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BIBLIOMETRIC ANALYSIS OF NEAR FIELD COMMUNICATION TECHNOLOGY USING VOSVIEWER APPLICATION WITH PUBLISH OR PERISH

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Abstract

The need for automatic identification software is increasing significantly in the modern world. The number of mobile smartphone users in Indonesia means that more and more technological features are offered, including Near Field Communication (NFC) technology. NFC technology is a viable substitute for wireless communication, serving as a swift, adaptable, and comparatively secure payment method. This research endeavors to assess computational bibliometrics through the fusion of mapping analysis utilizing VOSviewer software and data compilation via Publish or Perish software. Bibliometric and descriptive quantitative approaches were used as data collection and processing methods. The data obtained results from a search using the keyword "Near Field Communication (NFC) Technology" on Google Scholar using Publish or Perish software. The search results show 816 articles published in the 2017-2021 range. However, only 31 articles pertain directly to the research subject, as indicated by the findings within the period spanning from 2017 to 2021. It has decreased every year. This is evidenced that in 2017, there were 284 articles published, and in 2018 there were 211 articles published; then in 2019, there were 167 articles published; in 2020, 104 articles were published; and in 2021, there were 50 published articles. This study proves that it is important to carry out bibliometric analysis, especially on "Near Field Communication (NFC) Technology". This research is expected to guide writers who want to do and determine the theme to be studied in their research.

Keywords: Bibliometric, Near field communication, Publish or perish, Technology, VOSviewer.

1. Introduction

The rapid advancement of small-chip electronics has ushered in a new era for wireless technology. This technology is widely produced and implemented in a card or smartphone device that will replace the magnetic data card technology previously used [1]. Adding a Processor chip to the data card allows it to perform further processing of the data it contains, making it easier to add additional features such as data security features and other applications [2]. In today's modern world, automatic identification software is needed. The need for implementation varies, such as collecting employee attendance data in the office, access cards to access special rooms, non-cash payments, smart cards, charge cards and other multipurpose cards. Some of these implementations have been implemented, but there are still opportunities for improvement and development. Due to the need for transaction speed and ease of access to information, it demands to continue to grow in line with user needs.

Integrating Near Field Communication (NFC) technology in mobile devices and smartcards gives users a convenient means to engage in diverse wireless communications [3]. Utilizing NFC requires no learning curve, as it operates automatically by bringing two devices within approximately 5-10 cm proximity, operating at frequencies of 13.56 MHz and speeds of 106, 212, 424, or 848 Kbits per second [4]. Essential applications like cashless payments (e-money) are bolstered by NFC, driving a surge in demand for NFC-capable devices due to their user-friendly nature. NFC operates on the principles of short-range wireless communication, drawing from Radio Frequency Identification (RFID) and other pertinent technologies [5, 6].

In improving certain research topics, researchers can use the help of VOSviewer software. VOSviewer is a software developed to create and analyze bibliometric mapping into several types of visual data [7]. Previous research on the use of NFC technology has been carried out by several researchers, in the research discussing how to use NFC technology in the teaching and learning process for students and lecturers to provide lecture material even though internet network is off [8]. Another study analyzes weaknesses in transactions when using a smartphone connected to NFC, which can cause security problems [9]. Other research discusses using NFC technology as a vehicle number identification letter with a mobile application [10]. Many previous studies have discussed the use of NFC technology in various fields of work, but research on the topic of bibliometric analysis of NFC Technology is still lacking, especially in using VOSviewer software to aid in mapping analysis.

Therefore, this study aims to conduct a bibliometric analysis on Near Field Communication (NFC) Technology by integrating mapping with VOSviewer software. Research with this method is important to determine the data's quantity and newness on the topic chosen by the researchers in the future. This research serves as a reference point for researchers aiming to undertake studies and identify the focal areas to explore in their research endeavours.

