



Accuracy Test of Technical Analysis Using Ichimoku Kinko Hyo, Moving Average Convergence Divergence, and Relative Strength Index on Stock Price of Companies Listed in The Infobank15 Index

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Abstract

Technical analysis indicators are widely used by investors to support investment decisions. This study aims to evaluate the accuracy of Ichimoku, MACD, and RSI as guidelines for predicting stock price movements and identifying buy–sell signals. Beyond relying on indicators, traders are also advised to maintain discipline, effective money management, and a strong trading psychology. The research focuses on Infobank15 index stocks observed from August to December 2023, using secondary data from the TradingView platform. Predictive signals and actual prices were collected from daily (D1) closing prices and analyzed using the documentation method. To test the accuracy of each indicator, the Mann-Whitney non-parametric test was employed to compare predictive signals against actual prices statistically. The results indicate that there is no significant difference between the predictive signals of Ichimoku Kinko Hyo and MACD indicators compared to actual prices. Ichimoku and MACD are declared accurate. However, the study reveals a disparity between the predicted prices generated by the RSI and actual prices. Therefore, RSI are declared inaccurate. Based on the analysis and comparison of the three indicators in terms of the number of signals, percentage accuracy of signals, and average return rates, it can be concluded that the MACD indicator delivers a more favorable return rate compared to the other two indicators. The Ichimoku Kinko Hyo is more effective at minimizing risks, while the RSI is the only indicator in this study that proved to be inaccurate.

Keywords *Technical Analysis, Ichimoku Kinko Hyo, Moving Average Convergence Divergence, Relative Strength Index, Infobank15*

INTRODUCTION

Investor growth in the Indonesian capital market reached 11.72 million by September 2023, with Millennials and Gen Z dominating 80% (KSEI, 2023). Stocks remain the most attractive instrument due to high return potential, while the financial sector—particularly banking—plays a central role, contributing 35.2% to the Jakarta Composite Index (JCI). The Infobank15 Index provides a focused benchmark for fundamentally strong and liquid banking stocks (IDX, 2023b; IDX, 2023c). Investment analysis typically employs both fundamental and technical approaches. Fundamental analysis evaluates a company's financials to determine its valuation, while technical analysis studies price and volume trends (Asthri et al., 2016). Given the volatility of Infobank15 stocks and the semi-strong efficiency of Indonesia's capital market, technical analysis is highly relevant.

Indicators are divided into lagging, which detect historical trends, and leading, which anticipate momentum (Ong, 2016). Schlotmann and Czubatinski (2019) further group them into

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momentum, trend, and volatility indicators. This study applies three: MACD as a lagging indicator, RSI as a leading indicator, and Ichimoku Kinko Hyo, which combines both. Prior findings are mixed: Ichimoku has been reported to be more effective than MACD and RSI (Almeida, 2020), while others have shown MACD's superior returns (Pramodya et al., 2023; Jauhari, 2022). Results on MACD accuracy also vary (Suryanto, 2021; Sofiyah, 2021), and RSI findings are inconsistent, with some highlighting higher returns (Setiani & Nugroho, 2022) and others their inaccuracy (Hidayat, 2023). These contradictions highlight the need to reassess the three indicators by comparing predicted and actual signals.

LITERATURE REVIEW

Efficient Market Hypothesis (EMH)

An efficient market reflects all available information in security prices (Tandelilin, 2017). Fama (1970) identified weak, semi-strong, and strong forms of efficiency. The Indonesian Stock Exchange is found to be semi-strong efficient (Dwipayana & Wiksuana, 2017; Kusumaningtyas, 2019), though not fully efficient in processing information.

Dow Theory

Formulated by Charles H. Dow, this theory uses historical price data to explain long-term market trends through six principles, including the idea that market action discounts everything, trends move in phases, volume confirms movements, and trends persist until reversal signals appear.

Technical Analysis

Defined as a statistical evaluation of securities using past price and volume data (Tandelilin, 2017), technical analysis seeks to detect trends early (Prabhata, 2012). While it generates buy or sell signals, it cannot guarantee full accuracy.

Ichimoku Kinko Hyo

Developed by Hosoda in 1968, the Ichimoku Kinko Hyo combines support and resistance, sentiment, and momentum analysis. With standard settings of 9, 26, and 52, it incorporates five elements, including Tenkan Sen, Kijun Sen, Chikou Span, and Kumo, making it both a trend and momentum indicator (Anthony, 2019).

Moving Average Convergence Divergence (MACD)

Created by Appel in the 1960s, MACD measures the relationship between two EMAs (12 and 26) with a 9-day signal line. Displayed as lines or histograms, it functions as a momentum oscillator with varying interpretations (Ong, 2016).

Relative Strength Index (RSI)

Introduced by Wilder in 1978, RSI oscillates between 0 and 100, identifying overbought conditions above 70 and oversold conditions below 30. Typically set at 14 days, it can also detect divergence between momentum and price movements (Ong, 2016).

