Article

Google Trend as a Tool for Market Analysis in Healthcare

Nahardian Vica Rahmawati[1], Nihayatul Munaa[1]*, Muhamad Ganda Saputra[1], Faizatul Ummah[1], Fara Nurdiana[1], and Ahmad Mustofa Lutfi[2]

[1] Universitas Muhammadiyah Lamongan ; navirastikes@gmail.com, nihayatul.munaa@umla.ac.id, muhamadgandasaputra77@gmail.com, faizatul_ummah@umla.ac.id, faranurdiana@umla.ac.id

[2] International Islamic University Malaysia ; ahmadm.lutfi@gmail.com

* Correspondence: nihayatul.munaa@umla.ac.id;

Abstract: This study aimed to analyze the market and the opportunity of Child Development Clinic using Google Trends and the effect of regulation on relative search volume (RSV). Child development has become a national priority since the issuance of regulation number 72 of 2021 concerning accelerating the reduction of stunting. The research used descriptive and analytic quantitative method. The data used relative search volume monthly from ten years (2013-2022). The data was then divided by the regional and before-after implementation the regulation of stunting reduction acceleration. Data were analyzed using ANOVA and t-student analysis. The findings showed that the relative search volume increased from the initial year before going down in 2018 and rose again during the pandemic. The region showed different RSV with p-value 0.001<0.05, and there was an effect of regulation implementation on RSV of child development. Google Trend is a management tool that can be used as a market analysis to assess the public interest in child development in healthcare services.

Keywords: child development clinic; google trend; healthcare business; market analysis

1. Introduction

Indonesia's health sector businesses, including hospitals, clinics, medical equipment, and medicines, continue to grow rapidly. A clinic is a health service facility that organizes and provides basic and/or specialist medical services, managed by multiple types of health workers and led by medical workers [1]. The rise of entrepreneurs entering the industrial sector in the health sector, namely clinics, is due to the increasing number of patients and the need for better quality of care.

Child development is currently the priority topic since the issuance of presidential regulation number 72 of 2021 concerning accelerating stunting reduction. This policy was taken based on the high number of stunting in Indonesia. Stunting is one of the challenges and global nutritional problems that people experience. The Ambitious World Health Assembly targets a 40% reduction in stunting rates worldwide by 2025. The 2018 Global Nutritional Report states that around 150.8 million (22.2%) stunted children under five, one of the factors hindering human development worldwide. Based on the results of the Survei Status Gizi Indonesia (SSGI) 2021, the Indonesian nutritional status study, the prevalence of stunting decreased from 27.7% in 2019 to 24.4% in 2022 [2].

Several factors that influence the occurrence of stunting are educational, economic, and socio-cultural factors. Several sources of knowledge in the millennial era include social media and information search tools such as Google. The Google database will record all data searches and can be accessed based on a certain time called Google Trend

Academic Editor: Maya Weka Santi

Received: July 10th, 2023
Revised: July 17th, 2023
Accepted: July 20th, 2023
Published: July 30th, 2023

(GT). Keywords are also called "search terms", which means search terms. The concept of user search trend data has been discussed in the previous year, and more research has been carried out since then [3]. This can allow health policymakers or investors to analyze new markets using market trends. Factors news, language, population,

Google Trends is a website owned by Google.Inc, which contains trends in the use of keywords on the Google search engine website and trending news [4]. Research has found that statistically, GT correlates with official reports of annual Dengue Fever cases in Indonesia [5]. The researchers tried to test the correlation of GT trends with a dataset of cases in an area. Less than 50% (of the total cases) of trending GT cases correlate/match with real cases in the field [6].