2. Method

This study uses quantitative bibliometric and descriptive analysis. We collect information from journals published on the Google Scholar website. Google

Scholar is a website containing sources of national and international journals that all users can access. A literature study on research related to the Near Field Communication theme was also conducted using the Publish or Perish software. Publish or perish is an application that can group data based on the keywords that have been searched. The data obtained from Publish or Perish is processed into a file in RIS format. and CSV. to be reprocessed using the VOSViewer application. The applications we use in this research are Publish or Perish and VOSviewer 1.6.17, which are useful in collecting data.

3. Results and Discussion

3.1. Preliminary phase

In the data analysis that has been carried out, a graph is mapped to visualize the condition of the number of related articles in the 2017-2021 range (see Fig. 1).

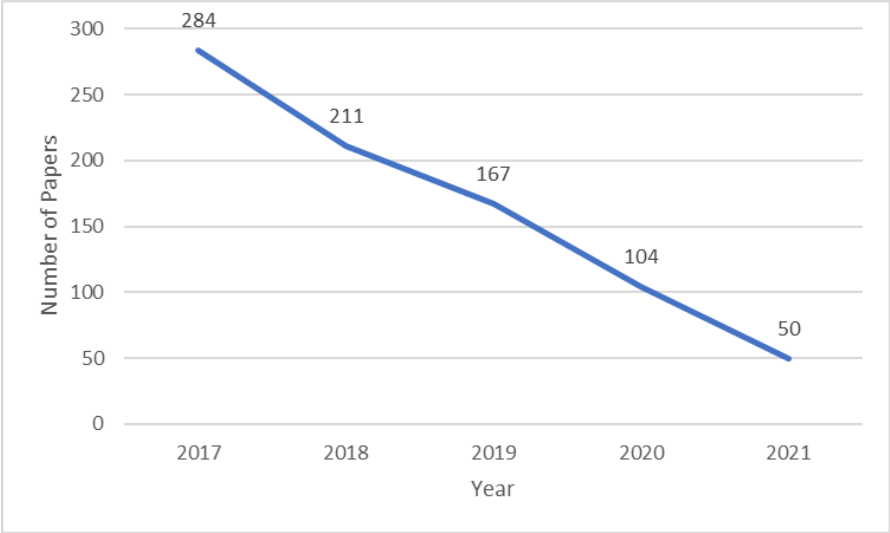

Fig. 1. The development of research on NFC technology.

Figure 1 illustrates the developments that occur in the research topic of NFC Technology based on the 2017-2021 range. Figure 1 shows that the number of research on NFC Technology has decreased yearly. It can be seen that in 2017, there were 284 articles published; in 2018, there were 211 articles published; in 2019, there were 167 articles published; then in 2020, there were 104 articles; and in 2021 there were only 50 articles published.

These results show that the number of research on NFC Technology is 816 articles, and 31 are relevant to the topic. After that, 20 articles with the most citations were selected from 20 journals based on Publish or Perish data (see Table 1).

Table 1 shows the data obtained from 20 journals that are relevant to the related topic. From 20 selected articles. The highest citation on NFC Technology is 360, while the lowest is 19. Based on Table 1, in 2017, there were seven articles with the highest citation of 264, then in 2018, there were nine articles with the highest citation of 360, then in 2019, there was 1 article with a citation of 53, then 2020

there are two articles with the highest citation being 86 and in 2021 there are no articles based on data obtained from Publish or Perish.

Table 1. Data for 20 journals with the most citations on NFC technology.

