

Candlestick

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RESEARCH ARTICLE

CANDLE STICK PATTERN RESEARCH ANALYSIS, FUTURE AND BEYOND: A SYSTEMATIC LITERATURE REVIEW USING PRISMA

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ABSTRACT

Online stock market circumstances allow traders to examine in real time or periodically with free or paid criteria and indicators. Candlestick charts and historical data help traders predict stock values. These forecasting methods rely on traders' experience. Such unscientific judgements lack empirical facts and mathematically established theories, which are rarely published in recognized scientific journals. Initial research revealed a gap between candlestick research and practice, creating a novel idea without scientific backing. Given the different study possibilities, the literature review must address the following questions: what's the trend in candlestick indicator research over the past five years, and what's ahead for candlestick stock price predictions. This study used PRISMA to conduct its literature review. Ten articles were duplicated in three indexes. Last, article content is compared to research questions. Only 20 Scopus (S) papers have more than 10 citations, and 2 don't have full paper access, so only 11 match the conditions. 100 publications were obtained from Google Scholar (GS), then re-filtered to obtain 19 with more than 10 citations and 6 without full paper access, for a total of 11 articles. 100 articles from Semantic Scholar (SS) met first requirements. Duplicate articles in each database were rechecked to produce 24 valid articles for future research. Economic and IT publications employ candlestick patterns in study. SLR screening and literature research yielded expert systems, historical research, ichimoku, local studies, and technological analysis. Expert system group dominates research, but no technique dominates implementation. Future research can be new. Candlestick patterns have only been tested on local stock markets in one country, therefore economic crises, commercial acts, or conflicts may lead the method to fail.

KEYWORDS

Candlestick, Stock trading, Chart Pattern, Systematic Literature Review, PRISMA

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1. Introduction

The stock market is one of the main activities of the economy in the country, and this is the case in many countries in the world. STATISTA noted that there were at least more than 100 trillion USD in stock market transactions worldwide in 2015 and although it declined since the pandemic in 2020 and competition with the cryptocurrency market, it still earned at least more than 60 trillion USD worldwide (STATISTA, 2020). This shows that large transactions automatically involve a large number of traders, so that it becomes a potential market to be educated in it.

The current stock market conditions, which have all become online trading, certainly make it easier for traders to analyze in real time or periodically with a variety of parameters and indicators that are available for free or paid. There are thousands of books with various languages that discuss analytical techniques and trading strategies using these various indicators, which generally use candlestick charts and historical data to make stock price predictions. But on the other hand, these prediction techniques and forecasting strategies seem unscientific and only based on the experience of other, more experienced traders. Such unscientific assessments are based on the lack of empirical evidence and algorithms or methods that are based on theories that have been mathematically proven through the research process and are apparently rarely published in scientific journals, even more so in reputable scientific journals.

An initial search in the SCOPUS database showing with the keyword stock candlestick prediction forecasting only

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and subjected to further analysis, PRISMA employs at least 27 clearly recognizable checklists.

3. Methodology

Filtering from three index databases, Scopus, Google Scholar, and Semantic Scholar, was used in this study to select journals with the keyword "candlestick pattern." Furthermore, selective filtering is performed by prioritizing articles with at least ten citations in order to account for the impact factor. Then, additional filtering is performed by ignoring search results in the form of book chapters and types of articles from other literature reviews in order to obtain articles that actually contain applied research in response to the research questions posed at the outset.

Next, examine each filtered article to see if it is available in full-text format and has a valid link to be reviewed and analyzed. Furthermore, grouping is performed based on the algorithm or method employed in order to obtain heterogeneity and homogeneity from the selected articles. The results of each check of this article serve as the foundation for the analysis in the following discussion. In summary, the results of completing the PRISMA checklist are shown in table 1, which is an adapted version of the PRISMA framework.

