# Global Financial Trading Strategies: A Bibliometric Analysis of the Indexed Publications in Scopus between 2001– 2021

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**In-Text Citation:** (Shafie & Yaacob, 2022)
**To Cite this Article:** Shafie, M. F., & Yaacob, M. H. (2022). Global Financial Trading Strategies: A Bibliometric Analysis of the Indexed Publications in Scopus between 2001 – 2021. *International Journal of Academic Research in Business and Social Sciences*, *12*(2), 165–181.

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# Global Financial Trading Strategies: A Bibliometric Analysis of the Indexed Publications in Scopus between 2001– 2021

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**Abstract**
A trading strategy is merely a technique that determines the criteria under which securities can be purchased or sold in a financial market. When it comes to trading strategy, there are two strategies that are commonly used, technical analysis and fundamental analysis. This paper shows a bibliometric analysis of the publications related to trading strategies. The objective is to ascertain and evaluate the contribution of the past studies in the financial trading strategy domain. According to findings, the emerging research themes in recent years in financial trading strategies are systematic computerized strategies such as machine learning. This report also evaluates a citation and co-citation analysis. The authors have examined the most influential research papers, authors, institutions, and journals. A dataset of 328 journals got extracted from Scopus through a bibliometric approach (for the period: 2001-2021). This bibliometric analysis has got supplemented by network analysis using "Visualization of similarities, (VOS) viewer" software. This data analysis could serve as a starting point for future researchers.
**Keywords:** Trading Strategy, Bibliometric, Scopus, Machine Learning, Artificial Intelligence

**Introduction**
Investing is a crucial decision that every trader or investor has to make at some point in their life. People can invest in Commodities, Stocks, Indices, Futures, FOREX, or any tradable instrument. Fundamental Analysis (FA) and Technical Analysis (TA) are two methods to determine investment opportunities in the financial market. Fundamental analysis involves the economic, political, and in-depth study of financial and non-financial aspects of a company. Technical analysis is an approach to examine market trading statistics, such as past prices and volume (Boobalan, 2014). Technical analysts use stock charts to forecast future price movements (Chitra, 2011). An investor can identify trend reversals sooner and anticipate future prices for taking buy-hold-sell decisions (Valarmathi and Kowsalya, 2016). Also, several asset management and trading firms developed and implemented technical trading strategies (Tapa et al., 2018).

The professional traders and retail traders have increased significantly due to market growth. The academicians are also interested since there is an opportunity for broader and in-depth research in the financial sector. It attracted all the market participants to study, research, and develop various trading strategies to beat the market and benefit themselves and the community.

After the publication of the efficient market hypothesis (EMH), researchers grew interested in technical analysis (Fama, 1970). EMH theory states that price reflects all known public and private information. Rational investors make decisions based on this information. Therefore, no strategy provides a return higher than buy-and-hold return in an efficient market. Market participants who believe that the market is efficient will adopt a buy-hold-sell strategy. EMH can be classified into three types: (i) weak, (ii) semi-strong, and (iii) strong form. Prices completely represent all prior market knowledge in weak-form efficiency. Prices represent all publicly accessible information in semi-strong EMH, and prices completely reflect all public and private information in strong form efficiency. In addition, Random Walk Theory (RWT) states that stock prices move randomly and are impossible to predict (Kirkpatrick and Dahlquist, 2011). However, post-financial crisis 2008, many investors, traders, and academicians developed various strategies to prove that gaining an abnormal return from the market is achievable through advanced computation capacity and various trading indicators developed by the market participants.

Due to technological advancement, systematic research and trading strategies in fundamental and technical analysis got effectively implemented for active portfolio management. It became more dominant and sophisticated due to its integration with artificial intelligence (AI) based rules (Fisichella and Garolla, 2021).

We will thoroughly examine the research papers published in the financial trading strategies domain. The objective of the research paper is to identify and evaluate the contribution of the past research conducted in the trading strategy domain and analyze the most influential research papers, authors, institutions, and journals. This paper also reviews a citation and co-citation analysis. It will answer the most crucial research questions:

- **Research Question 1**: What are the most common keywords used in the financial trading strategy domain?
- **Research Question 2**: What are the most cited article and their strategies?
- **Research Question 3**: Who are the most active publishers in the financial trading strategy domain?
- **Research Question 4**: What are the latest trading strategy developed in the financial market?

We performed the Bibliometric analysis to answer the above questions and generate an overall picture by analyzing hundreds of journals. Bibliometrics analysis is the research field to study the current trends in the literature of a specific research field and delivers procedures and impetuses for future research (Somanathan and Rama, 2020). It is a structured process of describing all documents produced in a specific field in terms of volume, connection, citations, productivity, quality, and tracking intellectual development and emerging trends (Khatib et al., 2021).

