



A Bibliometric Analysis of Nanocrystalline Cellulose Synthesis for Packaging Application Research Using VOSviewer

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Abstract. Nanocrystalline cellulose is a type of renewable nano material that has many beneficial properties and has applications in various fields, one of which is packaging. This study aims to present an analytical map of studies in the manufacture of nanocrystalline cellulose using VOSviewer software. Based on the keywords “synthesis nanocrystalline cellulose” and “packaging application”, there were 500 related articles published in the 2017-2021 range. The results of the analysis show that the number of research articles on nanocrystalline cellulose synthesis has increased significantly every year. This is due to the need for new environmentally friendly and biodegradable materials for packaging. This research is expected to be a reference for researchers in determining the research topic to be carried out.

1. Introduction

Bibliometrics is used to observe and evaluate quantitatively a science with research management, such as VOSviewer (Zitt, 2015). VOSviewer is an application or software commonly used to describe bibliographic analysis maps based on topic areas, titles, abstracts, and keywords (Hamidah et al., 2020; Yu et al., 2020).

One of the topics to be analyzed is nanocrystalline cellulose. Nanocrystalline cellulose is a type of renewable nano material that can be applied in various fields such as biomedical engineering, catalysts, food packaging, etc. due to its good physical, mechanical and chemical properties, biodegradability, and low toxicity (Bhat et al., 2017; George & Sabapathi, 2015).

Several studies of nanocrystalline cellulose have been reported, for example the research conducted by Jean Paulo Oliveira et al (Oliveira et al., 2018). where they made nanocrystalline cellulose from rice and oat husks by enzymatic hydrolysis method, research by Yunqing He et al. (He et al., 2020) making nanocrystalline cellulose from pea hull waste by acid hydrolysis method and its application to food packaging, research by Weihui Jiang et al. (Jiang & Li, 2020) made nanocrystalline cellulose from softwood pulp with double oxidation and ultrasonication methods for application in natural rubber composites. However, there is no study that presents bibliometric analysis in nanocrystalline cellulose synthesis research, especially using analysis maps with VOSviewer software in its presentation.

This paper aims to lead bibliometric research on nanopolymers especially in nanocrystalline cellulose by map fusion using VOSviewer software.

2. Method

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2.1. Presentation of the wastewater treatment plant

The treatment in this station goes through several phases shown schematically Figure 1.

2.2. Wastewater and industrial water purification processes in the station

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3. Results and Discussion

The development of technology and information is marked by the entry of the internet in human life that makes a significant change. With the development of technology, it makes many application platforms appear including social media. Social media are experiencing a rapid development. Therefore, social media is often used by businessman as a tool to promote their products (see Figure 1).

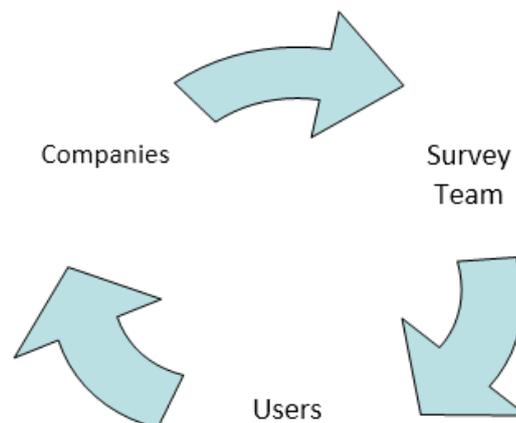


Figure 1. Prototype Model

We can see from the figure above that the population in Indonesia reach 268 million with a percentage of 56%. The total population of internet subscribers in Indonesia is 355.5 million with a percentage of 133% . However, the total population of internet users is 150 million with a percentage of 56% and the number of active users on social media reaches 150 million users every day with a percentage of 56% and 130 million online users via mobile phones with a percentage of 48% (see Table 1). Sed egestas mattis condimentum. Etiam et tristique turpis. Ut tincidunt velit vitae hendrerit euismod. Sed molestie volutpat orci ut placerat. Ut sit amet lorem urna. Donec luctus pharetra venenatis. Ut vel orci venenatis, tincidunt orci sit amet, pharetra ipsum. Pellentesque commodo nulla vitae ex blandit, ut sagittis turpis vestibulum (see Table 2).