From a supply point of view, the number of clinics that focus on growth and development (Growth and Development Clinics) is still limited. The number of clinics in western Indonesia is around 150, with growth and development. At the same time, in central Indonesia, there are about 130 clinics for growth and development, and in eastern Indonesia, there are around 40 clinics for growth and development. Meanwhile, from a demand point of view, even though the level of awareness of parents is getting higher, the existence of a complete place for activities to facilitate special attention to child development in Indonesia, in general, parents are still limited to referring to the mother and child hospital so that if an examination is carried out children and there are no experts needed, parents must go to another place as a doctor's referral. The clinic business grows and becomes one of the health services that can be considered, and market analysis is needed. The importance of market and marketing aspects in a company, namely where a market and marketing aspect is used to determine how much demand there is so that the business can run according to desired results. This research aims to describe the child development information-seeking interests in Indonesia over the last 10 years, predict growth and analyze differences in growth and development information-seeking interests in Indonesia by region, and analyze differences before and after the stunting acceleration policy.

2. Materials and Methods

This research used analytical, quantitative research with a cross-sectional approach. Analytical, quantitative research is conducted without interfering with Relative Search Volume (RSV) research subjects directed at explaining a situation or situation. Meanwhile, cross-sectional is a study to study the correlation between risk factors by approach or data collection at one time only [7].

Researchers took RSV data monthly in the Growth and Development Clinic from 2013 to 2022. Data analysis in this study used descriptive statistical analysis, data analysis prerequisite tests (normality test and homogeneity test), ANOVA Test and student t-test.

Trends in the state of data that increases or decreases over time. There are several techniques for making a trend model. The technique that is often used is the least square method. The approximate linear trend model is as follows:

a and b are obtained by using the formula:

$\alpha = - \mathrm{b}t\overline{y}$

$$\overline{y} = \frac{\sum y}{n} \quad dan \quad \overline{t} = \frac{\sum t}{n}$$

$$b = \frac{\sum ty - \frac{\sum t \sum y}{n}}{\sum t^2 - \frac{(\sum t)^2}{n}}$$

Information :

a and b : constants and coefficients

ŷ : is the time series data to De estimated

t : is the time variable

n : is the number

To perform a time series analysis test, use the following formula:

$$\hat{y} = \alpha + bt$$

3. Results

The normality test was conducted to determine whether the samples taken came from the same population or were normally distributed. The normality test results with the Kolmogorov-Smirnov show that the data in this study are normally distributed because the sig value of the variable has exceeded the sig value of 0.05. And it can be concluded that the data is normally distributed, which means that the samples taken in this study come from the same population.

A homogeneity test is carried out to determine whether the samples have the same variance. The results of testing the homogeneity of the data using the Levence Test technique. The results of the homogeneity test using Levene show that the value is less than sig. (0.05), so the data in this study are not homogeneous and means that the sample data studied have unequal variances.

Descriptive statistical analysis is statistics used in analyzing data by describing or describing the data that has been collected. The results of the descriptive statistical analysis research can be seen in table 1 below:

Table 1. RSV results from 2013 to 2022

No.	Year	West Regional	Middle Regional	East Regional	Average
1.	2013	13190	3825	840	5951
2.	2014	13635	4475	910	6340
3.	2015	13880	4260	905	6348
4.	2016	13625	4040	985	6216
5.	2017	12730	4370	900	6000
6.	2018	12435	4190	955	5860
7.	2019	13470	4335	910	6238
8.	2020	13695	4615	1025	6445
9.	2021	14105	4355	1055	6505

No.	Year	West Regional	Middle Regional	East Regional	Average
10.	2022	14005	4420	1020	6481
Amount		134770	42885	9505	62386

RSV results data for 2013 to 2022 from January to December. Based on the descriptive analysis, it can be seen that the average (mean) is 6238.66, the median (Me) is 4345, the mode (Mo) is 910, and the standard deviation is 5397. The maximum score obtained is 14105 and the minimum score is 840. Then the range the maximum score (range) that may be obtained is 14105-840 = 13.265.