Figure 1 shows the method flows of the searching strategy. The research got conducted on 4th January 2022. Initially, 711 document results appeared after searching the keywords trading strategy, trading indicators, or trading analysis. We further constricted the criteria to the year 2000–21 and only selected journal documents as it gives higher credibility in the research area. We eliminated some journals since they were related to electricity trading

analysis and irrelevant to the financial trading strategy. Table 1 includes only journals written in English to make the research paper more meaningful.

The following section describes the applicable methodology for selecting the sample data. Subsequently, we will analyze the above topics and answer the research questions. Finally, we will conclude the research paper by summarizing the findings.

**Methodology**
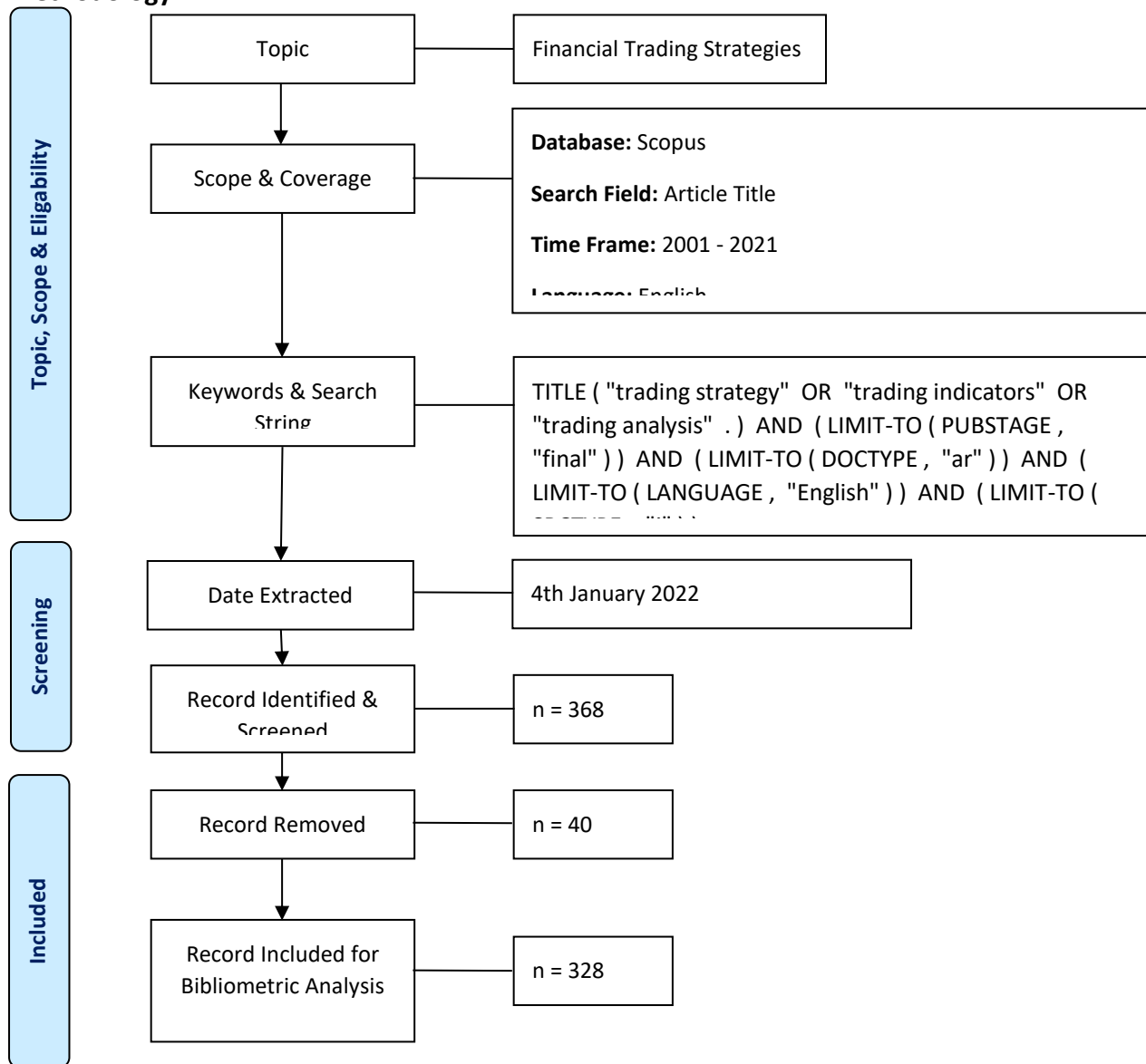


**Figure 1.** Flow diagram of the search strategy.

**Source:** (Zakaria et al, 2020). Worldwide Melatonin Research: A Bibliometric Analysis of the Published Literature between 2015 and 2019, Chronobiology International. https://doi.org/10.1080/07420528.2020.1838534