Table 1. A simple table. Place the caption above the table. Here the caption is wider than the table so we extend it slightly outside the width of the table. Justify the text. Leave 6 pt of space between the caption and the top of the table

	Wake Chi Sqr. (N=15, df=1)	p	Stage 1 Chi Sqr. (N=15, df=1)	p	Stage 2 Chi Sqr. (N=15, df=1)	p
F3	1.143	0.285	0.286	0.593	0.286	0.593
Fz	1.143	0.285	0.067	0.796	0.067	0.796
C4	2.571	0.109	0.600	0.439	1.667	0.197

Table 2. SWOT Analysis

STRENGTH (S)	<ul style="list-style-type: none"> a. The tour packages that were marketed through online media were quite varied. b. Display images on the website for each tour package were very interesting. c. Marketing costs incurred were cheaper than using print media d. Traveling information could be found easily by consumers e. The website enabled to be accessed worldwide
WEAKNESSES (W)	<ul style="list-style-type: none"> a. Consumers found it difficult to request special package tours b. Occasionally consumers complained about the incompatibility offered on the packages with what actually served to them c. The price of tour packages was in Indonesian Rupiah (IDR) d. Error system occurred occasionally
OPPORTUNITIES (O)	<ul style="list-style-type: none"> a. It took short time to renew or add new tour packages b. Various and interesting tour packages attracted consumers to book a package c. Tour packages were sold to the specific target d. The website enabled to be accessed worldwide
THREATS (T)	<ul style="list-style-type: none"> a. Business competition got tougher to promote travel packages through online b. Personal data of consumers were at risk of data misuse for buying package online c. It occasionally had price competition with other travel agents d. Consumers had low trust due to several online sites that commit fraud
Strategy SO	<ul style="list-style-type: none"> a. Utilizing a variety of packages and attractive travel package to increase the interest of consumers b. Cheap package prices must be followed by appropriate quality so sales are on target

Strategy WO	<ul style="list-style-type: none"> c. Increasing promotion through online media so that more consumers access the website d. Showing complete information about travel packages
Strategy ST	<ul style="list-style-type: none"> a. Giving new options to consumers b. The information posted on the website must be in accordance with facts c. Applying excellent internet connection system to prevent error system
Strategy WT	<ul style="list-style-type: none"> a. Making different tour packages and changed the website appearance to be more attractive and optimal b. Keeping the personal data confidential to prevent data c. Providing accurate information from existing facts as they are
	<ul style="list-style-type: none"> a. Improving the quality of products and services b. Offering special prices in Indonesian Rupiah for domestic tourists

Based on the data above, it shows that there are 5 social media that are most often used by internet users. The data is taken from the website WebSindo. The 5 media most frequently used by internet users in Indonesia in 2019 is YouTube, WhatsApp, Facebook, Instagram, Line with the percentage of 88, 83, 81, 80, and 59%, respectively. From the statistics above, social media is needed by internet users. So, based on those needs, business activities that use social media as a forum for business start to emerge, especially social media Instagram as one of the most frequently used business platforms. Business is not only a non-profit business, but businesses in the health sector also use Instagram social media as a tool to promote their services.

4. Conclusion

It can be said that it is appropriate to choose online media as a medium for promotion and marketing of travel packages because it has been proven with SWOT analysis and it showed many internal factors that have a positive impact on the company. The advantages of each strategy that comes from within the company must be improved to reduce the weaknesses and threats of competitors.

Acknowledgement

It can be concluded that social media is one of the the tool to promote business better, especially business in the field of public health services. It is effective when it packed with new innovations. It will facilitate internet users to access and to maintain positive image for the company.

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