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Buy And Sell Signal Accuracy Of The LQ45 Index Using MACD And RSI Indicators, 2022-2025

Rezky Amelia[1], Alim Syariati[2], Eka Indriyani[3]

[1,2,3]Management, Faculty of Islamic Economics and Business, Alauddin State Islamic University of Makassar

Abstract

This study aims to analyze the accuracy of buy and sell signals generated by the Moving Average Convergence Divergence (MACD) and Relative Strength Index (RSI) indicators for stocks included in the LQ45 Index during 2022–2025 and to determine which indicator provides better accuracy. This research addresses the need for reliable technical analysis tools amid stock market volatility and changing investor sentiment. Previous studies have examined MACD and RSI individually, but comparative evidence regarding their accuracy for LQ45 stocks remains limited. This study employs a quantitative approach with a comparative descriptive design. Secondary data consisting of historical stock prices of LQ45 constituents were obtained from stock market sources. Data were analyzed by calculating the accuracy of buy and sell signals generated by both indicators, followed by descriptive statistics, normality testing, and difference testing. The results show that both MACD and RSI provide reasonably accurate trading signals. However, MACD demonstrates higher accuracy than RSI, particularly in identifying market trends and momentum. RSI is more effective in identifying overbought and oversold conditions. These findings provide comparative evidence for selecting technical indicators in LQ45 stock investment decisions.

Keywords: Signal Accuracy, MACD, RSI, LQ45 Index

INTRODUCTION

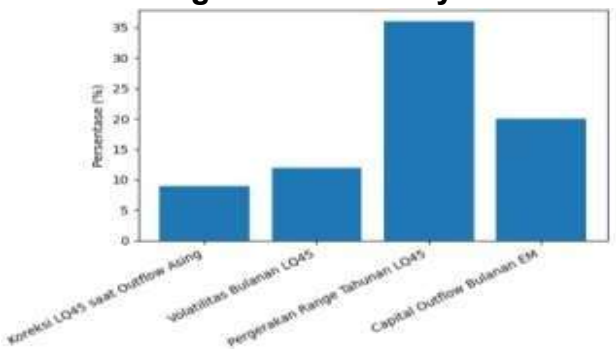
The capital market plays an important role in supporting a country's economy through its financial intermediation function, connecting parties with excess funds (investors) and parties requiring funding (issuers). In Indonesia, public interest in capital market investment has continued to grow alongside increasing financial literacy and easier access to digital investment platforms. Stocks are among the most attractive

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investment instruments because of their potential returns. The development of information technology and social media has further increased public interest in stock investment, particularly among younger generations who have easier access to capital market information (Rika Dwi Ayu Parmitasari et al., 2026). Among the stocks listed on the Indonesia Stock Exchange (IDX), those included in the LQ45 Index are considered attractive because they represent companies with high market capitalization, strong liquidity, and relatively sound fundamentals. The LQ45 Index consists of 45 selected stocks based on liquidity, market capitalization, and fundamental criteria, making these stocks relatively easy to trade with high transaction frequency and volume and relatively low bid-ask spreads (Santoso Sukamulja, 2020; Java Al Maduri et al., 2025; Santoso & Sukamulja, 2024).

However, high liquidity does not eliminate price volatility. LQ45 stocks remain vulnerable to global economic uncertainty, monetary policy changes, geopolitical developments, and foreign capital movements. High trading activity reflects strong investor interest and makes the LQ45 Index an important reference in Indonesian stock market analysis (Setiawan et al., 2021). Nevertheless, emerging markets, including Indonesia, tend to be sensitive to changes in global risk perceptions and foreign capital flows, which may cause substantial changes in stock prices (Gaies et al., 2024). Foreign capital outflows may generate significant short-term corrections, demonstrating the sensitivity of liquid stocks to changes in global sentiment (Xiao et al., 2023). In addition, excessive market reactions and negative global sentiment can create short-term price anomalies, making it difficult for investors to determine appropriate entry and exit points (Liu et al., 2022). These conditions indicate the importance of analytical methods that can assist investors in identifying market movements more accurately.

Figure 1 : Market Changes and Volatility: Literature Illustration



Source: Processed from Indonesia Stock Exchange and Bank Indonesia data and related literature.