Table 1. Checklist for PRISMA

Method for PRISMA	
Eligibility criteria	From 2017 to 2022 with citations of more than 10 and from journal article
Information sources	S = Scopus GS = Google Scholar SS = Semantic Scholar
Search strategy	From a single keyword: "candlestick pattern"
Selection process	After filtering by eligible criteria, then filter them by title. Afterward it excludes any literature review articles including any theoretical review.
Data collection process	Using Publish and Perish v 8, and to guarantee search results, repeat at least three times. After further filtering, export the results to Excel and separate them by information source.
Data items	Except for a real case study and the direct application of any candlestick pattern or chart, there is no particular filter for data elements. For simpler processing, all chosen items were imported into Mendeley in full-text PDF format and downloaded for additional review.
Synthesis methods	<ul style="list-style-type: none"> - Grouping the database results and examining each article's abstractIf abstract shows literature review or theoretical comparison, then omit it - The most commonalities are used to group objects. - The final grouping's outcomes are further examined and then harmonized across databases. - In order to address research questions and describe any methods used to tabulate or visually present the results of individual studies and syntheses, the results of the grouping reviewed were based on an abstract and full-text study..

4. Results and Discussion

4.1. Initial Selection

With the help of the keywords described in the previous section, the first choice was made using the Publish and Perish application version 8. For the Google Scholar (GS) and Semantic Scholar (SS) databases, which each have a maximum of 500 articles since the same year, the initial search for the Scopus (S) database returned a total of 98 articles since 2017. After that, the results are filtered such that each article's impact factor is correctly ensured, providing there are more than 10 citations. To confirm the originality of the ensuing analysis study, the identical articles were then searched for throughout the three databases.

The article's content is then subjected to a preliminary screening process based on titles and abstracts to see if it doesn't fall under the headings of a literature review or comparison theory, as well as to see if it actually applies a candlestick pattern or chart with its application in an algorithm or specific method. The further filtering involved removing publications

content. The results of this initial analysis eventually narrowed down to five groups, namely the theme of *Expert System*, *Historical*, *Ichimoku*, *Local Study* and *Technical Analysis*. This categorization is based on the results of an abstract study and the conclusions of each article that has been analyzed in the first stage. In full, the grouping of articles can be seen in table 2.

The first group shows that there are at least seven articles that discuss candlesticks and include them in the realm of the Expert System. There are two articles that use Neural Network in making stock price predictions by making candlesticks as its main parameter (J. H. Chen & Tsai, 2020; Ng et al., 2011) While the rest use fuzzy and learning techniques to look for similarities in candlestick patterns so that they can be predicted for movement in the next period (Carpentier & White, 2013; Goswami et al., 2009) However, apart from the SLR screening results, there are dozens of articles that have the same theme, but have citations that are not very significant.

The second group is an article in which historical data and statistical analysis are used in making price predictions using candlesticks. In the first article, the candlestick pattern was used extensively which was then applied to experiments that used comparisons with other patterns (Hu et al., 2019), even this was done more than 25 different patterns. While the second article uses historical data which is then entered into calculations using machine learning (Ananthi & Vijayakumar, 2020), so it is hoped that the data can be a more accurate reference in making predictions. However, the use of historical data can be wrong if there is a data anomaly in price movements, for example during the pandemic in early 2020 or during a recession issue that could make the data not move according to the expected pattern.

The third group of SLR results is the group in which Ichimoku or Japanese indicators, which are becoming increasingly popular, are discussed. Ichimoku, also known as Japanese Candlestick, is the result of empirical studies utilizing candlesticks, and has been utilized in numerous studies on various stock exchanges to strengthen its validity (Heinz et al., 2021). However, research on this topic is still categorized as moderate because, despite the fact that many researchers have used this analysis technique, the majority of the articles produced have a low citation factor. So that there are only three articles in this group that meet the screening criteria, namely those using the S&P 500 index (Heinz et al., 2021), the China index (S. Chen et al., 2016), and one other article making predictions using Ichimoku as a parameter in clustering (Chmielewski et al., 2015).