No.	Authors	Title	Year	Cites	Refs
1.	Lindlof, T. R. and Taylor, B. C.	Qualitative communication research methods	2017	10781	[11]
2.	Soltani, Z., et al,	The impact of the customer relationship management on the organization performance	2018	755	[12]
3.	Tan, P., et al.	Teaching management system with applications of RFID and IoT technology	2018	527	[13]
4.	Guerboukha, H., et al.	Toward real-time terahertz imaging	2018	236	[14]
5.	Vuran, M. C., et al.	Internet of underground things in precision agriculture: Architecture and technology aspects	2018	196	[15]
6.	Zheng, Y., et al.	Conceptualizing development in information and communication technology for development (ICT4D)	2018	180	[16]
7.	Bandodkar, A. J., et al.	Wearable sensors for biochemical sweat analysis	2019	160	[17]
8.	Lee, G., et al.	Fully biodegradable microsupercapacitor for power storage in transient electronics	2017	150	[18]
9.	Lao, L., et al.	A survey of IoT applications in blockchain systems: Architecture, consensus, and traffic modeling	2020	128	[19]
10.	Wong, M. H., et al.	Enhancement-mode Ga2O3 MOSFETs with Si-ion-implanted source and drain	2017	121	[20]
11.	Wang, J., et al.	Optimal coverage multi-path scheduling scheme with multiple mobile sinks for WSNs	2020	117	[21]
12.	Liu, J., et al.	Are plasmonic optical biosensors ready for use in point-of-need applications?	2020	82	[22]
13.	Li, C., et al.	Laser-induced periodic surface structures with ultrashort laser pulse	2018	14	[23]
14.	Xiao, A., et al.	An optical microfiber biosensor for CEACAM5 detection in serum: sensitization by a nanosphere interface	2019	12	[24]

15.	Wiecha, P.R.; and Muskens, O.L.	Deep learning meets nanophotonics: a generalized accurate predictor for near fields and far fields of arbitrary 3D nanostructures	2019	9	[25]
16.	Zhan, B., et al.	Wearable near-field communication antennas with magnetic composite films	2017	6	[26]
17.	Pfeifer, S., et al.	Forward transformation from reactive near-field to near and far-field at millimeter-wave frequencies	2020	4	[27]
18.	Jennette, T. L., and Ahuja, K. K.	Noise source location and scaling of subsonic upper surface blowing	2020	3	[28]
19.	King, R., and Nagasubramani, P.C.	VHF Near Field Antenna Design for Wireless Sensing Applications in Harsh Environments	2019	2	[29]
20.	Bengtsson, D., and Löw, W.	Non-Contact Pcb Fault Detection Using Near Field Measurements and Thermal Signatures	2020	1	[30]

3.2. CNN architecture

Research with topics related to NFC Technology based on visualization using the VOSviewer application is divided into 4 clusters, namely Cluster 1, Cluster 2, Cluster 3, and Cluster 4 (see Figs. 2-5).

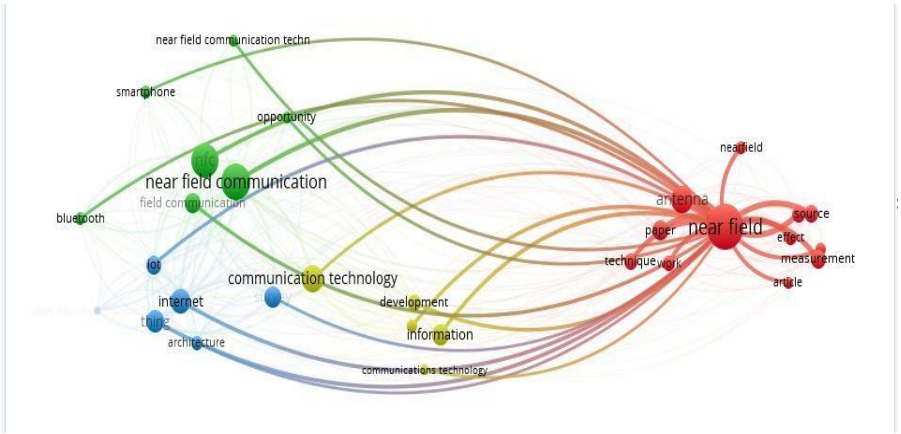

Fig. 2. Cluster 1 network visualization of near field communication technology.

Cluster 1 is marked with a red net and has 13 items: antenna, article, effect, far field, source, measurement, near field, nearfield, paper, near field measurement, performance, technique, and work.