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Buy and sell signal accuracy refers to the extent to which signals generated by a particular method correctly reflect subsequent actual price movements. The higher the proportion of correct signals compared with total signals, the greater the accuracy and reliability of the method in supporting investment decisions (Kostini et al., 2024). Accurate trading signals are important because they can help investors determine appropriate entry and exit points, reduce errors in interpreting market conditions, and minimize the impact of false signals caused by market noise and volatility (Faradilla & Raprayoga, 2025). Investors therefore need to apply appropriate analytical approaches before making buying and selling decisions because market risk and business conditions can significantly influence stock prices (Alwi et al., 2021). Previous research has also shown that technical indicators such as Moving Average Convergence Divergence (MACD) and Relative Strength Index (RSI) can provide useful signals for predicting stock price movements, although their effectiveness may differ depending on market conditions (Latipah & Syafitri, 2024).

Moving Average Convergence Divergence (MACD) is a technical indicator that analyzes the relationship between two exponential moving averages, commonly using the 12-day and 26-day periods, with a 9-day signal line. Buy signals generally occur when the MACD line crosses above the signal line, while sell signals appear when the MACD line crosses below the signal line. Histogram movements can also indicate changes in market momentum. The ability of MACD to identify momentum, trends, and divergence makes it useful for detecting potential changes in market direction (Chong et al., 2014). Previous research by Navarro and Navarro (2023) examined the effectiveness of MACD in generating buy and sell signals and found empirical evidence supporting its use as a technical analysis tool for investment decision-making. Thus, MACD may provide stronger signals in markets characterized by relatively clear and strong trends.

In contrast, the Relative Strength Index (RSI) is a momentum oscillator designed to measure the speed and magnitude of price movements on a scale from 0 to 100. RSI commonly identifies overbought conditions when its value exceeds 70 and oversold conditions when its value falls below 30. These conditions can provide indications of potential price reversals and are particularly useful when markets experience extreme price movements (Indah & Mahyuni, 2022). Previous research has found that RSI can effectively identify trends and market momentum and support buy and sell decisions (Chong et al., 2014). Vaidya (2020) also found that RSI is useful for identifying medium- and long-term trends. Furthermore, Syahazwani and Shariman (2023) reported that RSI

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can provide high precision in identifying overbought and oversold conditions. Nevertheless, both MACD and RSI may produce false signals, particularly during volatile or sideways market conditions (Chong et al., 2014).

Based on the existing literature, an important research gap remains regarding the comparative accuracy of MACD and RSI in generating buy and sell signals specifically for LQ45 stocks during the 2022–2025 period. Previous studies have generally examined the effectiveness of individual indicators or focused on different market periods and instruments, while relatively limited research has directly compared both indicators under the same LQ45 market context. The 2022–2025 period is particularly relevant because it reflects post-pandemic market adjustments, global inflationary pressures, changing monetary policies, and fluctuations in foreign capital flows. Therefore, this study aims to comparatively analyze the accuracy of buy and sell signals generated by MACD and RSI for stocks included in the LQ45 Index during 2022–2025 and determine which indicator provides the better level of accuracy. The novelty of this research lies in providing recent empirical comparative evidence regarding the effectiveness of MACD and RSI within the specific context of LQ45 stocks. The findings are expected to contribute to the development of technical analysis literature and provide practical information for investors in selecting indicators to support more accurate and measurable investment decisions.

LITERATURE REVIEW

Previous studies have extensively examined the use of technical indicators to generate buy and sell signals in the Indonesian stock market. Moving Average Convergence Divergence (MACD) is generally used to identify trends and market momentum, while Relative Strength Index (RSI) is mainly applied to detect overbought and oversold conditions. Pramudya and Pramudya (2020) found that MACD had a positive and significant effect on the accuracy of buy and sell signals for LQ45 stocks, while RSI had a positive but insignificant effect. Christian et al. (2022) also demonstrated that the effectiveness of technical indicators differs among methods, with MACD producing positive returns but involving more transactions and greater risk. Darmawan and Rahyuda (2024), examining banking stocks within the LQ45 Index, reported that MACD generated 53 buy and sell signals, of which 43 were successfully followed by corresponding price movements. Similarly, Bella and Lusiawati (2024), who analyzed energy-sector LQ45 stocks using Candlestick, Bollinger Bands, MACD, RSI, Stochastic Oscillator, and Parabolic SAR, found that MACD and RSI generated different trading

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signals across stocks, indicating that indicator effectiveness may depend on individual stock characteristics and market conditions.