The fourth group is a collection of articles that use candlestick patterns in price predictions on the local stock exchange. In general, local stock exchange research uses a type of event study that relates changes in stock prices to news or momentum in a certain period. So that research involving local stock exchanges using candlestick patterns is not too much and only a few have significant citation factors. In fact, this type of research is actually very much needed by local traders, because each exchange has different characteristics. As is the case with predictions on the Brazilian exchange (Do Prado et al., 2013), which are confirmed to be different from those on the Thai exchange (Tharavanij et al., 2017). Especially with the events that exist on the Chinese exchange (Li et al., 2008), but not the same as what happened on the Taiwan exchange (Lu, 2014).

The last group is a group of articles in which it discusses the strategy of implementing candlesticks as part of technical analysis. In this theme, there are many book-type publications that mention various types of candlestick formations and the potential for bullish and bearish that can occur as price predictions. However, discussing this strategy in the form of research or scientific work is still relatively rare compared to other themes. But in the SLR conducted this time, there are at least six articles that meet the initial screening criteria. Of the six articles, four of them discuss trading strategies using candlesticks in general along with empirical proofs on local exchanges (T.-H. Lu & Shiu, 2011; T. H. Lu et al., 2012, 2015; Zhu et al., 2016). While the rest try to make price predictions with candlestick formations which are then combined with other methods. In general, the results of article screening can be seen in table 2.

Table 2. Article Screening Result

Conflicts of Interest: "The authors declare no conflict of interest."