Infobank15

Launched in 2012, Infobank15 tracks 15 fundamentally strong and liquid banking stocks (IDX, 2023a). Constituents must have been listed for at least six months and meet fundamental and liquidity criteria.

Hypotheses

H1 : Ichimoku Kinko Hyo is accurate in predicting the stock price movements.

H2 : MACD is accurate in predicting stock price movements.

H3 : RSI is accurate in predicting stock price movements.

H4 : There is a comparison of the accuracy of each indicator in predicting the stock price movements.

RESEARCH METHOD

This study uses a comparative approach to test the accuracy of Ichimoku Kinko Hyo, MACD, and RSI. Buy and sell signals generated by these indicators were compared with the actual stock prices of Infobank15 companies from August to December 2023. Historical price data were obtained from TradingView candlestick charts, utilizing daily closing prices to verify the alignment between predictions and outcomes. For analysis, prediction signals were coded as 1 for bullish and 2 for bearish, while actual prices were coded as 1 for bullish, 2 for bearish, and 3 for sideways.

Actual Price

Actual stock prices were measured using daily closing prices, which reflect market supply and demand. Price movements were classified based on two candles following each prediction signal: code 1 for bullish, 2 for bearish, and 3 for sideways.

Prediction Signal

For Ichimoku Kinko Hyo, bullish signals occurred when Tenkan Sen crossed above Kijun Sen, the price was above the kumo, and Chikou Span crossed from below, while bearish signals were the opposite. For MACD, bullish signals appeared when the MACD line crossed above the signal line, and bearish signals when the line crossed below it. For RSI, bullish signals were generated when the index crossed upward through 30, while bearish signals occurred when it crossed downward through 70. All signals were coded as 1 for bullish and 2 for bearish, then analyzed using the Mann-Whitney U Test to determine whether prediction signals significantly differed from actual prices.

FINDINGS AND DISCUSSION

Accuracy of Ichimoku Kinko Hyo

The figure below presents the research documentation on determining buy and sell signals using the Ichimoku Kinko Hyo for Bank Central Asia Tbk (BBCA) stock.



Figure 1. Sample documentation of bullish (I-BL) and bearish (I-BR) signals from Ichimoku Kinko Hyo

Out of the 15 companies analyzed, 11 generated signals using the Ichimoku Kinko Hyo indicator. A total of 28 signals were identified, comprising 14 bullish and 14 bearish. Statistical analysis was then conducted to evaluate the accuracy of these signals.

Table 1. The Mann-Whitney U test results for the Ichimoku Kinko Hyo

Ranks				
	Group	N	Mean Rank	Sum of Rank
Value	Predicted Signals	28	26.00	728.00
	Actual Price Ichimoku	28	31.00	868.00
	Total	56		

Test Statistics	
	Value
Mann-Whitney U	322.000
Wilcoxon W	728.000
Z	-1.309
Assymp. Sig (2 Tailed)	0.190

a. Grouping Variable: Group

Source: Processed Data (2024)

The Mann-Whitney test for Ichimoku Kinko Hyo shows a significance level of 0.190 (>0.05), indicating no significant difference between predicted and actual prices. Thus, H1 is accepted, confirming the accuracy of Ichimoku in predicting Infobank15 stock movements. As both a trend and momentum indicator, Ichimoku effectively identifies prevailing trends, reversals, and support-resistance levels, making it suitable for trending stocks. These findings align with those of [Pramodya et al. \(2023\)](#) but differ from [Almeida \(2020\)](#), who argued that the Ichimoku was more accurate than the MACD and RSI.

Accuracy of Moving Average Convergence Divergence (MACD)

The figure below presents the research documentation on determining buy and sell signals using the MACD for Bank Negara Indonesia Tbk (BBNI) stock.



Figure 2. Sample documentation of bullish (M-BL) and bearish (M-BR) signals from MACD

All 15 observed companies generated signals from the MACD indicator, resulting in a total of 64 signals, comprising 39 bullish and 25 bearish signals.

Table 2. The Mann-Whitney U test results for the MACD

Ranks			
Group	N	Mean Rank	Sum of Rank
Predicted Signals	64	59.72	3822.00
Value	Actual Price MACD	64	69.28
	Total	128	

Test Statistics	
	Value
Mann-Whitney U	1742.000
Wilcoxon W	3822.000
Z	-1.671
Assymp. Sig (2 Tailed)	0.095

a. Grouping Variable: Group

Source: Processed Data (2024)

For MACD, the significance value is 0.095 (>0.05), indicating no significant difference, and thus H2 is accepted. MACD is therefore accurate for predicting Infobank15 stocks, functioning as a lagging and momentum indicator to measure trend strength and reversals. The results support [Suryanto \(2021\)](#), [Pramodya et al. \(2023\)](#), and [Jauhari \(2022\)](#), who highlighted MACD's superiority over Ichimoku and RSI, but contradict [Sofiyah \(2021\)](#) and [Setiani and Nugroho \(2022\)](#), who questioned its accuracy relative to RSI.