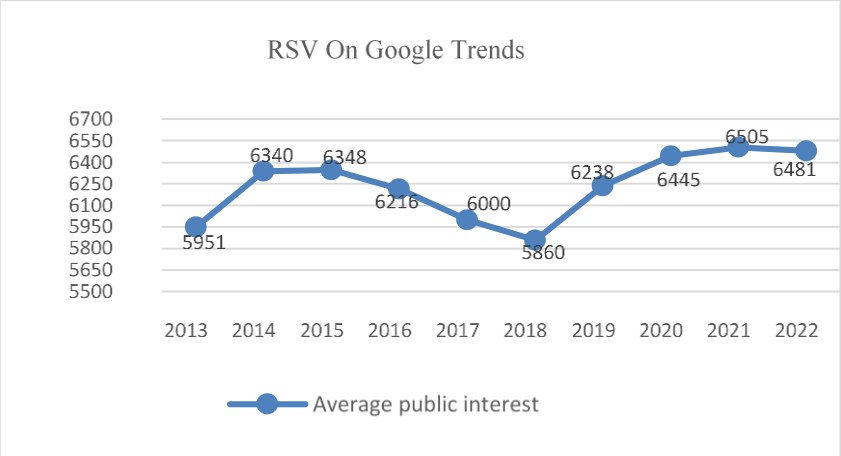

Figure 1. Graph of Average RSV Results in 2013 – 2022

Based on graph 1 above, it can be concluded that the descriptive statistics on the results of relative search volume (rsv) on Google trends of public interest about growth and development in Indonesia on the graph from 2013 to 2014 rsv results increased by 5951 then increased by 6340, in 2015 the results rsv of 6348 continued to decrease until 2018 as many as 5860 and increased in 2019 as many as 6238 continued to increase in 2021 as many as 6505, and RSV results decreased in 2022 as much as 6481.

Time series analysis is one of the statistical procedures used in forecasting future events. Time series analysis uses data linked by time, so a correlation between the current event and the previous period will occur.

To perform a time series analysis test, use the following formula:

$\hat{y} = \alpha + bt$

$$\overline{y} = \frac{187160}{120} = 1560 \quad dan \quad \overline{t} = \frac{7260}{120} = 60{,}5$$

$$b = \frac{11445775 - 11323180}{583220 - 439230} = 0{,}851$$

$\alpha = 1560 - (0.851 \times 60.5) = 1508$

We can predict people's interest in 2023 every month based on past trends.

$\hat{y}\ 122 = 1508 + 0.851(122) = 1612$ $\hat{y}\ 121 = 1508 + 0.851(121) = 1611$

$\hat{y}$ 128 = 1508 + 0.851(128) = 1617

$\hat{y}$ 129 = 1508 + 0.851(129) = 1618

$\hat{y}$ 130 = 1508 + 0.851(130) = 1619

$\hat{y}$ 131 = 1508 + 0.851(131) = 1619

$\hat{y}$ 132 = 1508 + 0.851(132) = 1620

$\hat{y}$ 123 = 1508 + 0.851(123) = 1613

$\hat{y}$ 124 = 1508 + 0.851(124) = 1614

$\hat{y}$ 125 = 1508 + 0.851(125) = 1614

$\hat{y}$ 126 = 1508 + 0.851(126) = 1615

$\hat{y}$ 127 = 1508 + 0.851(127) = 1616

Table 2. RSV Prediction Results for 2023

No.	Month	predictions RSV
1.	January	1611
2.	February	1612
3.	March	1613
4.	April	1614
5.	May	1614
6.	June	1615
7.	July	1616
8.	August	1617
9.	September	1618
10.	October	1619
11.	November	1619
12.	December	1620
	Average	1617

From the results of the time series analysis in table 2, namely the prediction of RSV in 2023, on Google Trends for 2023 the average search results about growth and development are 1617 in Indonesia.