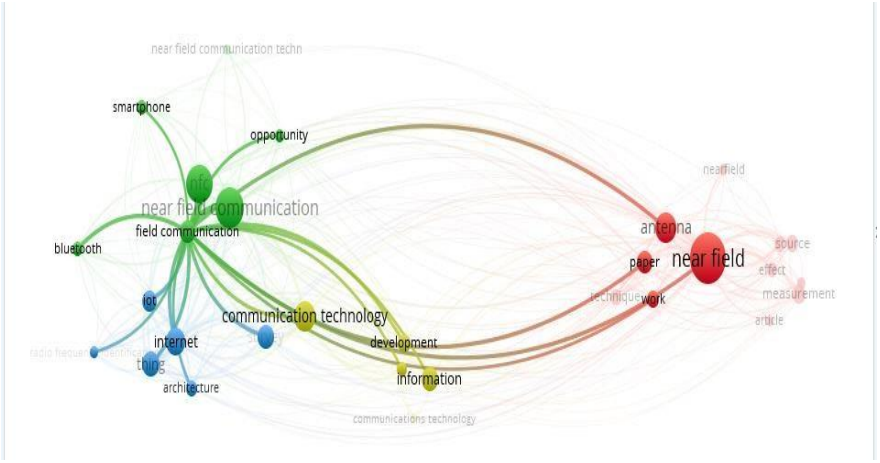

Fig. 3. Cluster 2 network visualization of NFC technology.

Cluster 2 is marked with a green net and has 7 items: Field communication, opportunity, near field communication technology, Bluetooth, Near Field Communication (NFC), and smartphone.

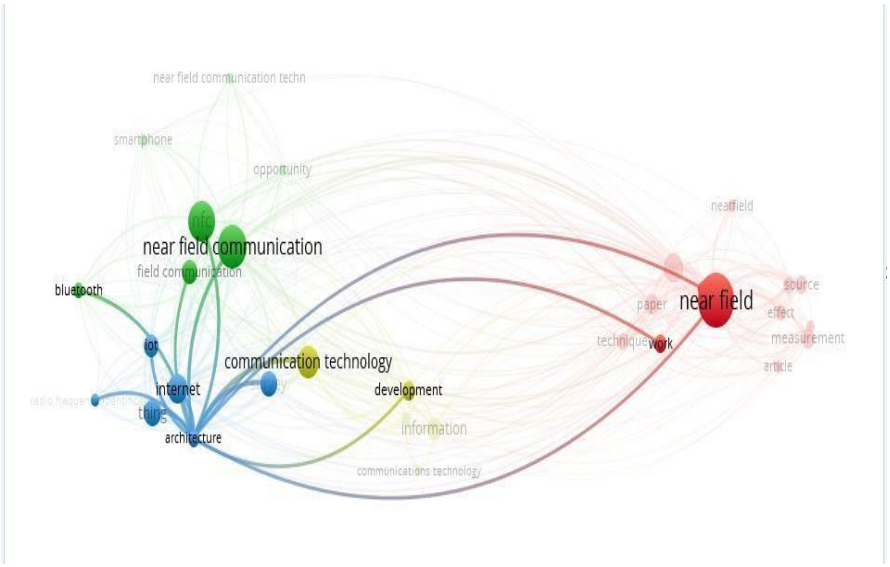

Fig. 4. Cluster 3 network visualization of NFC technology.

Cluster 3 is marked with a blue net and has 6 items: architecture, internet, IoT, radio frequency identification, survey, and things.

Cluster 4 is marked with a yellow net and has 5 items: communication technology, communications technology, development, information, and state.