Accuracy of Relative Strength Index (RSI)

The figure below presents the research on determining buy and sell signals using the RSI for Bank Jago Tbk (ARTO) stock.



Figure 3. Sample documentation of bullish (R-BL) and bearish (R-BR) signals from RSI

All 15 companies observed produced signals from the RSI indicator, resulting in a total of 45 signals, comprising 29 bullish and 16 bearish signals.

Table 3. The Mann-Whitney U test results for the RSI

Ranks				
	Group	N	Mean Rank	Sum of Rank
Value	Predicted Signals	45	40.32	1814.50
	Actual Price MACD	45	50.68	2280.50
	Total	90		
Test Statistics				
			Value	
	Mann-Whitney U		779.500	
	Wilcoxon W		1814.500	
	Z		-2.166	
	Assymp. Sig (2 Tailed)		0.030	
a. Grouping Variable: Group				

Source: Processed Data (2024)

The Mann-Whitney test for RSI produces a significance value of 0.030 (<0.05), indicating a significant difference between predictions and actual outcomes. Thus, H3 is rejected, showing RSI is inaccurate for Infobank15 stocks. Although effective for identifying overbought and oversold conditions, RSI often gives false signals in strongly trending markets, making it more suitable for sideways conditions. This finding supports [Hidayat \(2023\)](#) but contrasts with [Daniswara et al. \(2022\)](#) and [Setiani and Nugroho \(2022\)](#), who reported that RSI is accurate and yields higher returns than MACD.

Comparison of the Accuracy of Each Indicator

The differences in indicator accuracy stem from their distinct characteristics and functions. The MACD is classified as a lagging indicator, focusing on trend detection, while the RSI is a leading indicator designed to measure momentum and identify overbought or oversold conditions. The Ichimoku Kinko Hyo, although primarily a lagging trend indicator, incorporates the Senkou Span (kumo), which provides support and resistance analysis similar to that of a leading indicator. Despite these differences, all three serve the common objective of helping investors forecast price movements and make informed trading decisions.

Performance comparisons show that MACD produced the highest number of signals with 64, followed by RSI with 45, and Ichimoku with 28. These results highlight that while all indicators contribute to technical analysis, their effectiveness varies depending on their structural design and application context.

Table 4. The number of signals and the accuracy percentage of the indicator

Indicator	Indicator Signal	Number of Signals	Total Number of Signals	Accurate Signal	Inaccurate Signal	Percentage Accuracy of Signal
Ichimoku Kinko Hyo	I-BL	14	28	6	8	54%
	I-BR	14		9	5	

Indicator	Indicator Signal	Number of Signals	Total Number of Signals	Accurate Signal	Inaccurate Signal	Percentage Accuracy of Signal
MACD	M-BL	39	64	21	18	55%
	M-BR	25		14	11	
RSI	R-BL	29	45	12	17	44%
	R-BR	16		8	8	

Source: Processed Data (2024)

The accuracy of the indicators was also evaluated based on the percentage of prediction signals that matched actual prices. MACD achieved the highest accuracy at 55%, followed closely by Ichimoku Kinko Hyo at 54%. In contrast, RSI recorded the lowest accuracy at 44%. These results reinforce MACD as the most reliable indicator among the three, while RSI proved the least consistent in predicting stock price movements.

Table 5. Average Return Levels of Indicators

Indicator	Indicator Signal	Average Return Value
Ichimoku Kinko Hyo	I-BL	0,52%
	I-BR	-0,81%
MACD	M-BL	0,72%
	M-BR	-0,49%
RSI	R-BL	0,44%
	R-BR	0.04%

Source: Processed Data (2024)

Beyond the number and accuracy of signals, performance was also measured through average return predictions. MACD produced the highest average return at 0.72%, followed by Ichimoku Kinko Hyo at 0.52%, and RSI at 0.44%. In terms of risk minimization, Ichimoku was the most effective with 0.81%, followed by MACD at 0.49%, and RSI at 0.04%. These findings confirm H4, indicating clear differences in the accuracy and performance of the three indicators when predicting stock price movements.

CONCLUSIONS

The study concludes that Ichimoku Kinko Hyo and MACD are accurate in predicting stock price movements of Infobank15 companies, while RSI is not. Among the three, the MACD generated the highest number of signals (64), followed by the RSI (45) and the Ichimoku (28). In terms of accuracy, the MACD achieved the highest percentage at 55%, followed by the Ichimoku at 54%, and the RSI at the lowest percentage of 44%. Regarding returns, MACD ranked first with 0.72%, followed by Ichimoku with 0.52%, and RSI with 0.44%. For risk minimization, the Ichimoku method performed best at 0.81%, ahead of the MACD at 0.49% and the RSI at 0.04%. Overall, MACD emerges as the most effective indicator, combining accuracy, signal volume, and return potential. Future research should extend the observation period, include indices beyond Infobank15, and consider additional technical, fundamental, and sentiment indicators to provide more comprehensive insights.

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