stock market which helps the investors to invest in those securities.

Keywords: *National Stock Exchange, Technical analysis, Exponential Moving Average, Relative Strength Index, Moving Average Convergence and Divergence, Stock Market.*

Introduction

The term 'technical' in its application to the stock market, has come to have a special meaning, quite different from its ordinary dictionary definition.¹ Technical analysis is a means of examining and predicting price movements in the financial markets by using historical price charts and market statistics. It is based on the idea that if a trader can identify previous market patterns, they can form a fairly accurate prediction of future price trajectories.² The Concept of Technical analysis was first introduced by Charles Dow, in the Dow Theory in the late 1800s, following several eminent researchers including William P. Hamilton, Robert Rhea, Edson Gould, and John Magee have further contributed to Dow Theory concepts by helping to form its basis. Technical analysis operates from the assumption that past trading activity and price changes of security can be valuable indicators of the security's future price movements when paired with appropriate investing or trading rules. Currently, technical analysis has evolved into hundreds of patterns and signals that have been developed by researchers to support technical analysis trading. Technical analysts have also developed types of trading systems that help them to forecast and trade on price movements. Some indicators are focused primarily on identifying the current market trend, including support and resistance areas, while others are focused on determining the strength of a trend and the likelihood of its continuation. Most commonly used technical indicators and charting patterns include trend lines, channels, oscillators, moving averages, and momentum indicators.

¹ Robert D. Edwards, John Magee, and W.H.C. Bassetti. "Technical Analysis of Stock Trends." Taylor & Francis Group, 2019. <https://www.pdfdrive.com/technical-analysis-of-stock-trends-eleventh-edition-e183985096.html>

² <https://www.ig.com/en/glossary-trading-terms/technical-analysis-definition>



Basic Assumptions of Technical Analysis

- The market discounts everything – Technical analysts believe that the impact of all the factors ranging from company fundamentals to broader market factors to market psychology is already incorporated in the stock price.
- Price move in trends – Analysts expect that prices even in random market movements will exhibit trends regardless of the time frame being observed.
- History repeats itself – Technical analysts consider that history tends to repeat itself, with the repetitive nature of price movements is often attributed to market psychology, which tends to be very predictable based on emotions like fear or excitement.³

Review of Literature

C. Boobalan (2014) has conducted a study on Technical Analysis of Selected Stocks (WIPRO, SBIN, GAIL, ONGC, and ITC) listed in the National Stock Exchange. Technical indicators like Relative Strength Index, Moving Average Convergence and Divergence, Exponential Moving Average were used to analyze the data for the period from February 2011 to March 2014. This study helps to understand the price behavior of the shares, the signals given by them, and the major turning points of the market price.

Rakshith L, Dr. Manoj Kumara N.V (2018) has examined a paper on Technical Analysis on Selected BSE Stocks intending to determine the share price of the selected company for the period from 1st January 2017 to 31st December 2017. The data were analyzed using statistical tools like Mean, Standard Deviation, Correlation, T-test, and Relative Strength Index. It was found that the RSI of the companies selected were having a high volatility rate and there was a change in the price level of selected companies during the period of the study.

Valarmathi. A Kowsalya. P (2016) has analyzed a paper on Technical Analysis of NSE towards IT Stocks regarding the Indian Stock Market for the period of December 2014 to April 2015. To analyze the data statistical tools like Exponential Moving Average and Relative Strength Index and was inferred based on the chart patterns formed. It was found that after the recession the IT companies provided short-term investment gain to their investors and also the market trend of the IT industry tends up with the gradual price fluctuations.