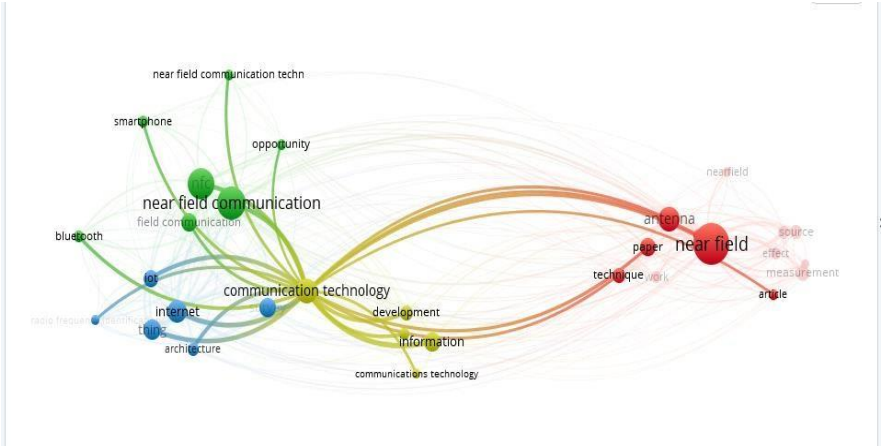

Fig. 5. Cluster 4 network visualization of NFC technology.

3.3. Network visualization NFC technology using VOSviewer

In the VOSviewer software, the mapping analysis results are divided into 3 types, one of which is Network Visualization using the keyword "NFC Technology" (see Fig. 6).

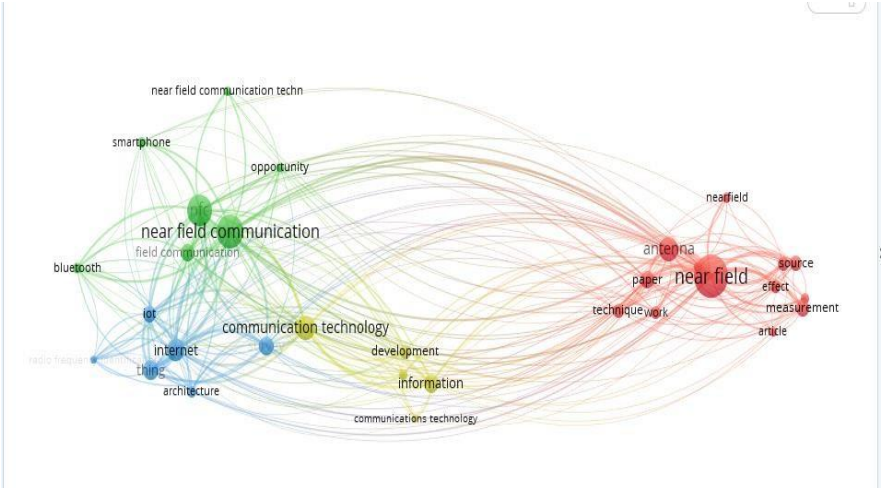

Fig. 6. Network visualization on NFC technology.

Network visualization depicts several related topics on a map as interconnected dots. Based on Fig. 6, it can show that the available network visualizations are related to various research topics. It can be explained that each network is related to the research topic, one example of which is communication technology, which has links to the education system, evidence, systematic review, individual, e-learning, technology acceptance model, higher education institution, training, application, covid, medical education, life, science, term, problem, implication, technology education, quality, teacher education, policy, innovation, attitude, relation, newer and technology integration.

3.4. Overlay visualization NFC technology using VOSviewer

The second type of mapping analysis is overlay visualization using the keyword "NFC Technology" (see Fig. 7).