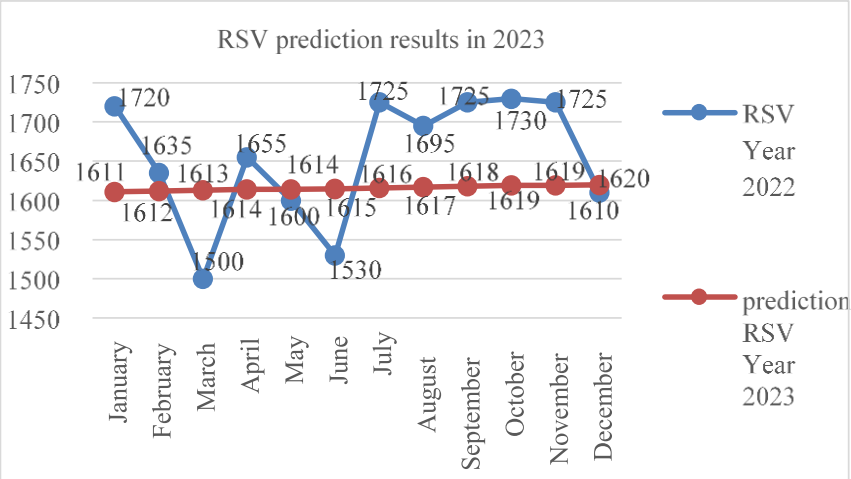

Figure 2. Graph of RSV Prediction Results in 2023

The results of the Time Series Analysis in graph 2 for predictions of rsv in 2023 each month get stable graphic results from January to December, while in 2022, from July to November, the rsv will experience a significant increase.

The One Way Anova test compares the averages of two groups from two different samples. Testing the hypothesis using a two-sample comparative test, One Way Anova, with a significance level 0.05. If the significance is more than 0.05, the two data have no different data.

Table 3. One-way ANOVA test results

No.	regional	Sig.	Ket
1.	West with Central	0.00	There's a difference
2.	Middle with West	0.00	There's a difference
3.	East with West	0.00	There's a difference

In table 3 the ANOVA test above shows that the significance is 0.00 <0.05, so there are significant differences between regions. From the test results, some regions in the western, central, and eastern regions get a result of 0.00, namely sig <0.05, meaning that each region has different RSV data.

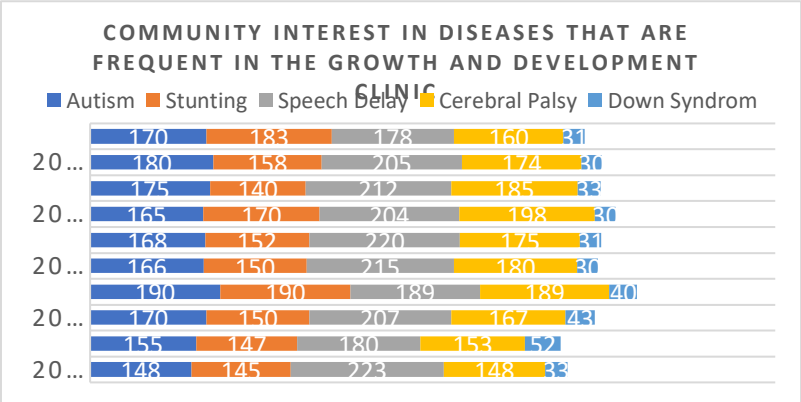

Figure 3. Graph of Public Interest in Common Diseases at the Growth and Development Clinic

The results of graph 3 are community interest in diseases that often exist in growth and development clinics from the search results for community interest using the Google trend method for some of the diseases above for ten years from 2013 - 2022 community interest from year to year continues to change, including in 2022 Public interest in stunting is 183 more than the public interest in other diseases, even though the stunting rate in Indonesia decreased in 2022, public interest in stunting will increase in 2022.

Independent sample t-test is used to determine whether there is a difference in the average of two unpaired samples. Independent sample t-test uses SPSS.