Comparative studies have produced different conclusions regarding the relative effectiveness of MACD and RSI. Sadipung and Fauzi (2024), who analyzed PT Perusahaan Gas Negara Tbk during 2022–2023, found that MACD generated seven true buy and seven true sell signals, while RSI generated only two true buy and two true sell signals. These findings suggest that MACD was more effective in identifying actual price movements for the observed stock. In contrast, Melda et al. (2025) reported that RSI achieved an accuracy rate of 97%, with 31 successful signals from 32 signals, whereas MACD achieved only 52%, with 86 successful signals from 166 signals. Nevertheless, MACD generated higher returns than RSI. The Mann–Whitney test conducted in the study also indicated no statistically significant difference between the accuracy of the two indicators. Herlambang et al. (2024) similarly found that MACD and RSI produced average accuracy levels above 50% when applied to LQ45 stocks. These findings reveal an important debate: an indicator with higher signal accuracy does not necessarily generate higher returns, and the superiority of an indicator may depend on the prevailing market condition.

Research involving other market indices provides additional evidence of the inconsistent effectiveness of technical indicators. Hutabarat et al. (2025), examining companies listed on the IDX30 Index, found that MACD achieved the highest observed accuracy at 89%, followed by Stochastic Oscillator at 81%, RSI at 79%, and Money Flow Index at 63%. The study concluded that MACD was the most consistent indicator, although other indicators could serve as confirmation tools. Meanwhile, Huda et al. (2025) found that the individual use of MACD, RSI, and Stochastic Oscillator did not consistently produce accurate buy and sell signals for JII30 stocks. However, combining the indicators improved the identification of bullish and bearish market conditions. These contrasting findings demonstrate that technical indicators do not have universally superior performance and that their effectiveness may vary according to market characteristics, stock selection, observation periods, and analytical approaches.

Based on the reviewed literature, an important research gap remains. Although previous studies have examined MACD and RSI separately or comparatively, relatively limited research has directly compared their signal accuracy across LQ45 stocks during the 2022–2025 period. Existing studies have mostly focused on specific companies, particular sectors, shorter observation periods, or different indices such as IDX30 and JII30. Furthermore, the findings remain inconsistent, with some studies identifying

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MACD as more effective, while others demonstrate superior accuracy for RSI. Therefore, this study positions itself as a comparative empirical study examining the accuracy of buy and sell signals generated by MACD and RSI for LQ45 stocks during 2022–2025. The novelty of this research lies in providing updated comparative evidence within the post-pandemic market period, characterized by changing investor sentiment, global economic uncertainty, and market volatility. The findings are expected to contribute to the literature on technical analysis and provide practical information for investors in selecting appropriate indicators for stock trading decisions.

RESEARCH METHOD

This study employs a quantitative approach with a descriptive-verificative design to examine the accuracy of buy and sell signals generated by the Moving Average Convergence Divergence (MACD) and Relative Strength Index (RSI) indicators for stocks included in the LQ45 Index during 2022–2025. Quantitative research is appropriate because the study uses numerical historical stock-price data and statistical procedures to objectively evaluate the performance of the indicators (Creswell, 2014; Siroj et al., 2024). The population consists of stocks included in the LQ45 Index listed on the Indonesia Stock Exchange (IDX), while the sample is selected using purposive sampling based on predetermined criteria, including continuous inclusion in the LQ45 Index, complete daily closing-price data during 2022–2025, active trading activity, and the absence of prolonged trading suspensions (Etikan, 2016). The research uses secondary data obtained through official IDX publications and Yahoo Finance, including daily opening, highest, lowest, closing prices, and trading volume. Data collection is conducted using documentation techniques, while the research instruments consist of the standard MACD and RSI formulas and an accuracy measurement based on the proportion of correct signals to total generated signals. The use of publicly available data also ensures that the research does not involve personal or confidential information.

The analytical framework evaluates MACD (X1) and RSI (X2) as technical indicators that generate buy and sell signals, with signal accuracy (Y) as the dependent variable. MACD is calculated using the difference between the 12-day and 26-day exponential moving averages, while RSI is calculated using its standard 14-period formula. Signal accuracy is calculated as the number of correct signals divided by the total number of signals multiplied by 100%. Data processing is performed using IBM SPSS Statistics. The analysis consists of descriptive statistics, normality testing, accuracy testing, and a difference test. Normality testing determines whether parametric

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or non-parametric statistical procedures are appropriate (Tyastirin & Hidayati, 2017). A One-Way ANOVA is used to examine whether there is a statistically significant difference in accuracy between MACD and RSI, with a significance level of 0.05 (Ghozali, 2018). Data credibility is maintained through the use of reliable and publicly accessible financial data, standardized technical-indicator formulas, transparent analytical procedures, and proper citation of all supporting scientific sources.

