

UDC 005

SYSTEM THINKING ON COMPETITIVE ADVANTAGE: A STUDY OF SYSTEMATIC AND BIBLIOMETRIC MAPPING

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ABSTRACT

The purpose of this study was to determine the development map of research on systems thinking and competitive advantage. The research was conducted using a systematic mapping study method to identify, evaluate, and interpret all available and relevant literature related to the research question or domain of interest, through searching the Scopus journal database, then processed and analyzed using the VOSViewer application program to find out the bibliometric map of research developments.

KEY WORDS

System thinking, competitive advantage, VOSViewer, systematic mapping, research gaps, bibliometric mapping.

Strategic management has evolved due to external changes caused by internal influences and different ways of doing business in society and trends that will occur in the future (Baumgartner & Ebner, 2010) (Anderson et al., 2014). Organizational competitive advantage in the digital economy era with a very competitive and dynamic environment as it is today will be achieved if the organization manages resources optimally. Resource-Based View (RBV) is the basis for seeing that the internal environment is a trigger for achieving competitive advantage (J. B. Barney & Clark, 2007). Organizational resources in the form of capabilities are key elements in RBV to generate Competitive Advantage (J. Barney, 2015) (Hitt et al., 2012).

Strategic management has become a phenomenon of growing organizational complexity (Pearce & Robinson, 2011). Moreover, with the scope of system thinking which includes system management, it is not just analytical thinking like strategic management, but more than that, system thinking can provide a comprehensive understanding without the need to know specifically about each part of the organization.

Systems thinking has contributed to all fields of science, since its presence in business management science, system thinking can improve managerial abilities in a holistic approach of a company. More simply, (Schaveling & Bryan, 2018) explain that systems thinking is about realizing that there are times when solving problems must be done by delaying and thinking first so that they can realize problems that must be studied differently. System measurement aims to determine how much the effectiveness and efficiency of a system when applied within the organization to be able to compete.

Evaluating research results can be done and is very dependent on the availability and reliability of data relating to the results of scientific research activities that are carried out properly (Zultaqawa et al., 2020). Mapping the topic of the field of science to explore the development of new knowledge in making further research plans (Barbosa et al., 2013). This is the basis for this research to seek and find solutions from the focus of research on systems thinking and competitive advantage. This research was conducted from literature review activities using a systematic mapping study, which is a secondary study research method by summarizing, identifying, evaluating, and interpreting all research topic results related to research topic questions or phenomena that will be of research concern (B. Kitchenham, 2004a).

The research questions of this article concentrate on categorizing related topics namely systems thinking and competitive advantage. Overall, the researchers analyzed the search results of article searches with the main questions including:

1. Research question 1: How is the trend of publication development every year?
2. Research question 2: How is the trend of publication development in each country?
3. Research question 3: How to visualize the bibliometric map of the development of the research topic?

LITERATURE REVIEW

Scopus is a reputable international scientific publication indexing database. It is a database of abstracts and citations from peer-reviewed scientific journals, books, and conference proceedings. As a search tool, Scopus has media to track, analyze, and visualize research results. Scopus can map research results based on fields of science, subject, category, author, keywords, publisher, year of publication, geography, and keywords (Burnham, 2006).

The purpose of conducting a systematic mapping study is to identify, evaluate, and review relevant literature, on the research objectives or research topics of interest (B. A. Kitchenham et al., 2020). The most common reasons for conducting systematic mapping are to summarize the existing evidence on the research topic, to identify gaps in current research and provide suggestions for future investigations, and to provide a background for positioning new research activities (Petersen et al., 2015). In other words, systematic mapping can be considered as a method to get an overview of a particular research area but not on the quality of the articles, because the systematic mapping study explores detailed information. Systematic reviews are very useful for synthesizing various research results related to the research plan so that researchers can present facts and empirical data in a more comprehensive and balanced manner (Barbosa & Alves, 2011).

Bibliometric studies in information science are studies that can reveal patterns of use of documents, developments of literature, or sources of information in a subject area (Ninkov et al., 2021). There are two types of studies in bibliometrics. First, a descriptive study to analyze publication productivity by looking at author patterns such as gender and author occupation, level of collaboration in writing articles, author productivity, author affiliation, and the subject of published articles. Second, an evaluative study to analyze the use of literature made by counting references or citations in research articles, books, or other formats (Lewison, 2020).