Modified from PRISMA (Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097)

**Results**
**Document Analysis**
During preliminary findings, 328 journals written in English were discovered in the financial trading strategy in Scopus as presented in Table 1 below:

**Table 1.** Document Type & Language

| Document Type | Total Publications | Language |
|---|---|---|
| Article | 328 | English |

**Subject Area Analysis**
Table 2 shows the subject areas having the highest publication in the financial trading strategy domain. Most of the research papers were in Economics, Econometrics, and Finance subject area (202 publications, 61.59%), followed by Business, Management, and Accounting (89 publications, 27.13%). Surprisingly, this financial trading strategy also got assigned to the non-finance topics such as Computer Science (64 publications, 19.51%), Mathematics (61 publications, 18.60%), Engineering (33 publications, 10.06%), and Decision Sciences (26 publications, 7.93%). The remaining subject areas had less than 20 publications each.

**Table 2.** Subject Area

| Subject Area | Number of Publications | (%) |
|---|---|---|
| Economics, Econometrics, and Finance | 202 | 61.59% |
| Business, Management, and Accounting | 89 | 27.13% |
| Computer Science | 64 | 19.51% |
| Mathematics | 61 | 18.60% |
| Engineering | 33 | 10.06% |
| Decision Sciences | 26 | 7.93% |
| Physics and Astronomy | 18 | 5.49% |
| Social Sciences | 17 | 5.18% |
| Neuroscience | 6 | 1.83% |
| Multidisciplinary | 5 | 1.52% |
| Arts and Humanities | 4 | 1.22% |
| Environmental Science | 4 | 1.22% |
| Energy | 3 | 0.91% |
| Materials Science | 3 | 0.91% |
| Agricultural and Biological Sciences | 2 | 0.61% |
| Psychology | 2 | 0.61% |
| Biochemistry, Genetics and Molecular Biology | 1 | 0.30% |
| Chemical Engineering | 1 | 0.30% |

**Publications Analysis**
Table 3 presents the performance of publications each year. It indicates that the overall number of citations and the number of publications are both growing throughout time. 33 papers got published in 2002, making it the highest ever publication since 2001. The highest total citation were 380 citations in the year 2002. Since 2002, the article 'The price

dynamics of common trading strategies' got 245 citations. Figure 2 illustrates a diagrammatic representation of the below table through a bar graph.

**Table 3.** Year of Publication

| Year | Total Number of Publications (TP) | No. of Cited Publications (NCP) | Total Citations (TC) | Average Citation per Publication (C/P) | Average Citation per cited Publication (C/CP) | h-index (h) | g-index (g) |
|------|------|------|------|------|------|------|------|
| 2021 | 26 | 7 | 12 | 0.46 | 1.71 | 2 | 2 |
| 2020 | 33 | 21 | 95 | 2.88 | 4.52 | 6 | 8 |
| 2019 | 21 | 16 | 83 | 3.95 | 5.19 | 6 | 8 |
| 2018 | 26 | 23 | 164 | 6.31 | 7.13 | 7 | 12 |
| 2017 | 29 | 24 | 262 | 9.03 | 10.92 | 10 | 15 |
| 2016 | 25 | 21 | 241 | 9.64 | 11.48 | 8 | 5 |
| 2015 | 19 | 18 | 276 | 14.53 | 15.33 | 9 | 16 |
| 2014 | 19 | 17 | 225 | 11.84 | 13.24 | 8 | 14 |
| 2013 | 13 | 10 | 299 | 23.00 | 29.90 | 6 | 13 |
| 2012 | 23 | 18 | 187 | 8.13 | 10.39 | 8 | 13 |
| 2011 | 12 | 12 | 103 | 8.58 | 8.58 | 6 | 10 |
| 2010 | 19 | 17 | 301 | 15.84 | 17.71 | 10 | 17 |
| 2009 | 10 | 8 | 204 | 20.40 | 25.50 | 7 | 10 |
| 2008 | 10 | 10 | 128 | 12.80 | 12.80 | 4 | 10 |
| 2007 | 9 | 9 | 156 | 17.33 | 17.33 | 7 | 9 |
| 2006 | 5 | 4 | 109 | 21.80 | 27.25 | 4 | 5 |
| 2005 | 9 | 8 | 171 | 19.00 | 21.38 | 5 | 9 |
| 2004 | 7 | 6 | 119 | 17.00 | 19.83 | 4 | 7 |
| 2003 | 4 | 4 | 89 | 22.25 | 22.25 | 2 | 4 |
| 2002 | 5 | 5 | 380 | 76.00 | 76.00 | 5 | 5 |
| 2001 | 4 | 4 | 153 | 38.25 | 38.25 | 4 | 4 |
| **Total** | **328** | **262** | **3,757** | | | | |
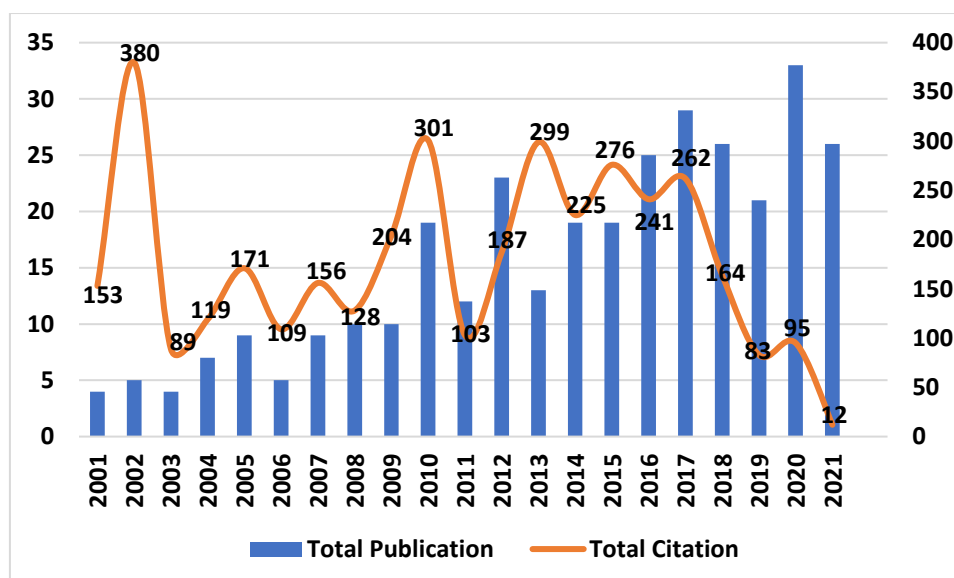
**Figure 2.** Total Publications and Citations by Year