Table 4. Independent Sample T-Test Results

No.	Results RSV	Sig . (2 tailed)	Significant level of anxiety
1.	Equal variances assumed	0.02	0.05
2.	Equal variances not assumed	0.00	0.05

The results of the test above show a sig. (2-tailed) value in equal variances not assumed of 0.00 <0.05, which states that there are differences in the interests of the Indonesian people before and after the accelerated stunting policy.

4. Discussion

Based on the descriptive statistical analysis test results, public interest is in seeking information about growth and development in Indonesia for ten years from 2013 to 2022. From the results of RSV on Google trend in 2014, there has been an increase in public interest in growth and development, because in 2014, there were several diseases directly transmitted diseases such as diarrhoea, hepatitis (especially hepatitis A, B, C), AIDS and pneumonia. Second, conditions originating from animals include DHF, bird flu, rabies and malaria. Third, non-communicable diseases include hypertension, asthma, COPD, diabetes mellitus, heart disease, stroke and cancer. Because of this, the community is interested in knowing information about health, including growth and development.

The results of this first test are supported by previous research tests conducted [8], which examined the pattern of outpatient visits to health centres in Bantul Regency from year to year, showing almost the same way. Infectious disease outpatient visits, especially diarrheal diseases, still occur in health centres throughout Bantul Regency. In contrast, non-communicable diseases such as hypertension, diabetes mellitus, and asthma significantly increased in 2014. According to the Global Nutrition Report in 2014, Indonesia was included in 17 out of 117 countries with three nutritional problems, namely stunting, wasting and overweight in toddlers [9].

In 2018, RSV results decreased. One of the problems in the community is the lack of support and concern from family members and community leaders regarding their interest in health. In addition, huge conditions occurred in 2018 due to the earthquake disaster. The Donggala earthquake occurred on September 28 2018. The Lombok earthquake began on July 29th 2018, with a magnitude of 6.4. while the earthquake had a magnitude of 7.4 and caused a tsunami and liquefaction around Palu and Donggala. Based on BNPB data [10]. Those two disasters got the attention of the nation, so the interest of child development decreased. In 2018, there were also public holidays throughout Indonesia due to Voting Day for the Election of Governors and Deputy Governors, Regents and Deputy Regents, and Mayors and Deputy Mayors in 2018 as a National Holiday [11].

In 2019 results experienced an increase in public interest in growth and development until 2021. The Covid 19 pandemic in 2020 brought many changes in people's lives, all things had to be done at home, learn to work, worship and even exercise at home, and all activities use gadgets to find out about events outside the home. Public awareness of improving health during a pandemic has increased, and people are aware of the importance of maintaining health and adopting a healthy lifestyle for individuals and the surrounding environment [12].

For this theory to be the basis for forming attitudes, the personal experience must leave a strong impression. The mass media also influences one's interests because news that should be conveyed factually objectively tends to be influenced by the interests of the writers, as a result it will affect the interests of consumers [13]. Based on the facts and theories above, the existence of phenomena about health brings changes in people's lives to know self-health, including growth and development and living a healthier and more regular life.

Based on Time Series Analysis is one type of analysis that is often used as a choice. From the results of the average prediction for 2023, there will be 1617, this shows that there is an increase in public interest in growth and development from the previous year. Over the past ten years, public interest in growth and development as measured by Google Trends RSV, has experienced a significant increase. Forecasting in 2023, the growth of public interest is stable for one year compared to 2022 in July to November,

experiencing a significant increase. The growth of individual RSV for each growth and development is most likely influenced by the growth observed in tracing.

Google Trend data, as currently formulated, does not appear to be a useful indicator of changes in population health levels during a public health crisis. Various other factors – such as total search volume, news reporting that stimulates curiosity about health topics, and the impact of the development of health symptoms on engagement with the Internet may influence search volume and relative activity to growth. Even though Google Trends does not provide information regarding what vaccine is meant, the author assumes that COVID-19 vaccination dominates people's search behaviour regarding vaccination during a pandemic [14].

Based on the facts and theory above, based on calculations using the time series analysis method, it can be seen that the environment, government actions, and market trends influence the results of calculating predictions every month.