Co-word analysis is based on co-occurrence analysis of words or keywords from two or more documents used to index documents (Zurita et al., 2020). Co-word analysis is intended to analyze the content, patterns, and trends of a collection of documents by measuring the strength of terms (Feng et al., 2017). Co-word analysis is used to calculate the number of keywords from a research document that appear simultaneously in the articles to be studied. The more keywords that appear in a set of documents that have been found, the stronger the relationship between these documents will be. Mapping based on co-word analysis of keywords is based on co-occurrence. The use of keywords that are not standardized will result in non-uniform terms. The concept of science contained in a document can be seen through the words used.

METHODS OF RESEARCH

This research uses a systematic mapping study (SMS) method which is a secondary study. Then processed and analyzed using the VOSViewer application program to find out bibliometric maps. To increase the accuracy of this study, the search and analysis process should be as accurate as possible. Thus, in this section, we characterize the process of selecting data sources, implementing strategies for generating search strings, and determining exclusion and inclusion criteria. Search strings or search keywords are created using the strategy of (B. Kitchenham, 2004a) regarding research (Vegendla et al., 2018). The first step is to determine the main keywords of the research focus, the second step is to examine the relevant articles, and the third is to look for alternative keyword forms to be used in the search process.

Next, the step to determine the category of exclusion criteria and inclusion articles is one of the activities of a systematic mapping study to cover relevant articles and separate irrelevant articles (B. Kitchenham, 2004b). In the systematic mapping process, to analyze and classify articles that have been selected based on criteria, the researcher developed a classification scheme that refers to (B. A. Kitchenham et al., 2005).

RESULTS AND DISCUSSION

The data search was carried out by searching through the Scopus database. The search uses keywords through the search field "Document search", then by using the key-string "system thinking" AND "competitive advantage". Here the researcher conducts the selection process by carrying out the inclusion process only on journal articles excluding books, proceedings, and magazines. Next, the researchers scanned each abstract and focused on finding or research findings to get relevant articles. Found as many as 87 document results articles/scientific publications about the development of systems thinking research and competitive advantage. The process of classifying the articles is shown in Figure 1 below:

Scoping Process		Scope	Number of Papers
Search with the keyword "system thinking" in-document search	↙	All papers	8,493
Focusing on relevant papers (last 10 years), document-type articles, business subject areas, and in English	↙	Article	748
Specifies with the key-string "competitive advantage"	↙	Article	103
Evaluating relevant papers	↙	Paper categorized inclusion	87

Figure 1 – Systematic Mapping Process in Scopus Database Sources: (B. A. Kitchenham et al., 2020)

Furthermore, it will answer research questions about the development of publications in the last 10 years, namely from 2013 to 2022, the trend of publication of articles from each country, as well as bibliometric visualization using VOSViewer to view a map of publication development based on the research topic. The following is a discussion to answer each of these research questions:

Research Question 1 Trends of Publication Development Every Year. Based on the results of the scoping articles carried out, it can be seen that the development of research over the last 10 years, namely in 2013-2022 is shown in the following figure:

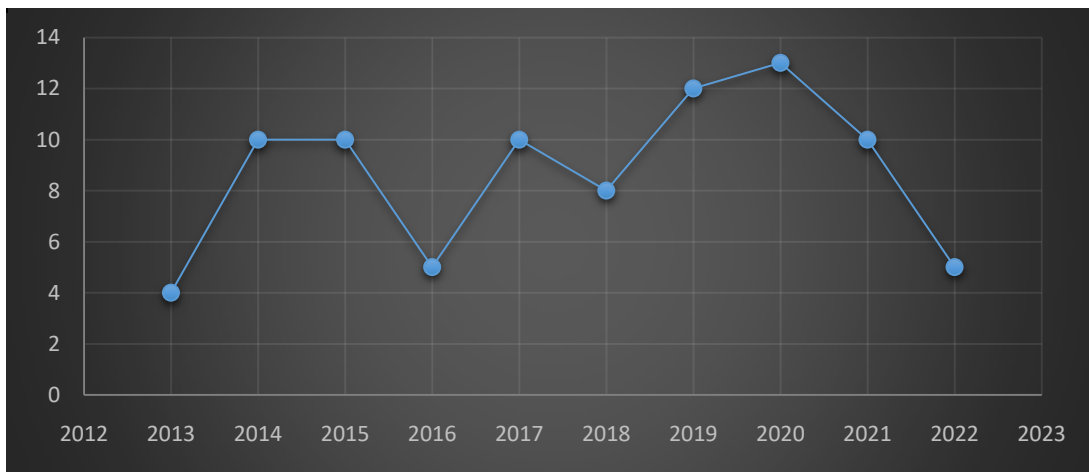


Figure 2 – The trend of Publication Development in 2013-2022 (Source: Processed by Researchers, 2022)

Figure 2 above shows that from 2013 to 2022, the most research developments occurred in 2020, namely as many as 13 publications of articles, and at least in 2013 as many as 4 publications. Then, it can be seen that the development trend in 2021 and 2022 decreased from 10 publications to 5 article publications.