**Countries Analysis**

Table 4 indicates the top producing countries in the financial trading strategy field. The countries having the highest number of publications are the United States with 86, followed by the United Kingdom with 50, China with 43, Taiwan with 27, Australia and Germany, having 17 publications each. Table 5 illustrates the Top 3 continents having the highest publications-Europe (149), followed by Asia (135) and North America (101).

**Table 4.** Top Countries contributed to a minimum of four (4) publications

| Country | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| United States | 86 | 75 | 1611 | 18.73 | 21.48 | 20 | 75 |
| United Kingdom | 50 | 45 | 702 | 14.04 | 15.60 | 14 | 45 |
| China | 43 | 36 | 479 | 11.14 | 13.31 | 11 | 36 |
| Taiwan | 27 | 22 | 251 | 9.30 | 11.41 | 9 | 22 |
| Australia | 17 | 17 | 302 | 17.76 | 17.76 | 9 | 17 |
| Germany | 17 | 15 | 222 | 13.06 | 14.80 | 9 | 15 |
| Italy | 16 | 15 | 276 | 17.25 | 18.40 | 9 | 15 |
| India | 16 | 8 | 92 | 5.75 | 11.50 | 5 | 8 |
| Canada | 15 | 13 | 198 | 13.20 | 15.23 | 7 | 13 |
| Hong Kong | 11 | 9 | 46 | 4.18 | 5.11 | 3 | 9 |
| Japan | 10 | 7 | 155 | 15.50 | 22.14 | 6 | 7 |
| Switzerland | 8 | 6 | 106 | 13.25 | 17.67 | 3 | 6 |
| Spain | 7 | 6 | 75 | 10.71 | 12.50 | 4 | 6 |
| France | 6 | 5 | 59 | 9.83 | 11.80 | 4 | 5 |
| South Korea | 6 | 5 | 35 | 5.83 | 7.00 | 3 | 5 |
| Poland | 5 | 5 | 76 | 15.20 | 15.20 | 3 | 5 |
| Austria | 5 | 5 | 17 | 3.40 | 3.40 | 2 | 5 |
| Netherlands | 4 | 4 | 82 | 20.50 | 20.50 | 4 | 4 |
| Saudi Arabia | 4 | 3 | 35 | 8.75 | 11.67 | 3 | 3 |
| Portugal | 4 | 4 | 21 | 5.25 | 5.25 | 3 | 4 |
| Russian | 4 | 2 | 4 | 1.00 | 2.00 | 1 | 2 |

**Table 5.** Top 3 Continents

| Country | Number of Publication |
|---|---|
| Europe | 149 |
| Asia | 135 |
| North America | 101 |

**Institutions Analysis**

Table 6 highlights the top productive University with at least four publications. The University College London (United Kingdom) leading with five publications, followed by the University of Toronto (Canada), the National of Chengchi University, University of Technology Sydney, King Saud University, Feng Chia University, and Columbia University with four publications each.