Issac Kofi Nti, Adebayo Felix Adekoya, and Benjamin Asubam Weyori (2020) have conducted a study to undertake a systematic and critical review of 122 pertinent research work reported in academic journals over 11 years (2007-2018) in the area of stock market prediction using machine learning. The various techniques pointed out from these reports have been formed into three categories, namely technical, fundamental, and combined analyses. The data were grouped in the following criteria: the nature of a dataset and the number of data sources used, the data timeframe, the machine learning algorithms used, machine learning task, used accuracy and error metrics and software packages were used for the modeling. It was found that 66% of documents reviewed were based on technical analysis; while 23% and 11% were based on fundamental analysis and combined analyses, respectively. Concerning the number of data sources, 89.34% of documents reviewed, used single sources; while 8.2% and 2.46% used two and three sources respectively. Support vector machines and artificial neural networks were found to be the most used machine learning algorithms for stock market prediction

³ <https://www.investopedia.com/terms/t/technicalanalysis.asp>



Hemal Pandya (2013) has analyzed a paper on Technical Analysis for selected companies of the Indian IT sector from 1-4-2010 to 31-3-2012. IT companies (HCL, INFOSYS, MPHASIS, WIPRO, and TCS) which were listed in both BSE and NSE was selected for the study. To analyze the data statistical tools and techniques like Line chart, Column chart, Stock (Candlestick) chart, Exponential Moving Average, Moving Average Convergence and Divergence, Relative Strength Index, and Rate of Change was used for the study. It was found that the stock prices of these IT companies have less fluctuation and predicted a large growth of IT companies in the future; also, the investment in these IT companies will benefit the investors.

Sudheer. V (2015) has conducted an Empirical study on Trading through Technical Analysis from Indian Stock Market from October 2013 to September 2014. The analysis of data is carried out by the Moving Average Convergence Divergence (MACD) technique to identify the scripts are technically strong or not. Also, it facilitates investors to recognize the current trend and risks associated with the script at par with the market. It was found from the MACD technique that Maruti and Hindustan Unilever companies' scripts were showing upward momentum and Ambuja Cement and NMDC scripts with high volatility whereas ICICI bank, TATA Steel and Cipla scripts were coming down consistently.

R.Chitra (2011) has examined a paper on technical analysis on selected stocks of the energy sector and interpreted whether to buy or sell them by using techniques like Beta, Relative Strength Index, and Simple Moving Average. The secondary data was collected from trading of the equity market in NSE from 1st April 2007 to 31st March 2010. It is found from the study that investors can hold and buy the shares of ONGC, TATA Power, NTPC, GAIL, CAIRN, BPCL, Power Grid Corporation of India, Reliance Power, and Reliance industries as these companies net profits are increasing at a higher rate.

Dr.K.Ramesh and Dr.V.Devendar (2017) have conducted a study on Technical Analysis to predict the future price and to interpret whether to buy or sell 13 Indian listed equities from each sector in NSE Nifty from July 2016 to June 2017. The statistical tools like Moving Average Convergence and Divergence and Relative Strength Index are used to identify the buy and sell signals in the Candlestick Chart. It is found from the study that there is a buy signal for 9 scripts, a sell signal for 2 scripts, and a neutral signal for 2 scripts. Also, there is a strong buy signal for Bharti Airtel Ltd, I T C Ltd, Adani Ports and Special Economic Zone Ltd, Ambuja Cements Ltd, Sun Pharmaceutical Industries Ltd, and Zee Entertainment Enterprises Ltd. and a strong sell signal for Infosys Ltd.

Objective of the study

The objective of the study is to analyze the performance of IT companies listed in the National Stock Exchange and to predict the future trends in the share prices through Technical Analysis like Exponential Moving Average, Relative Strength Index, and Moving Average Convergence and Divergence.

Methodology of the study

The study is based on analytical research. For this study, 9 IT companies (TATA Consultancy Services Ltd., Infosys Ltd., WIPRO Ltd., HCL Technologies Ltd., Tech Mahindra Ltd., Larsen & Toubro Ltd., Mindtree Ltd., NIIT Ltd., and Aptech Ltd.) were selected based on the Market Capitalization Rate. The secondary data was collected from the NSE website for the period of 1st December 2020 to 30th November 2021. Daily Closing Price of 9 IT Companies shares were considered and the future price movements were analyzed using Technical Analysis.