Research Question 2 Trend of Publication Development in Each Country. Based on the grouping of articles that have been categorized as inclusion, it shows the development trend of each country that publishes articles, as shown in the following figure:

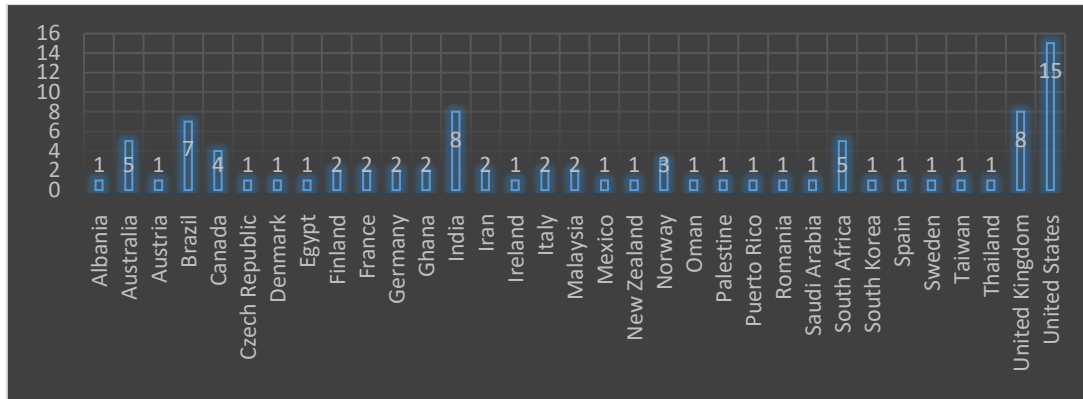


Figure 3 – The trend of Publication Development in Each Country (Source: Processed by Researchers, 2022)

Based on Figure 3 above, it can be seen that the development trend of countries that publish articles is dominated by the United States, namely as many as 15 article publications with a comparison of the distribution of articles around the world. This condition shows that the research topic has received a lot of attention from academics and practitioners in the United States. Then, in the Southeast Asian region, two countries have published, namely Malaysia with 2 publications and Thailand with 1 publication. However, in Indonesia, there have been no international publications. This indicates that research trends still have many opportunities to be used as research topics in Indonesia.

Research Question 3 Visualization of Bibliometric Map Development of Research Topics. The results of searching for groups of articles through the Scopus database using the key-string "system thinking" AND "competitive advantage" and categorized as inclusion, obtained as many as 87 documents on the development of research results, then analyzed using the VOSViewer application so that the following results were obtained:

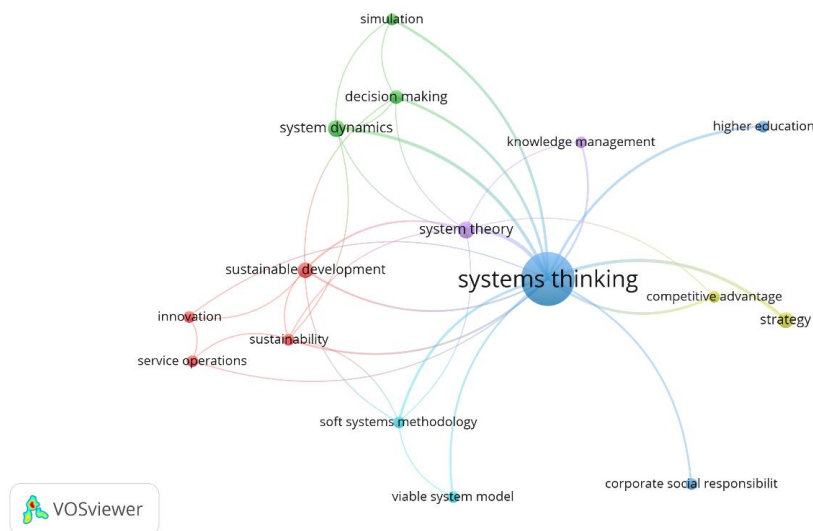


Figure 4 – Visualization of Research Development Network (Source: Processed by Researchers, 2022)