**Table 6.** Top productive University with at least four publications

| Affiliation | Country | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|---|
| University College London | United Kingdom | 5 | 2 | 43 | 8.60 | 21.50 | 2 | 5 |
| University of Toronto | Canada | 4 | 4 | 99 | 24.75 | 24.75 | 4 | 4 |
| National Chengchi University | Taiwan | 4 | 2 | 46 | 11.50 | 23.00 | 2 | 4 |
| University of Technology Sydney | Australia | 4 | 4 | 42 | 10.50 | 10.50 | 4 | 4 |
| King Saud University | Saudi Arabia | 4 | 3 | 35 | 8.75 | 11.67 | 3 | 4 |
| Feng Chia University | Taiwan | 4 | 3 | 27 | 6.75 | 9.00 | 2 | 4 |
| Columbia University | United States | 4 | 4 | 21 | 5.25 | 5.25 | 2 | 4 |

**Authors Analysis**

Table 7 shows the top productive authors. From the sample of 328 publications, most of the authors had three publications. Troiano gained the highest citations with 90, followed by Faff and Bayraktar, having 59 and 15, respectively.

**Table 7.** Top Productive Authors

| Author's Name | Affiliation | Country | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|---|---|
| Troiano | Università degli Studi del Sannio | Italy | 3 | 3 | 90 | 30.00 | 30.00 | 3 | 3 |
| Faff | The University of Queensland | Australia | 3 | 3 | 59 | 19.67 | 19.67 | 2 | 3 |
| Bayraktar | University of Michigan | United States | 3 | 3 | 15 | 5.00 | 5.00 | 3 | 3 |
| Chan | Hong Kong Polytechnic University | Hong Kong | 3 | 3 | 5 | 1.67 | 1.67 | 2 | 2 |
| Hui | Hong Kong Polytechnic University | Hong Kong | 3 | 3 | 5 | 1.67 | 1.67 | 2 | 2 |

**Source Title Analysis**

Table 8 shows the top active source title published in the financial trading journals. The most influenced sources are Quantitative Finance having 14 publications and 178 citations. Followed by Expert System With Applications (12 publications; 264 citations), Physica A Statistical Mechanics and Its Applications (11 publications; 120 citations), Journal of Banking and Finance (9 publications; 332 citations), Investment Management and Financial Innovations (9 publications; 32 citations).

**Table 8.** Top Active Source Title

| Source Title | Number of Publication | Total Citations | Publisher | Cite Score | SJR 2018 | SNIP 2018 |
|---|---|---|---|---|---|---|
| Quantitative Finance | 14 | 178 | Taylor & Francis | 2.8 | 0.771 | 1.33 |
| Expert Systems With Applications | 12 | 264 | Elsevier | 12.7 | 1.368 | 3.079 |
| Physica A Statistical Mechanics And Its Applications | 11 | 120 | Elsevier | 5.6 | 0.64 | 1.197 |
| Journal Of Banking And Finance | 9 | 332 | Elsevier | 4.4 | 1.58 | 2.166 |
| Investment Management And Financial Innovations | 9 | 32 | Business Perspectives | 1.6 | 0.213 | 0.692 |
| Applied Economics | 8 | 77 | Taylor & Francis | 2.3 | 0.569 | 1.029 |
| Financial Markets And Portfolio Management | 6 | 20 | Springer Nature | 0.8 | 0.184 | 0.365 |
| International Review Of Financial Analysis | 6 | 18 | Elsevier | 4.9 | 1.27 | 1.907 |
| Neurocomputing | 5 | 121 | Elsevier | 9.8 | 1.085 | 2.108 |
| Journal Of Futures Markets | 5 | 112 | Wiley-Blackwell | 2.4 | 0.88 | 1.28 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pacific-Basin Finance Journal | 5 | 45 | Elsevier | 3.2 | 0.697 | 1.521 |
| International Review Of Economics And Finance | 5 | 35 | Elsevier | 3.6 | 0.781 | 1.521 |
| Managerial Finance | 5 | 5 | Emerald | 1.5 | 0.271 | 0.656 |
| Finance Research Letters | 4 | 19 | Elsevier | 5.3 | 1.339 | 1.914 |
| International Journal Of Theoretical And Applied Finance | 4 | 8 | World Scientific | 0.9 | 0.469 | 0.812 |

**Citation Analysis**

Table 9 presents the Citations Metrics. 328 publications had 3,757 citations for the past 21 years. It results averaging of 178.9 citations yearly and 11.45 citations per paper. The papers per author are 158.09 and, the authors per paper are 2.52, resulting in an h-index and g-index of 33 and 49, respectively.