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References

- Ananthi, M., & Vijayakumar, K. (2020). Stock market analysis using candlestick regression and market trend prediction (CKRM). *Journal of Ambient Intelligence and Humanized Computing*, 0123456789. <https://doi.org/10.1007/s12652-020-01892-5>
- Bulkowski, T. N. (2008). Encyclopedia of candlestick charts. *Wiley Trading Series*, 940. [http://hym-2017.corpuscodea.es/pdf/Thomas N. Bulkowski - Encyclopedia of Candlestick Charts \(2008\).pdf%0Ahttps://www.amazon.com/Encyclopedia-Candlestick-Trading-Bulkowski-published/dp/B00EKYJEJK/ref=sr_1_3?s=books&ie=UTF8&qid=1499257147&sr=1-3&keywords=En](http://hym-2017.corpuscodea.es/pdf/Thomas N. Bulkowski - Encyclopedia of Candlestick Charts (2008).pdf%0Ahttps://www.amazon.com/Encyclopedia-Candlestick-Trading-Bulkowski-published/dp/B00EKYJEJK/ref=sr_1_3?s=books&ie=UTF8&qid=1499257147&sr=1-3&keywords=En)
- Carpentier, N., & White, D. (2013). Perspective des parcours de vie et sociologie de l'individuation. *Sociologie et Sociétés*, 45(1), 279–300. <https://doi.org/10.7202/1016404ar>
- Chen, J. H., & Tsai, Y. C. (2020). Encoding candlesticks as images for pattern classification using convolutional neural networks. *Financial Innovation*, 6(1). <https://doi.org/10.1186/s40854-020-00187-0>
- Chen, S., Bao, S., & Zhou, Y. (2016). The predictive power of Japanese candlestick charting in Chinese stock market. *Physica A: Statistical Mechanics and Its Applications*, 457, 148–165. <https://doi.org/10.1016/j.physa.2016.03.081>
- Chmielewski, L., Janowicz, M., Kaleta, J., & Orłowski, A. (2015). Pattern recognition in the Japanese candlesticks. In A. Wiliński, I. El Fray, & J. Pejaš (Eds.), *Advances in Intelligent Systems and Computing* (Vol. 342, Issue August 2016, pp. v–vi). Springer International Publishing. <https://doi.org/10.1007/978-3-319-15147-2>
- Chootong, C., & Sornil, O. (2012). Trading Signal Generation Using A Combination of Chart Patterns and Indicators. *IJCSI*, 9(6), 202–209. www.IJCSI.org
- Deng, S., & Sakurai, A. (2014). Short-term foreign exchange rate trading based on the support/resistance level of Ichimoku Kinkohyo. *Proceedings - 2014 International Conference on Information Science, Electronics and Electrical Engineering, ISEEE 2014*, 1, 337–340. <https://doi.org/10.1109/InfoSEEE.2014.6948127>
- Do Prado, H. A., Feredá, E., Morais, L. C. R., Luiz, A. J. B., & Matsura, E. (2013). On the effectiveness of candlestick chart analysis for the Brazilian stock market. *Procedia Computer Science*, 22, 1136–1145. <https://doi.org/10.1016/j.procs.2013.09.200>
- Fong, W. M. (2014). *The Lottery Mindset: Investors, Gambling and the Stock Market*. Palgrave Pilot. <https://doi.org/10.1057/9781137381736.0001>
- Goswami, M. M., Bhensdadia, C. K., & Ganatra, A. P. (2009). Candlestick analysis based short term prediction of stock price fluctuation using SOM-CBR. *2009 IEEE International Advance Computing Conference, IACC 2009, March*, 1448–1452. <https://doi.org/10.1109/IADCC.2009.4809230>
- Heinz, A., Jamalooden, M., Saxena, A., & Pollacia, L. (2021). Bullish and Bearish Engulfing Japanese Candlestick patterns: A statistical analysis on the S&P 500 index. *Quarterly Review of Economics and Finance*, 79, 221–244. <https://doi.org/10.1016/j.qref.2020.06.006>
- Hu, W., Si, Y. W., Fong, S., & Lau, R. Y. K. (2019). A formal approach to candlestick pattern classification in financial time series. *Applied Soft Computing Journal*, 84, 105700. <https://doi.org/10.1016/j.asoc.2019.105700>
- Li, H., Ng, W. W. Y., Lee, J. W. T., Sun, B., & Yeung, D. S. (2008). Quantitative study on candlestick pattern for shenzhen stock market. *Conference Proceedings - IEEE International Conference on Systems, Man and Cybernetics*, 54–59. <https://doi.org/10.1109/ICSMC.2008.4811250>
- Lu, T.-H., & Shiu, Y.-M. (2011). Pinpoint and synergistic trading strategies of candlesticks. *International Journal of Economics and Finance*, 3(1), 234–244. <https://doi.org/10.5539/ijef.v3n1p234>
- Lu, T. H. (2014). The profitability of candlestick charting in the Taiwan stock market. *Pacific Basin Finance Journal*, 26, 65–78. <https://doi.org/10.1016/j.pacfin.2013.10.006>
- Lu, T. H., Chen, Y. C., & Hsu, Y. C. (2015). Trend definition or holding strategy: What determines the profitability of candlestick charting? *Journal of Banking and Finance*, 61, 172–183. <https://doi.org/10.1016/j.jbankfin.2015.09.009>
- Lu, T. H., Shiu, Y. M., & Liu, T. C. (2012). Profitable candlestick trading strategies-The evidence from a new perspective. *Review of Financial Economics*, 21(2), 63–68. <https://doi.org/10.1016/j.rfe.2012.02.001>
- Martinsson, F., & Liljeqvist, I. (2017). *Short-Term Stock Market Prediction Based on Candlestick Pattern Analysis Short-Term Stock Market Prediction Based on Candlestick Pattern Analysis*. School of Computer Science and Communication Stockholm.
- Ng, W. W. Y., Liang, X. L., Chan, P. P. K., & Yeung, D. S. (2011). Stock investment decision support for Hong Kong market using RBFNN based candlestick models. *Proceedings - International Conference on Machine Learning and Cybernetics*, 2, 538–543. <https://doi.org/10.1109/ICMLC.2011.6016839>
- Ong, E. (2016). *Technical Analysis for Mega Profit*. Gramedia Pustaka Utama.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. In *The BMJ* (Vol. 372). <https://doi.org/10.1136/bmj.n71>

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