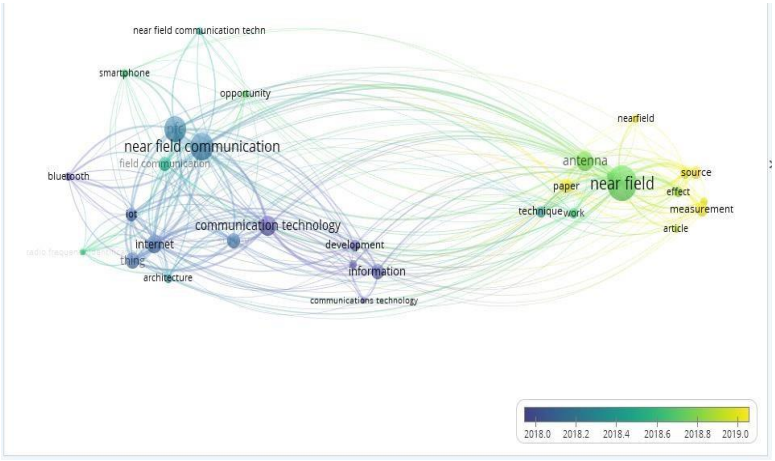

Fig. 7. Overlay visualization on NFC technology.

This overlay visualization serves to visualize a bibliometric map in the form of an overlay and to find out the novelty of a study [31]. On Fig. 7, to find out the novelty of a research topic, you can pay attention to the colors listed on each topic. The colour of the year that is getting lighter indicates that the research is still relatively new; on the contrary, if the colour is getting darker, it shows that the number of this research has been widely studied. One example of a theme with novelty in this overlay visualization is the topic of Near Field Communication on Paper, Source, and Measurement.

3.5. Density visualization NFC technology using vosviewer

The last type of mapping in VOSviewer is Density Visualization using the keyword "NFC Technology" (see Fig. 8).

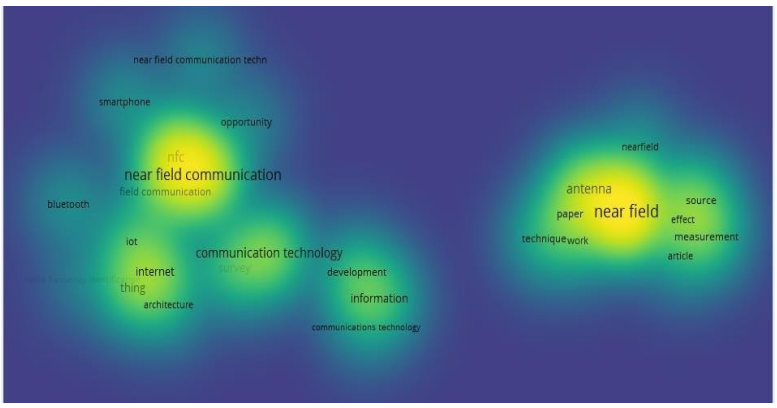

Fig. 8. Density visualization in NFC technology.

Density visualization functions to classify research topics based on the number of studies carried out. This type of visualization can be seen from the colour of each term. Based on Fig. 8, the term with a lighter colour indicates the topic has an element of novelty that researchers can investigate. On the other hand, when the colour of the term gets darker, the topic is a topic that is rarely re-examined.

Figure 8 shows that the term with the lighter colour is marked with a yellow colour with a large diameter. Topics with novelty elements include Near Field Communication on the topic of IoT, Internet, Architecture, Communication, Field Communication, Development, Information, Paper, and others. On the other hand, topics that appear to be rarely discussed are marked with a faded green colour. Examples of topics rarely discussed based on the Fig. 8 are Bluetooth, Smartphone, Opportunity, Communication Technology, Nearfield, and others.

This study informs the important of bibliometric analysis in showing the current research trend. This is in line with current literature [32-38], giving idea for further information for the use of vosviewer for analyzing research trend.

4. Conclusion

In the research that has been carried out on the analysis of computational bibliometrics in Near Field Communication Technology. From the data obtained using these keywords, 816 articles were obtained, and there were only 31 articles relevant to the related topic. This study uses the help of 2 data processing software to perform bibliometric computational analysis, namely Publish or Perish and VOSviewer. The application serves to collect data related to the intended topic. Based on the studies that have been made, it can be observed that research on NFC Technology in the 2017-2021 range has decreased every year. In this study, bibliometric computational analysis was used to identify previous research. This research aims to serve as a point of reference for researchers, guiding them to select novel research subjects for exploration in the times ahead.

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