RESULT

1. Descriptive Statistical Analysis

The descriptive statistical analysis was conducted to provide an overview of the distribution and general characteristics of the MACD and RSI indicators used in this study. The analysis includes the minimum value, maximum value, mean, and standard deviation of each indicator. These descriptive measures are important for identifying the central tendency and variability of the data before conducting further statistical analysis.

Table 1. Descriptive Statistical Analysis

Descriptive Statistics					
	N	**Min**	**Max**	**Mean**	**Std. Deviation**
MACD	40	52	82	64,35	7,389
RSI	40	52	76	61,00	7,292

Source: Processed with SPSS 25 (2026)

Based on Table 1, the descriptive statistical results show that both MACD and RSI consist of 40 observations. MACD has a minimum value of 52 and a maximum value of 82, with a mean of 64.35 and a standard deviation of 7.389, while RSI has a minimum value of 52 and a maximum value of 76, with a mean of 61.00 and a standard deviation of 7.292. These results indicate that MACD has a higher average value than RSI, suggesting that MACD provides a higher average accuracy during the observation period.

2. Normality Test

A normality test was performed to determine whether the data for the MACD and RSI indicators follow a normal distribution. The normality test is important because

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normally distributed data are one of the assumptions underlying several parametric statistical procedures, including ANOVA.

Table 2. Normality Test

Tests of Normality						
Indicator	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MACD	0,096	40	.200*	0,970	40	0,369
RSI	0,136	40	0,059	0,945	40	0,052

Source: Processed with SPSS 25 (2026)

Table 2, the normality test results indicate that both MACD and RSI data are normally distributed. The Kolmogorov-Smirnov test produces significance values of 0.200 for MACD and 0.059 for RSI, while the Shapiro-Wilk test produces significance values of 0.369 for MACD and 0.052 for RSI. Since all significance values are greater than 0.05, the null hypothesis is not rejected, indicating that the data do not significantly deviate from a normal distribution.

3. MACD and RSI Accuracy

The next analysis focuses on comparing the accuracy of MACD and RSI in predicting stock price movements. Table 3 presents the accuracy percentages of both technical indicators for ten LQ45 stocks over the 2022–2025 period. This comparison provides an overview of the performance of each indicator across different companies and years.

Table 3. Results of MACD and RSI Accuracy Analysis for LQ45 Stocks, 2022-2025

Stock Code	Year	MACD Accuracy (%)	RSI Accuracy (%)
ADRO	2022	72%	60%
	2023	65%	76%
	2024	82%	58%
	2025	64%	60%
TLKM	2022	75%	63%

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Stock Code	Year	MACD Accuracy (%)	RSI Accuracy (%)
	2023	67%	53%
	2024	67%	52%
	2025	67%	60%
ASII	2022	67%	53%
	2023	67%	54%
	2024	56%	53%
	2025	61%	63%
ICBP	2022	52%	56%
	2023	79%	56%
	2024	57%	60%
	2025	71%	67%
UNTR	2022	75%	75%
	2023	56%	72%
	2024	65%	62%
	2025	65%	73%
BBCA	2022	70%	70%
	2023	56%	56%
	2024	67%	68%
	2025	62%	62%
BBRI	2022	68%	68%
	2023	55%	58%
	2024	52%	52%
	2025	60%	55%
BMRI	2022	74%	74%
	2023	64%	64%
	2024	56%	56%
	2025	56%	56%
BBNI	2022	60%	60%
	2023	63%	71%
	2024	68%	71%
	2025	52%	52%

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Stock Code	Year	MACD Accuracy (%)	RSI Accuracy (%)
BBTN	2022	64%	64%
	2023	70%	70%
	2024	68%	52%
	2025	59%	57%

Source: Data Processed Based On The Accuracy Model (2026).