**Table 9.** Citations Analysis Metrics

| Metrics | Data |
|---|---|
| Articles | 328 |
| Total Number of Citations | 3,757 |
| Total Years | 21 |
| Total Citations Per Year | 178.9 |
| Total Citations Per Paper | 11.45 |
| Total Cites Per Author | 1,719.33 |
| Total Papers Per Author | 158.09 |
| Total Authors Per Paper | 2.52 |
| h_index | 33 |
| g_index | 49 |

**Articles Analysis**

Table 10 shows the top 20 highly cited articles in financial trading. Published in 2002 and co-authored by Joshi and Farmer, the article "The price dynamics of common trading strategies" has received the highest citations with 245, resulting in an average of 12.25 cites per year. Other articles which got more than 100 citations are Optimal trading strategy and supply/demand dynamics (184 citations with an average of 20.44 cites per year) and "Trend-following trading strategies in commodity futures: A re-examination" (105 citations with an average of 8.75 cites per year).

**Table 10.** Top 20 Highly cited articles

| No. | Author(s) | Title of Articles | Year | Cites | Cites per Year |
|---|---|---|---|---|---|
| 1 | Farmer & Joshi (2002) | The price dynamics of common trading strategies | 2002 | 245 | 12.25 |
| 2 | Obizhaeva & Wang (2013) | Optimal trading strategy and supply/demand dynamics | 2013 | 184 | 20.44 |
| 3 | Szakmary et al (2010) | Trend-following trading strategies in commodity futures: A re-examination | 2010 | 105 | 8.75 |
| 4 | Brooks, et al (2001) | A trading strategy based on the lead-lag relationship between the spot index and futures contract for the FTSE 100 | 2001 | 96 | 4.57 |
| 5 | Marshall et al (2006) | Candlestick technical trading strategies: Can they create value for investors? | 2006 | 80 | 5 |
| 6 | Narayan et al (2015) | Do Momentum-Based Trading Strategies Work in the Commodity Futures Markets? | 2015 | 72 | 10.29 |
| 7 | Ahn, et al (2003) | Risk Adjustment and Trading Strategies | 2003 | 69 | 3.63 |
| 8 | Kwon & Kish (2002) | Technical trading strategies and return predictability: NYSE | 2002 | 66 | 3.3 |
| 9 | Krauss (2017) | Statistical arbitrage pairs trading strategies: review and outlook | 2017 | 59 | 11.8 |
| 10 | Ellis & Parbery (2005) | Is smarter better? A comparison of adaptive, and simple moving average trading strategies | 2005 | 57 | 3.35 |
| 11 | Ni & Yin (2009) | Exchange rate prediction using hybrid neural networks and trading indicators | 2009 | 56 | 4.31 |
| 12 | Li & Kuo (2008) | Knowledge discovery in financial investment for forecasting and trading strategy through wavelet-based SOM networks | 2008 | 56 | 4 |
| 13 | Goldstein & Kavajecz (2004) | Trading strategies during circuit breakers and extreme market movements | 2004 | 56 | 3.11 |
| 14 | Zbikowski (2015) | Using Volume Weighted Support Vector Machines with walk-forward testing and feature selection to create a stock trading strategy | 2015 | 54 | 7.71 |
| 15 | Rad, et al (2016) | The profitability of pairs trading strategies: distance, cointegration, and copula methods | 2016 | 52 | 8.67 |
| 16 | Nuij, et al (2014) | An automated framework for incorporating news into stock trading strategies | 2014 | 50 | 6.25 |

| 17 | Cuoco, et al (2008) | Optimal dynamic trading strategies with risk limits | 2008 | 50 | 3.57 |
|----|----|----|----|----|----|
| 18 | Perlin (2009) | Evaluation of pairs trading strategy at the Brazilian financial market | 2009 | 48 | 3.69 |
| 19 | Cartea & Jaimungal (2015) | Risk metrics and fine-tuning of high-frequency trading strategies | 2015 | 40 | 5.71 |
| 20 | Serban (2010) | Combining mean reversion and momentum trading strategies in foreign exchange markets | 2010 | 40 | 3.33 |

**Authorship Analysis**

Table 11 presents the total authors per article. Out of 828 authors, 50 are single-authors, representing 15.2% of the total authors. The remaining 778 authors formed collaborations, spanning from 2 to 9 authors per article.

**Table 11.** Total Author(s) per article

| Author Count | Number of Publications | (%) |
|----|----|----|
| 1 | 50 | 15.2% |
| 2 | 125 | 38.1% |
| 3 | 103 | 31.4% |
| 4 | 33 | 10.1% |
| 5 | 13 | 4.0% |
| 6 | 1 | 0.3% |
| 7 | 1 | 0.3% |
| 9 | 1 | 0.3% |
| 0* | 1 | 0.3% |
| **Total** | **328** | **100.00** |

* No author is listed.