Tools of the Technical Analysis

1. Exponential Moving Average

The Exponential Moving Average (EMA) is a type of moving average that considers the weighted average of a series of recent data to reflect the ongoing trend in the market. The weight of the EMA is exponentially tilted towards more recent occurrences, giving the recent data greater influence over the reading.⁴

The formula for EMA is,

$$\text{EMA}_{(\text{Current})} = (\text{Current Closing Price} - \text{Previous EMA} * \text{Multiplier}) + \text{Previous EMA}$$

The formula for smoothing constant (Multiplier) is,

$$K = 2 / (1 + N)$$

Where N = number of periods for EMA.

How this Indicator works

- EMA is used to determine the trend direction, and to trade in that direction. When the EMA rises, investors consider buying when prices dip near or just below the EMA but when the EMA falls, investors consider selling when prices rally towards or just above the EMA.
- Moving averages can also indicate support and resistance areas. A rising EMA tends to support the price action, while a falling EMA tends to provide resistance to price action. This reinforces the strategy of buying when the price is near the rising EMA and selling when the price is near the falling EMA.⁵

2. Relative Strength Index

Developed by J. Welles Wilder, the Relative Strength Index (RSI) is a momentum oscillator that measures the speed and change of price movements. RSI oscillates between zero and 100. The most popular is the 14 days RSI where the RSI is calculated based on 14 days values. According to Wilder, RSI is considered overbought when above 70 and oversold when below 30. Signals can also be generated by looking for divergences, failure swings, and centerline crossovers. RSI can also be used to identify the general trend. RSI is an extremely popular momentum indicator that has been featured in articles, interviews, and books over the years.⁶

The formula for RSI is,

$$\text{RSI} = 100 - (100 / (1 + \text{RS}))$$

Where RS = Relative Strength

$$\text{RS} = \text{Average Gain} / \text{Average Loss}$$

How this indicator works

- RSI is considered overbought when above 70 and oversold when below 30. These traditional levels can also be adjusted if necessary to better fit the security. During strong trends, the RSI may remain overbought or oversold for extended periods.
- RSI also often forms chart patterns that may not show on the underlying price chart, such as double tops and bottoms and trend lines. Also, look for support or resistance on the RSI.

⁴ <https://www.ig.com/en/trading-strategies/what-is-exponential-moving-average-ema-and-how-to-use-it-200129>

⁵ <https://www.fidelity.com/learning-center/trading-investing/technical-analysis/technical-indicator-guide/ema>

⁶ https://school.stockcharts.com/doku.php?id=technical_indicators:relative_strength_index_rsi



- In an uptrend or bull market, the RSI tends to remain in the 40 to 90 range with the 40-50 zone acting as support. During a downtrend or bear market, the RSI tends to stay between the 10 to 60 range with the 50-60 zone acting as resistance. These ranges will vary depending on the RSI settings and the strength of the security's or market's underlying trend.
- If underlying prices make a new high or low that isn't confirmed by the RSI, this divergence can signal a price reversal. If the RSI makes a lower high and then follows with a downside move below a previous low, a Top Swing Failure has occurred. If the RSI makes a higher low and then follows with an upside move above a previous high, a Bottom Swing Failure has occurred.⁷

3. Moving Average Convergence and Divergence

Developed by Gerald Appel in the last seventies, moving average convergence divergence (MACD) is one of the simplest and most effective momentum indicators available. The MACD indicator is one of the most popular technical analysis tools. MACD fluctuates above and below the zero line as the moving averages convergence, Cross, and divergence. Standard MACD is a 12-day exponential moving average (EMA) less the 26-day EMA. A 9-day EMA of MACD is plotted alongside between MACD and its 9-day EMA, the signal line. Convergence occurs when the moving averages move towards each other. Divergence occurs when the moving averages move away from each other.⁸

The formula for the calculation of MACD is,

MACD line = (12-day EMA – 26-day EMA)

Signal line = 9-day EMA of MACD line

MACD histogram = MACD line – Signal line

Positive MACD indicates that the 12-day EMA is above the 26-day EMA i.e. when the MACD histogram is positive. This means the upside momentum is increasing. On the other hand, **negative MACD** indicates that the 12-day EMA is below the 26-day EMA i.e. when the MACD histogram is negative. This means downside momentum is increasing.