Based on Table 3, the accuracy results show that the performance of MACD and RSI varies across the ten LQ45 stocks and the 2022–2025 observation period. MACD records its highest accuracy at 82% for ADRO in 2024, while RSI reaches its highest accuracy at 76% for ADRO in 2023. In several observations, MACD achieves higher accuracy than RSI, while in other observations RSI performs better, and some observations show equal accuracy between the two indicators. This variation indicates that the effectiveness of MACD and RSI differs depending on the stock and year. Nevertheless, the descriptive results indicate that MACD generally has a higher average accuracy than RSI, as reflected by the mean values of 64.35% and 61.00%, respectively.

4. Difference Test (One-Way ANOVA)

This test aims to determine whether the observed difference between the two indicators represents a statistically significant difference rather than merely a difference occurring due to variation in the sample data.

Table 4. Results of Statistical Difference Test

Indicator Comparison	ANOVA Significance (Sig.)
MACD – RSI	**0.045**

Source: Processed with SPSS 25 (2026)

Based on the output above, the ANOVA test obtained a significance value of 0.045, which is less than 0.05. Therefore, it can be concluded that there is a significant difference between the two indicators in generating signals.

DISCUSSION

Based on the results of the research and the statistical tests conducted, this discussion explains the accuracy of buy and sell signals generated by the Moving

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Average Convergence Divergence (MACD) and Relative Strength Index (RSI) indicators for stocks included in the LQ45 Index during 2022-2025. The discussion focuses on the ability of each indicator to identify actual price movements and compares their respective levels of accuracy.

1. The Use of MACD in Measuring the Accuracy of Buy and Sell Signals

The results indicate that the Moving Average Convergence Divergence (MACD) indicator is capable of generating relatively accurate buy and sell signals for LQ45 stocks. All observed MACD accuracy values exceeded the 50% threshold established in this study. The highest accuracy reached 82%, while the lowest was 52%, with an average accuracy of 64.35%. These findings indicate that MACD has a relatively consistent ability to identify stock price trends and momentum. Therefore, the hypothesis stating that MACD is capable of predicting buy and sell signals is supported.

The consistency of MACD can be explained by its characteristics as a trend-following indicator. MACD uses the difference between exponential moving averages to identify changes in price direction and momentum. A bullish crossover occurs when the MACD line moves above the signal line, indicating increasing upward momentum, while a bearish crossover occurs when the MACD line moves below the signal line, indicating weakening momentum. Murphy (1999) explains that trend-based indicators are particularly useful when the market demonstrates a clear upward or downward trend because they enable investors to follow the dominant direction of price movements.

The findings are consistent with Guercio et al. (2019), who found that technical indicators can contribute to improving the quality of trading signals by capturing changes in trends and market momentum. Similarly, Wong et al. (2020) demonstrated that combining MACD with other technical indicators, including RSI, can improve signal quality, particularly under unstable market conditions. Furthermore, Metghalchi et al. (2012) found that MACD-based trading strategies could generate relatively stable performance, especially when markets exhibited clear trends. Chong et al. (2008) also reported that MACD performed well compared with several other technical indicators under trending market conditions.

In the context of LQ45 stocks, these findings are relevant because the index consists of highly liquid stocks with substantial trading activity. High liquidity facilitates active price movements, allowing changes in momentum to be more readily identified through MACD. Nevertheless, differences in accuracy among individual stocks demonstrate that MACD does not produce identical results across all securities. Such

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differences may be influenced by stock-specific characteristics, volatility, investor sentiment, macroeconomic conditions, and market uncertainty. Therefore, although MACD can serve as a useful technical analysis tool, investors should not rely on it as the sole basis for investment decisions.

2. The Use of RSI in Measuring the Accuracy of Buy and Sell Signals

The results also demonstrate that the Relative Strength Index (RSI) is capable of generating reasonably accurate buy and sell signals for LQ45 stocks. All RSI accuracy values exceeded 50%, with the highest accuracy reaching 76% and the lowest reaching 52%. The average accuracy was 61.00%. These findings indicate that RSI has a relatively good ability to identify price momentum, particularly market conditions characterized by overbought and oversold levels. Consequently, the hypothesis stating that RSI can predict buy and sell signals is supported.

RSI is a momentum oscillator designed to measure the strength and speed of price movements over a specific period. In general, a high RSI value may indicate an overbought condition, whereas a low RSI value may indicate an oversold condition. This information can help investors identify potential price reversals. However, the effectiveness of RSI depends considerably on market conditions. In sideways markets, RSI can be useful for identifying potential reversal points. Conversely, during strong trends, overbought or oversold conditions may persist for relatively long periods, potentially causing premature or false signals.