Based on the results of the one-way ANOVA test research from RSV data, people's interest in growth and development in Indonesia, the data results are different. Differences in each region in Indonesia are influenced by several factors, namely population, environment, and education.

Population is the biggest driver of development because a larger population is a potential market that is a source of demand for various goods and services, with an adequate population that can also improve people's welfare [15]. The lack of education and understanding of the community causes people not to know how to respond to health in themselves [16].

According to one's own living environment is the community, community and group environment can influence individual social life, including decisions to utilize health services and facilities in the community [17].

Based on the facts and theories above, several factors influence people's interest in health, including human education to understand health, healthy living behaviours, and health benefits. Awareness of the importance of healthy living encourages us to maintain and preserve their health.

Based on the independent t-test results on the average difference before the 2013-2019 stunting acceleration policy and after the 2020-2022 stunting acceleration policy regarding community interest in growth and development clinics. The test results in 2021 have increased after the policy to accelerate stunting. This is also due to the increasing stunting rate in Indonesia and the public's interest in health, including growth and development.

From the research results, it can be said for policymakers to take more appropriate actions and decisions. Their interventions can be used effectively to increase public awareness of the impact of a disease and its ability to protect against health [18].

Based on the facts and theories above, with the policy towards health. So the government and the community focus on jointly carrying out development to achieve good health conditions, people who live in an environment with healthy behaviour, can reach quality health services fairly and equitably, and have a better health status.

5. Conclusions

This research is to determine and analyze the influence of business opportunities in growth and development clinics using the Google Trend method. The public's description of growth and development in Indonesia from 2014 has increased and decreased in 2018 and will rise again from 2019 to 2021 and fall again in 2022. The results of the time series analysis on the prediction of the average RSV in 2023 are 1617, which shows increased public interest in growth and development from the previous year.

There are significant differences between regions. From the test results, some regions in the western, central, and eastern regions get a result of 0.00, namely sig <0.05, which means that each region has statistically different RSV data. The results of the t-test

show a sig.(2tailed) value of 0.00 <0.05, which states that there are differences in the interests of the Indonesian people before and after the accelerated stunting policy.

6. Patents

Author Contributions: Study Design, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Data Collec-tion, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Supervision, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Data Analysis, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Manuscript Writing, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Literature review, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Reference, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi; Manuscript Revision, Nahardian Vica Rahmawati, Nihayatul Munaa, Muhamad Ganda Saputra, Faizatul Ummah, Fara Nurdiana, and Ahmad Mustofa Lutfi. All authors have read and agreed to the published version of the manuscript

References

[1] J. C. Brinkman, K. S. McQuivey, J. D. Hassebrock, M. L. Moore, J. R. Pollock, and J. M. Tokish, "Public Interest in Shoulder Platelet-Rich Plasma Injections Is Increasing: A 10-Year Google Trends Analysis," *Arthrosc. Sport. Med. Rehabil.*, vol. 5, no. 4, p. 100744, 2023, doi: 10.1016/j.asmr.2023.04.026.

[2] S. P. Jun, H. S. Yoo, and S. Choi, "Ten years of research change using Google Trends: From the perspective of big data utilizations and applications," *Technol. Forecast. Soc. Change*, vol. 130, no. November 2017, pp. 69–87, 2018, doi: 10.1016/j.techfore.2017.11.009.

[3] D. Knipe, D. Gunnell, H. Evans, A. John, and D. Fancourt, "Is Google Trends a useful tool for tracking mental and social distress during a public health emergency? A time–series analysis," *J. Affect. Disord.*, vol. 294, pp. 737–744, 2021, doi: 10.1016/j.jad.2021.06.086.

[4] L. Widyarsi and H. Usman, "Penggunaan Data Google Trends untuk Peramalan Tingkat Pengangguran Terbuka di Tingkat Nasional dan Regional di Provinsi Jawa Barat," *Semin. Nas. Off. Stat.*, vol. 2021, no. 1, pp. 980–990, 2021, doi: 10.34123/semnasoffstat.v2021i1.842.