How this indicator works

MACD generates two kinds of signals. They are: -

- **Signal Line Crossovers:** a bullish crossover occurs when MACD turns up and crosses above the signal line. A bearish crossover occurs when MACD turns down and crosses below the signal line.
- **Centre Line Crossovers:** a bullish centerline crossover occurs when MACD moves above the zero line to turn positive. At this time a BUY signal is generated. A bearish centerline crossover occurs when MACD moves below the zero line to turn negative. At this time a SELL signal is generated.⁹

Data Analysis and Interpretation

With the help of Tradingview.com charts of 9, IT companies have been constructed to interpret based on their price fluctuations.

⁷ <https://www.fidelity.com/learning-center/trading-investing/technical-analysis/technical-indicator-guide/RSI>

⁸ Sudheer. V (2015). Trading Through Technical Analysis: An Empirical Study From Indian Stock Market. International Journal of Development Research. Vol.5,Issue,08, pp. 5410-5416, August, 2015.

⁹ Hemal Pandya (2013). Technical Analysis for Selected Companies of Indian IT Sector. International Journal of Advanced Research. Volume 1, Issue 4.



Chart 1 shows the EMA, RSI, and MACD of TATA Consultancy Services Ltd.



Interpretation

▪ **Exponential Moving Average (EMA)**

Above chart signifies those two smoothing curves are drawn along with the price curve. EMA 20 represents the 20 days Exponential Moving Average (Fast Moving Average) while EMA 50 represents the 50 days Exponential Moving Average (Slow Moving Average). Moving averages are often used by technical analysts to keep track of price trends and identify the trade signals. A ‘Buy’ signal indicates that the faster-moving average crosses above the slower moving averages. A ‘Sell’ signal indicates that the faster-moving average crosses below the slower moving averages. It is observed from the above chart that both 20 days EMA and 50 days EMA is rising and the price of TCS is above the moving averages. The 20 days EMA (fast-moving average) is below the 50 days EMA (slow-moving average), so the trend of TCS indicates a sell signal or a Bearish trend.

▪ **Relative Strength Index (RSI)**

From the above chart the price line of TCS and the 14 days RSI line are plotted. The RSI values of 70 or above indicate that the security is overbought or overvalued and the RSI values of 30 or below indicate that the security is oversold or undervalued, hence there are chances for a trend reversal in both conditions. The RSI value of TCS was above 70 in January 2021 indicating that the security of TCS was overbought and between August to September 2021 we can see the uptrend of TCS security. At the end of October 2021, we can see the bearish sign indicating that the TCS security is oversold, whereas at the end of November 2021 the RSI value lies between 50 to 70 indicating a bullish trend.

▪ **Moving Average Convergence and Divergence (MACD)**

MACD is often displayed with a histogram that graphs the distance between the MACD and its signal line. If the MACD is above the signal line, the histogram will be above the MACD’s baseline. If the MACD is below its signal line, the histogram will be below the MACD’s baseline. Therefore, traders



use the MACD's histogram to identify when bullish or bearish momentum is high. From the above chart of TCS, a bearish trend can be seen at the end of November 2021, also a negative MACD indicates that the 12-day EMA is below the 26-day EMA i.e., when the MACD histogram is negative but in the above chart of TCS, MACD histogram is positive as the MACD line is slowly moving upward after touching the signal line below zero at the end of November 2021 by indicating a downside momentum.

Chart 2 shows the EMA, RSI, and MACD of Infosys Ltd.



Interpretation

- **EMA**

It is observed from the above chart that both 20 days EMA and 50 days EMA is rising and the price of Infosys is below the moving averages. The 20 days EMA (fast-moving average) is above the 50 days EMA (slow-moving average) indicating a buy signal or bullish trend.

- **RSI**

From the above chart the price line of Infosys and the 14 days RSI line are plotted. The security of Infosys was over-bought in the beginning month of January 2021, June 2021, and August 2021. At the month-end of November 2021, the RSI lies between 40 to 50 indicating a downtrend or a bear market.