**Keywords Analysis**

Table 12 shows the top common keywords used by the researcher in the financial trading strategy domain. Trading strategy(s) has 107 publications (32.6%), followed by Commerce with 67 (20.4%) and Financial Markets with 36 (11%). Other keywords such as Stock Market, Electronic Trading, Pairs Trading, and Technical Analysis each have more than 20 publications. The authors mapped the keywords extracted for each documents using the VOS viewer, a computer system for building and visualizing bibliometric maps. This pictorial representation will help in a better understanding of the statistical data. Color-related keywords are grouped together since they have a similar relationship.

**Table 12.** Top Keywords

| Author Keywords | Number of Publications | (%) |
|---|---|---|
| Trading Strategy(s) | 107 | 32.6% |
| Commerce | 67 | 20.4% |
| Financial Markets | 36 | 11.0% |
| Stock Market | 24 | 7.3% |
| Electronic Trading | 21 | 6.4% |
| Pairs Trading | 21 | 6.4% |
| Technical Analysis | 20 | 6.1% |
| Investments | 19 | 5.8% |
| Algorithmic Trading | 17 | 5.2% |
| Finance | 17 | 5.2% |
| Market Efficiency | 16 | 4.9% |
| Profitability | 16 | 4.9% |
| Costs | 13 | 4.0% |
| Momentum | 13 | 4.0% |
| Genetic Algorithms | 12 | 3.7% |
| Optimization | 12 | 3.7% |
| Deep Learning | 11 | 3.4% |
| Financial Market | 10 | 3.0% |
| Forecasting | 10 | 3.0% |
| Machine Learning | 10 | 3.0% |
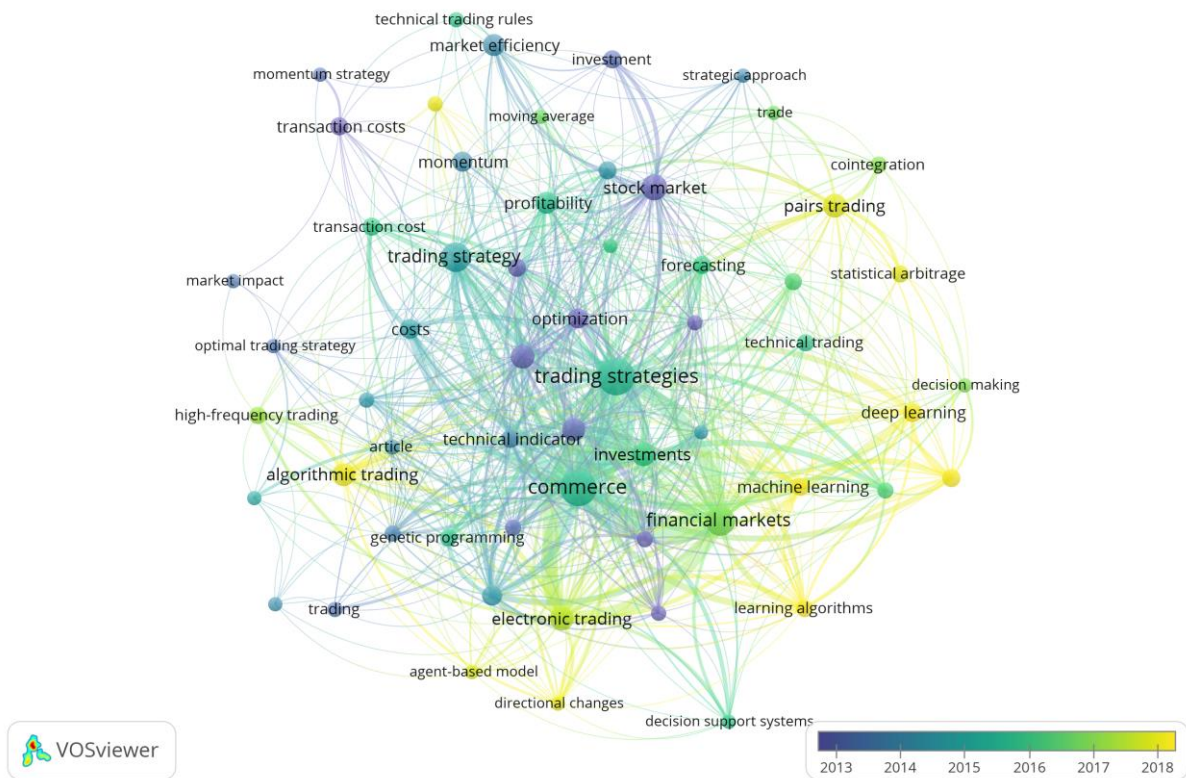


**Figure 3.** Network visualization map of the author keywords

The keyword used in the most recent articles is shown by the yellow color. The trend shifted to machine learning, deep learning, learning algorithms, electronic trading, etc.