[5] A. Sampri, A. Mavragani, and K. P. Tsagarakis, "Evaluating Google Trends as a Tool for Integrating the 'Smart Health' Concept in the Smart Cities' Governance in USA," *Procedia Eng.*, vol. 162, pp. 585–592, 2016, doi: 10.1016/j.proeng.2016.11.104.

[6] L. A. Sebopelo, A. J. Bourcier, O. E. Dada, G. Adegboyega, D. S. Nteranya, and U. S. Kanmounye, "Retrospective review of Google Trends to gauge the popularity of global surgery worldwide: A cross-sectional study," *Ann. Med. Surg.*, vol. 71, no. October, p. 102950, 2021, doi: 10.1016/j.amsu.2021.102950.

[7] V. V. Coanto, R. Novaria, and A. Pujianto, "Pengaruh Kualitas Produk, Lokasi dan Fasilitas terhadap Minat Beli Konsumen. (Studi Kasus Pada Kedai The Cowboy Burger Surabaya)," *J. Din. Adm. Bisnis*, vol. 4, no. 2, 2018.

[8] Z.-Y. Choo, Z.-N. Choo, and A. Ruiz de Luzuriaga, "Google Trends analysis of teledermatology interest in the United States during the COVID-19 pandemic," *JAAD Int.*, vol. 12, pp. 171–173, 2023, doi: 10.1016/j.jdin.2023.04.006.

[9] S. Cho *et al.*, "Correlation between national influenza surveillance data and Google Trends in South Korea," *PLoS One*, vol. 8, no. 12, 2013, doi: 10.1371/journal.pone.0081422.

[10] A. coordinating center for H. Association, "SITUATION UPDATE NO. 3 M 7.4 EARTHQUAKE & TSUNAMI Sulawesi, Indonesia," no. 3, pp. 1–12, 2018.

[11] A. coordinating center for H. Association, "SITUATION UPDATE No. 2," no. 2, 2018.

[12] R. N. N. U. R. Apandi, “Relevansi Nilai , Subjektifitas Other Comprehensive Income dan Kualitas Audit.”

[13] T. Simonart, X. L. Lam Hoai, and V. De Maertelaer, "Epidemiologic evolution of common cutaneous infestations and arthropod bites: A Google Trends analysis," *JAAD Int.*, vol. 5, pp. 69–75, 2021, doi: 10.1016/j.jdin.2021.08.003.

[14] H. Awijen, Y. Ben Zaied, and D. K. Nguyen, "Covid-19 vaccination, fear and anxiety: Evidence from Google search trends," *Soc. Sci. Med.*, vol. 297, no. February, p. 114820, 2022, doi: 10.1016/j.socscimed.2022.114820.

[15] A. D. Riyanto, “Pemanfaatan Google Trends Dalam Penentuan,” *Issn 1979-2328*, vol. 2014, no. semnasIF, pp. 52–59, 2014.

[16] S. Springer, A. Strzelecki, and M. Zieger, "Maximum generable interest: A universal standard for Google Trends search queries," *Healthc. Anal.*, vol. 3, no. February, p. 100158, 2023, doi: 10.1016/j.health.2023.100158.

[17] Indah Rahmawati, Tarisa Afira Pramesti, Urfa Khairatun Hisan, and M. Miftahul Amri, “Peluang Pemanfaatan Google Trends dalam Pencegahan Masalah Kesehatan Massal: Studi Kasus COVID-19,” *Bincang Sains dan Teknol.*, vol. 1, no. 01, pp. 41–47, 2022, doi: 10.56741/bst.v1i01.67.

[18] Chumnumpan, Pattarin, and S. Xiaohui, "Understanding New Products' Market Performance Using Google Trends. Australasian Marketing Journal," vol. 27, pp. 91–103, 2019.