- **MACD**

The above chart of Infosys shows that in the beginning month of December 2020 the MACD line crosses from below to above the signal line indicating a bullish trend. Whereas, the MACD line at end of November 2021 is crossing from above to below the signal line indicating a bearish trend. A negative MACD indicates that the 12-day EMA is below the 26-day EMA i.e. when the MACD histogram is negative.



Chart 3 shows the EMA, RSI, and MACD of WIPRO Ltd.



Interpretation

▪ EMA

From the above chart of Wipro Ltd. the 20 days EMA and 50 days EMA is increasing and the price is below the moving averages. The 20 days EMA crosses below the 50 days EMA indicating a sell signal or a bearish trend.

▪ RSI

The price line of Wipro Ltd. and 14 days of RSI line are plotted in the above chart. At the beginning of December 2021, the RSI lies between 50 to 60 and increases to above 70 from 1st January 2021 to 15th January 2021 indicating the Wipro company security is over purchased and it fluctuated in the following months. At the end of November 2021, the RSI of Wipro keeps moving downward indicating a bearish trend.

▪ MACD

It is observed from the above chart that a negative MACD indicates that the 12-day EMA is below the 26-day EMA i.e. when the MACD histogram is negative. In December we can see the MACD line is crossing from below to above the signal line indicating a bullish trend, whereas at the end of October 2021 the MACD line is crossing from above to below the signal line and keeps moving downward indicating a bearish trend.



Chart 4 shows the EMA, RSI, and MACD of HCL Technologies Ltd.



Interpretation

▪ EMA

The price line of HCL Technologies is below the two moving averages and the 20 days EMA and 50 days EMA are showing an increasing and fluctuating trend. The 20 days EMA and 50 days EMA are showing an increasing trend from the beginning month of December 2020 and keep fluctuating further. But in November 2021, the 20 days EMA line crosses the 50 days EMA line and keeps moving downward by indicating a sell signal to the investors.

▪ RSI

In the above chart, the price line and 14 days RSI are plotted. At the beginning month of December 2020 the RSI keeps moving upward indicating a bullish trend, whereas from October to November 2021, the RSI lies between 30 to 50 indicating a bearish trend.

▪ MACD

At the beginning month of December 2020, the MACD line increases along with a positive MACD histogram and keeps fluctuating. In September end the MACD line crosses from above to below the signal line indicating a bearish trend and at the end of November 2021, the negative MACD line is



crossing from below to above the negative signal line indicating that prices of HCL Technologies may increase in the future.

Chart 5 shows the EMA, RSI, and MACD of Tech Mahindra Ltd.



Interpretation

▪ EMA

The above chart signifies the price of Tech Mahindra is above the two moving averages and the 20 days EMA and 50 days EMA is increasing. The 20 days EMA line is above 50 days EMA indicating a buy signal or a bullish trend for investors to purchase the security.

▪ RSI

The price line and 14 days RSI of Tech Mahindra are plotted in the above chart. The increasing trend of RSI in the beginning month of December 2020 indicates the securities of Tech Mahindra are over-bought or overvalued in January 2021 and August 2021. At present, the RSI lies between 50 to 60 indicating that prices may go high in the future.

▪ MACD

At the beginning month of December 2020, the MACD line crosses from above to below the signal line and keeps fluctuating. At the end of November 2021, the MACD line crosses from above to below signal line with a negative MACD Histogram indicating a bearish trend.



Chart 6 shows the EMA, RSI, and MACD of Larsen & Toubro InfoTech Ltd.



Interpretation

- **EMA**

The price of Larsen & Toubro InfoTech Ltd. is above the two moving averages and the 20 days EMA and 50 days EMA is increasing. The 20 days EMA line is above the 50 days EMA line indicating a buy signal or a bullish trend.

- **RSI**

The price line of Larsen & Toubro InfoTech Ltd. and 14 days RSI are depicted in the above chart. The RSI of Larsen & Toubro InfoTech Ltd. started with the bullish trend in December 2020 and reached to overbought position till mid of January 2021. During mid-month of February 2021, and from the end of April to the mid-month of May 2021 shows a bearish trend. From the end of July till the end of September we can see the security was overvalued and at present, the RSI lies between 50 to 60 indicating that the price may increase in the future.