**Discussion**

This bibliometric analysis was conceived based on two research questions stated in the introduction section. This section will answer those questions in the same sequence.

- **Research Question 1**: What are the most common keywords used in the financial trading strategy domain?

As discussed earlier in the keyword analysis section, trading strategy and trading strategies are the most common keywords used by past researchers in 107 publications. Followed by the keywords- Commerce (67 publications) and Financial market (36 publications). This research paper is based on keywords "trading strategy", "trading indicators" and "trading analysis". These keywords appeared in about 328 journals. Contrarily, many authors conducted research based on keywords such as their specific strategy and model as the indexed keyword. For example, the indexed keywords used in the article 'A Novel Trading Strategy Framework Based on Reinforcement Deep Learning for Financial Market Predictions' are machine learning, stock trading, decision making, deep learning, and reinforcement learning. Using specific keywords instead of generic (like trading strategy) enhances the quality of the papers.

- **Research Question 2**: What are the most cited articles and their strategies?

We analyzed a total of 328 articles and counted the total number of citations for each one. According to Ding and Cronin (2011), citation analysis is the most popular approach to quantify the impact of a research publication. As per the Scopus database, the article "The price dynamics of common trading strategies" garnered the highest citations with a total of 245. The article got co-authored by Farmer and Joshi. This research shows how various commonly used financial trading methods affect price dynamics, demonstrating how they amplify noise, induce price patterns, and cause excess and clustering volatility. To conclude, trend-following acts as signal filters, amplifying high-frequency noise and producing positive autocorrelations in the short term. Value investing techniques are signal transducers that cause negative short-term autocorrelations by embedding value information into prices.

- **Research Question 3**: Who are the most active publishers in the financial trading strategy domain?

Our study in the source title analysis indicates that Quantitative Finance has the highest total publication in the financial trading strategy branch. However, looking at the overall picture in Table 8, Elsevier publisher has received a total of 954 citations from 57 total publications, and numerous source titles under a single publisher. Expert Systems With Applications, Physica A Statistical Mechanics and Its Applications, and Journal of Banking and Finance were the top 3 Elsevier's source titles, with a total of 32 publications with 716 citations.

- **Research Question 4**: What are the recent strategy analysis development in the financial market?

An analysis from VOS provides a clear picture of the recent trend in the trading strategy domain. Many researchers are now developing trading strategies based on machine learning, a branch of artificial intelligence (AI), and computer science. The purpose is to use data and algorithms to imitate the way humans learn, gradually improving its accuracy (IBM, 2020). As per Figure 3, keywords such as deep learning, reinforcement learning, algorithmic trading, electronic trading are all interrelated with machine learning trading strategy. Due to

technological advances, the trading strategy based on machine learning can challenge the theory and the application of EMH and RMT in the future, which got widely accepted in the financial market world since the 1970s.

## Conclusion

Fundamental analysis and technical analysis are primary ways to identify investment opportunities in the financial market. Fundamental analysis is a technique to predict future price movements of a financial asset considering economic, political, and other pertinent factors. Technical analysis is a method of tracking market activity statistics such as past prices and volume. In reality, many market participants base trading decisions considering both fundamental and technical analysis.

The idea of market efficiency, as defined by Fama (1970), is inextricably linked to trading strategy research. The EMH can get classified in three forms of efficiencies: (i) weak form, (ii) semi-strong form, and (iii) strong form. Many researchers have devised and tested various trading strategies since the 1970s to support and refute the validity of this hypothesis. It leads to the objective of this paper: assessing the contribution of the past studies in the financial trading strategy domain.

The study applies bibliometric analysis to examine the trend in financial trading strategies. To summarize:
a) 328 articles have been examined, contributed by 828 authors from various institutions and countries;
b) 3,757 citations have been recorded for the past 21 years, with a substantial increase since 2010;
c) this area gained momentum and popularity from other researchers starting from 2010 due to the global financial crisis in 2007 – 2008;
d) this paper acknowledges the dominance of authors from Europe as a top active continent contributing to 149 publications. Meanwhile, the United States contributes the highest publications by any country with 86 publications;
e) 'trading strategy(s)' is the most encountered keyword in this paper, followed by 'commerce' and 'financial markets';
f) in terms of most active source titles, Quantitative Finance ranks first with a total of 14 publications, followed by Expert Systems With Applications (12 publications) and Physica A Statistical Mechanics And Its Applications (11 publications).

This bibliometric analysis has got extended by network analysis using, "Visualization of similarities, (VOS) viewer" software. Future scholars might use the findings of this study as a reference point, especially in the area of systematic computerized strategies such as factors causing the investors to shift to machine learning instead of a traditional buy-hold-sell decision and can consider analyzing this domain in other main databases, such as Google Scholar or Jstor.

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