Figure 4 above shows a map that is the result of an analysis that uses all related and unrelated research developments in systems thinking and competitive advantage. The results of the network visualization of the development map of the research topic are divided into 6 clusters, namely:

1. Cluster 1 shows an interconnected red map visualization consisting of 4 research topics including innovation, service operations, sustainability, and sustainable development;
2. Cluster 2 shows the visualization of interconnected green maps consisting of 3 research topics including decision making, simulation, and system dynamics;
3. Cluster 3 shows an interconnected blue map visualization consisting of 3 research topics including corporate social responsibility, higher education, and systems thinking;
4. Cluster 4 shows an interconnected yellow map visualization consisting of 2 research topics including competitive advantage and strategy;
5. Cluster 5 shows an interconnected purple map visualization consisting of 2 research topics including knowledge management and system theory;
6. Cluster 6 shows an interconnected light blue map visualization consisting of 2 research topics including the soft system methodology and the variable system model.

Based on the results of the analysis using the VOSViewer application and displaying a visualization map of the clusters of the development of the research topic, the following are classified into the table:

Table 1 – Classification of Research Topics

Research Topic	Number of articles
Competitive Advantage	3
Corporate Social Responsibility	3
Decision Making	4
Higher Education	3
Innovation	3
Knowledge Management	3
Service Operations	3
Simulation	3
Soft Systems Methodology	3
Strategy	5
Sustainability	3
Sustainable Development	5
System Dynamics	6
System Theory	6
Systems Thinking	49
Viable System Model	3

Source: Processed by Researchers, 2022.

Through the map visualization and classification, it was found that the scope of systems thinking research contained 49 publications with links to system dynamics, system theory, strategy, and sustainable development.

In this study, research gaps regarding the relationship between systems thinking and competitive advantage in business and management were carried out (Brønn & Brønn, 2015; Hahn & Tampe, 2021; Sénquiz-Díaz & Ortiz-Soto, 2019). After reviewing the 3 articles, it was found specifically the relationship between system thinking and competitive advantage, which emphasizes the development of models to assist organizations in achieving maximum goals and measuring the level of effectiveness and efficiency of companies with system thinking. So that it becomes an opportunity for researchers to build a novelty for further research.

CONCLUSION

Based on the results and discussion above, it can be concluded that the trend of the development of article publications in the last 10 years from 2013 to 2022 was the most in 2020, namely as many as 13 article publications, and at least in 2013 there were 4 publications. Then in 2021 and 2022, it decreased from 10 publications to 5 article publications. Based on the development trend of countries publishing articles, the United States is dominated by 15 publications. In Southeast Asia, two countries have published, namely Malaysia with 2 publications and Thailand with 1 publication. However, in Indonesia, there have been no international publications. This indicates that research trends still have many opportunities to be used as research topics in Indonesia. The VOSViewer visualization shows that the development map of research topics specifically shows the relationship between system thinking and competitive advantage, which emphasizes the development of models to help organizations achieve maximum goals and measure the level of effectiveness and efficiency of the company with system thinking. So that it becomes an opportunity for researchers to build a novelty for further research.