These findings are consistent with Chong et al. (2014), who demonstrated that RSI can contribute to improving trading-signal quality, particularly when combined with other technical indicators. Guercio et al. (2019) similarly reported that momentum indicators such as RSI can help capture changes in price direction and provide additional information for trading decisions. Furthermore, Marshall et al. (2008) found that technical indicators can generate profitable trading signals under certain market conditions. Park and Irwin (2007) also explained that technical trading strategies may demonstrate effectiveness across financial markets, particularly in emerging markets where market efficiency may differ from that of developed markets.

The findings therefore indicate that RSI is a useful supporting indicator, although its effectiveness varies according to market conditions. Its average accuracy of 61.00% exceeds the minimum criterion established in this study. However, RSI recorded a lower average accuracy than MACD. This difference may be related to the sensitivity of RSI to short-term price movements. Such sensitivity is advantageous for detecting extreme

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market conditions but may also increase the possibility of false signals when prices experience substantial short-term volatility.

3. Comparison of MACD and RSI in Measuring Buy and Sell Signal Accuracy

The descriptive statistical results show that MACD achieved an average accuracy of 64.35%, whereas RSI achieved an average accuracy of 61.00%. Therefore, descriptively, MACD produced a higher level of accuracy than RSI. This difference was further supported by the One-Way ANOVA test, which produced a significance value of 0.045, below the 0.05 significance level. This result indicates that there is a statistically significant difference between the accuracy levels of MACD and RSI. Thus, the hypothesis concerning differences in the performance of the two indicators is supported.

The superiority of MACD can be explained by its nature as a trend-following indicator. The use of moving averages enables MACD to reduce some short-term price fluctuations and focus more strongly on the underlying market trend. RSI, in contrast, is a momentum indicator that responds more rapidly to price changes. This responsiveness is beneficial for identifying overbought and oversold conditions but may also increase the likelihood of false signals during highly volatile market conditions. Chong et al. (2014) emphasized that differences in the characteristics of technical indicators can influence their effectiveness under different market conditions.

The findings are also consistent with Metghalchi et al. (2019), who reported that MACD-based trading strategies could provide relatively stable performance because of their ability to follow market trends. Meanwhile, momentum indicators such as RSI may generate more frequent signals, potentially increasing the risk of incorrect trading decisions. Anggraini and Imron (2025) also found that MACD produced high buy and sell signal accuracy compared with RSI. In addition, Kaya et al. (2025) reported that MACD demonstrated advantages in identifying trend patterns because its moving-average-based approach is relatively resistant to random price fluctuations or *random noise*. Singh and Priyanka (2025) further indicated that although RSI is effective in identifying overbought and oversold conditions, MACD has an advantage in identifying the overall direction of market trends.

Overall, this study demonstrates that MACD is more accurate than RSI in generating buy and sell signals for LQ45 stocks during 2022–2025. This superiority is reflected in its higher average accuracy and the statistically significant difference identified through the ANOVA test. Nevertheless, the findings do not imply that RSI is ineffective. RSI remains valuable as a complementary indicator, particularly for

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identifying overbought and oversold conditions. Therefore, combining MACD as the primary trend indicator with RSI as a confirmation indicator may provide a more comprehensive approach to analyzing buy and sell decisions. Such integration can help investors reduce false signals and improve decision-making, particularly when market volatility and investor sentiment are changing rapidly.

CONCLUSION

This study concludes that both MACD and RSI are capable of generating reasonably accurate buy and sell signals for LQ45 stocks during 2022-2025. MACD achieved an average accuracy of 64.35%, with individual accuracy ranging from 52% to 82%, while RSI achieved an average accuracy of 61.00%, ranging from 52% to 76%. These results indicate that MACD provides better and more consistent signal accuracy than RSI. The One-Way ANOVA test produced a significance value of 0.045 (<0.05), confirming a significant difference between the two indicators. Therefore, MACD is considered more effective for identifying buy and sell signals, particularly during trending market conditions, while RSI remains useful for detecting overbought and oversold conditions. The findings suggest that investors may combine MACD and RSI to obtain more comprehensive trading signals and reduce false signals. However, this study is limited to LQ45 stocks and the 2022–2025 observation period. Future research should consider additional technical indicators, longer observation periods, and external factors such as macroeconomic conditions and market sentiment.

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