- **MACD**

From the above chart, the MACD line is intersecting multiple times with the signal line over the period. During the mid-month of November 2021, the MACD line crosses from above to below signal line and continues to move downward with a negative MACD histogram indicating a bearish trend.



Chart 7 shows the EMA, RSI, and MACD of Mindtree Ltd.



Interpretation

▪ EMA

The price of Mindtree Ltd. is below the two moving averages and the 20 days EMA and 50 days EMA is rising. The 20 days EMA line is above the 50 days EMA line indicating the bullish trend or a buy signal for the investors.

▪ RSI

The above chart of Mindtree Ltd. depicts the price line and 14 days RSI line. The RSI of Mindtree Ltd. shows a bullish trend at the beginning month of December 2020 and the security is overbought at many stages during the period. But in the mid-month of November 2021 after reaching 70 the RSI line started to move downwards by indicating a bearish trend.

▪ MACD

It is observed from the above chart that a negative MACD indicates that the 12-day EMA is below the 26-day EMA i.e. when the MACD histogram is negative. At present, the MACD line is crossing from above to below the signal line and keeps moving downward indicating a bearish trend.



Chart 8 shows the EMA, RSI, and MACD of NIIT Ltd.



Interpretation

▪ EMA

The price of NIIT Ltd. is above the two averages and the 20 days EMA and 50 days EMA is rising. The 20 days EMA line is above the 50 days EMA line indicating a buy signal or a bullish trend.

▪ RSI

In the above chart, the price line of NIIT Ltd. and 14 days RSI is plotted. It is observed from the above chart that NIIT Ltd. security was undervalued from 15th March 2021 to 31st March 2021. From 3rd June 2021 to 16th June 2021 the security was overvalued which intends the investors to over purchase the security of NIIT Ltd. At the end of November 2021, the RSI lies between 50 to 70 indicating a bullish trend.

▪ MACD

The above chart depicts the positive MACD which indicates that the 12-day EMA is above the 26-day EMA i.e. when the MACD histogram is positive. The MACD line crosses from below to above the signal line indicating an upward trend or a bullish trend.



Chart 9 shows the EMA, RSI, and MACD of Aptech Ltd.



Interpretation

▪ EMA

The price of Aptech Ltd. is below the fast moving average (20 days EMA) and the 20 days EMA and 50 days EMA is rising. The 20 days EMA line is above the 50 days EMA line indicating a buy signal or a bullish trend.

▪ RSI

The price line of Aptech Ltd. and 14 days RSI line is plotted in the above chart. At the beginning of December month, we can see an upward trend and keeps increasing till mid-month of February 2021 indicating that Aptech Ltd. security was overvalued but the RSI line started to move downwards at the end of February 2021 signifying that security was oversold till the end of March 2021 and from there the RSI line started to move upwards and kept fluctuating. At the end of November 2021, the RSI lies between 50 to 60 indicating that the prices may go high in the future.

▪ MACD

The above chart signifies a positive MACD as the 12 days EMA is above the 26 days EMA but with a negative MACD histogram. Considering the MACD line at the mid-month of November 2021 is crossing from above to below the signal line indicating a bearish trend or a downward trend.

Conclusion

Technical analysis is based on price movement and volume of transactions which aims to recognize the potential of stock in the future. Technical analysis helps the traders to analyze the security for short-term trading and to identify the correct time for entering or exiting the market. With the right amount of



knowledge on technical indicators, a technical analyst can predict the future share prices and trends of the selected companies in the stock market which helps the investors to invest in them. The technical analysis of 9 IT companies using technical indicators like Exponential Moving Average, Relative Strength Index, and Moving Average Convergence and Divergence signifies that the market trend of the IT industry aims skyward with the progressive price fluctuation. A technical analyst should have exquisite knowledge about stock patterns and trends through which an investment decision can be made on the selected companies. Investors should also consider fundamental analysis along with technical analysis for a better investment decision in the stock market and to predict the future share prices of the companies.

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