REFERENCES

1. Anderson, B. S., Kreiser, P. M., Kuratko, D. F., Hornsby, J. S., & Eshima, Y. (2014). Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal*, 51(2), 315–334. <https://doi.org/10.1002/smj>.
2. Barbosa, O., & Alves, C. (2011). A systematic mapping study on software ecosystems. *CEUR Workshop Proceedings*.
3. Barbosa, O., Santos, R. P. dos, Alves, C., Werner, C., & Jansen, S. (2013). A systematic mapping study on software ecosystems from a three-dimensional perspective. In *Software Ecosystems: Analyzing and Managing Business Networks in the Software Industry*. <https://doi.org/10.4337/9781781955635.00011>
4. Barney, J. (2015). Firm resources and sustained competitive advantage. *International Business Strategy: Theory and Practice*, 17(1), 283–301.
5. Barney, J. B., & Clark, D. N. (2007). *Resource-Based Theory: Creating and Sustaining Competitive Advantage*. Oxford University Press, 336. <https://doi.org/10.1362/026725708X382046>.
6. Baumgartner, R. J., & Ebner, D. (2010). Corporate sustainability strategies: Sustainability profiles and maturity levels. *Sustainable Development*, 18(2), 76–89. <https://doi.org/10.1002/sd.447>.
7. Brønn, C., & Brønn, P. S. (2015). A systems approach to understanding how reputation contributes to competitive advantage. *Corporate Reputation Review*, 18(2). <https://doi.org/10.1057/crr.2015.5>.
8. Burnham, J. F. (2006). Scopus database: a review Content of Scopus. *BioMed Central*, 3(1).
9. Chen, X., Chen, J., Wu, D., Xie, Y., & Li, J. (2016). Mapping the Research Trends by Co-word Analysis Based on Keywords from Funded Project. *Procedia Computer Science*. <https://doi.org/10.1016/j.procs.2016.07.140>.
10. Feng, J., Zhang, Y. Q., & Zhang, H. (2017). Improving the co-word analysis method based on semantic distance. *Scientometrics*, 111(3). <https://doi.org/10.1007/s11192-017-2286-1>.
11. Hahn, T., & Tampe, M. (2021). Strategies for regenerative business. *Strategic Organization*, 19(3). <https://doi.org/10.1177/1476127020979228>.
12. Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2012). *Strategic management cases: competitiveness and globalization*. Cengage Learning.
13. Kitchenham, B. (2004a). Procedures for performing systematic reviews. *Keele, UK, Keele University*, 33(TR/SE-0401), 28. <https://doi.org/10.1.1.122.3308>.
14. Kitchenham, B. (2004b). *Procedures for Performing Systematic Reviews* Barbara Kitchenham. *Annals of Saudi Medicine*, 37(1).

15. Kitchenham, B. A., Budgen, D., & Brereton, P. (2020). Systematic Review and Mapping Study Procedures. In *Evidence-Based Software Engineering and Systematic Reviews*. <https://doi.org/10.1201/b19467-31>.
16. Kitchenham, B. A., Pickard, L., Linkman, S., & Jones, P. (2005). A framework for evaluating a software bidding model. *Information and Software Technology*, 47(11). <https://doi.org/10.1016/j.infsof.2004.05.005>.
17. Lewison, G. (2020). Preparation of bibliometrics papers. In *Anais da Academia Brasileira de Ciencias* (Vol. 92, Issue 3). <https://doi.org/10.1590/0001-3765202020201327>.
18. Ninkov, A., Frank, J. R., & Maggio, L. A. (2021). Bibliometrics: Methods for studying academic publishing. *Perspectives on Medical Education*. <https://doi.org/10.1007/s40037-021-00695-4>.
19. Pearce, J., & Robinson, A. (2011). Strategic management : Formulation , implementation & control. In *Mcgraw Hill Higher Education; 12th Revised edition,2011,*. <https://doi.org/10.1177/002088170504300201>.
20. Petersen, K., Vakkalanka, S., & Kuzniarz, L. (2015). Guidelines for conducting systematic mapping studies in software engineering: An update. *Information and Software Technology*, 64. <https://doi.org/10.1016/j.infsof.2015.03.007>.
21. Schaveling, J., & Bryan, B. (2018). Making Better Decisions Using Systems Thinking. In *Making Better Decisions Using Systems Thinking* (pp. 1–3). Springer. https://doi.org/10.1007/978-3-319-63880-5_1.
22. Sénquiz-Díaz, C., & Ortiz-Soto, M. (2019). A multifold perspective of knowledge sharing and virtual teams: The development of an IMOI model. *Journal of Technology Management and Innovation*, 14(2). <https://doi.org/10.4067/s0718-27242019000200088>.
23. van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*. <https://doi.org/10.1007/s11192-009-0146-3>.
24. Vegendla, A., Duc, A. N., Gao, S., & Sindre, G. (2018). A systematic mapping study on requirements engineering in software ecosystems. *Journal of Information Technology Research*, 11(1). <https://doi.org/10.4018/JITR.2018010104>.
25. Zultaqawa, Z., Alexandri, M. B., & Hardinata, C. (2020). Keunggulan Kompetitif Pada Usaha Kecil Dan Menengah : Sebuah Studi Pemetaan Sistematis. *AdBispreneur*. <https://doi.org/10.24198/adbispreneur.v4i3.18646>.
26. Zurita, G., Shukla, A. K., Pino, J. A., Merigó, J. M., Lobos-Ossandón, V., & Muhuri, P. K. (2020). A bibliometric overview of the *Journal of Network and Computer Applications* between 1997 and 2019. *Journal of Network and Computer Applications*, 165. <https://doi.org/10.1016/j.jnca.2020.102695>.