The Analysis of Information Search Patterns in the Youth Workforce during the Covid-19 Pandemic Using Google Trends

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Abstract
This study aims to analyze the pattern of information seeking for the young workforce using Google Trends. This research was conducted in 2021 based on keywords trending in Indonesia that year. The data collected is in the form of time-series data from January to August 2021. The data obtained from the COVID-19 Task Force website is the number of additional confirmed cases of COVID-19 every day. And then, the data obtained from Google Trends is the subject of searches on Google that are trending in 2021 categories "What is it", "How to", and "Covid 19". In addition, the purpose of this study was also to look at the trend of seeking information for young age groups during the COVID-19 pandemic. This study uses Relative Search Volume (RSV) and Pearson Correlation Test to see the relationship between the independent and dependent variables.

Keywords: Information search, Young workforce, RSV, Google trends, Pearson Correlation

1. Introduction

1.1. Introduce the problem

One of the strategic agendas of youth development is to create the next generation of the nation's strong, independent, and competitive future. Realizing the importance of the roles and functions inherent in youth, the government seeks to develop the potential of youth through awareness, empowerment, and youth development in all fields as part of national development (Statistics Indonesia, 2021).

The existence of an increase in the economy in a country is an essential aspect of national development; therefore, the high unemployment rate will result in hampered national development (Ginting, 2021). In 2021, Indonesia"s youth Open Unemployment Rate was 14 per cent. This figure is much higher than the national unemployment rate (6.49 per cent), and this phenomenon has consistently occurred every year since 2015. If we look at the results of the 2021 Susenas, around 64.92 million Indonesians or almost a quarter of Indonesia"s population

(23.90 per cent) are in the youth age group. The Covid-19 pandemic has also increased the unemployment rate, especially in young people aged 20-29 years (Rizaty, 2021). The high youth unemployment rate is a challenge that the current government must face (Statistics Indonesia, 2021). Minister of Manpower Ida Fauziyah said the unemployment rate in Indonesia during the Covid-19 pandemic increased from 4.9 per cent to 7 per cent or 9.7 million people (kompas.com, 2021). In addition, the International Labor Organization (ILO) has also predicted a potentially large number of layoffs among young workers; around 16% or one in six young workers will lose their jobs during the Covid-19 pandemic (Ngadi et al., 2020).

Information on access to information and communication technology (ICT) in the 2021 Susenas was obtained from whether youth used cell phones (HP), used computers, and accessed the internet in the last three months.

From this data, it is known that access to ICT by youth in Indonesia has shown an increase in the last three years. In 2021, the highest ICT indicators development can be seen in the percentage of youth who use cellphones, reaching 95.57 per cent. An increase also follows the increase in cellphone use in the percentage of youth accessing the internet.

According to internet use, most children aged five years overuse the internet to access social media and find information. The increase in internet penetration is in line with the restrictions on community activities during the coronavirus pandemic, which began to enter in early 2020 (Jayani, 2021).

By combining the phenomenon that the unemployment rate of young people is getting higher during the pandemic, this group of generation z and millennials is looking for sources of information through websites or the media. Those groups who are vulnerable to the impact of this pandemic use social media to meet their information needs (Sitompul, Maheasy & Damanik, 2021). This forms data on information-seeking patterns accumulated in the Google Trends annual report.

Today, Google is one of the most widely used search engines, especially in Indonesia (Simon, 2021). The Google Year in Search report shows that nine topic categories are trending, and many Indonesians will be looking for them in 2021. The categories include Who, National Events, Songs, What is it, How to, Recipes, Movies and trends around Covid-19. According to Google Indonesia"s Consumer Products Manager, Feliciana Wienathan, trending topics related to these nine categories show the public"s reaction to a series of events in early 2020. According to him, Indonesian people are currently in a state of survival mode and are starting to contemplate and find ways to get up towards recovery.

This study uses the use and gratification theory to explain information-seeking behaviour in using or utilizing media. The theory proposed by Kazt and Gurevic is a theory that is widely used in media use research. This theory focuses on what audiences do with the media. This theory emerged after developing new media or the internet (Karman, 2013).

There has been much research on searching for information through Google Trends, such as the study conducted by Effenberger et al. (2020), who conducted a Google Trends search for "Coronavirus" and compared the Relative Search Volume (RSV) index with the number of COVID-19 cases reported by the Center for Disease Control and Prevention European Disease

Control (ECDC) used time lag correlation analysis. As a result, the worldwide Google Trends index peaked on March 12, 2020, when the number of infected patients rose in Europe, and COVID-19 was declared a pandemic. This is in line with research conducted by Patel et al. (2020) and Cho et al. (2013), where a positive correlation exists between the RSV index and the number of COVID-19 cases.

Research conducted by Cousins (2020) examines whether search engine query patterns can help predict the rate of COVID-19 cases at the state and metropolitan area levels in the United States. Prediction results are highly correlated with the rate of confirmed cases. However, Rovetta"s research (2021) shows that Google Trends has experienced many anomalies. Nugroho and Sandyawan"s research (2020) also shows that the search for information related to COVID-19 negatively influences the development of COVID-19 cases. In contrast to the research conducted by Ciofani et al. (2021), Google Trends showed a sharp spike in search volume for chest pain which was strongly correlated with the number of COVID-19 cases in the United States. This is in line with research conducted by Limilia and Pratamawaty (2020) regarding the trend of searching for information on Covid-19 and comparing it with information available on the official website of the Indonesian Ministry of Health from January to March.

Based on previous research, there has been no research linking trending Google trends topics with an increase in the number of daily cases of covid 19. According to the researchers, previous research still focuses on using google trends for forecasting or prediction and searching for information with relevant keywords. So this study was conducted to analyze the pattern of information seeking for the young workforce using Google Trends. This research was conducted in 2021 in Indonesia based on the trending keywords in that year. In addition, the purpose of this study was also to look at the trend of seeking information for young age groups during the COVID-19 pandemic. This study uses the Pearson Correlation Test to see the relationship between the independent and dependent variables.

1.2.Literature review

Research by Effenberger et al. (2020) conducted a Google Trends search for "Coronavirus" and compared the Relative Search Volume (RSV) index with the number of COVID-19 cases reported by the European Center for Disease Control (ECDC) using time lag correlation analysis. As a result, the RSV index and the number of COVID-19 cases are positively correlated. This is in line with research conducted by Patel et al. (2020), Limilia and Pratamawaty (2020), and Ciofani et al. (2021), which used the Relative Search Volume index.

Cho et al. (2013) study to determine the relationship between national influenza surveillance data and Google Trends in South Korea used 12 influenza-related queries, from September 9, 2007, to September 8, 2012. Pearson correlation coefficients were calculated to compare national surveillance and Google Trends data for the period overall and five influenza seasons. The result is that there is a positive relationship between the national influenza surveillance data and Google Trends in South Korea.

Research by Askistas and Zimmermann (2009) has done forecasting using google econometrics regarding forecasting using google trends. The results show a strong correlation between

keyword searches and the unemployment rate using German monthly data and indicate substantial potential for the method used. This prompted Choi and Varian (2012) to conduct research to demonstrate how to use search engine data to estimate the short-term value of economic indicators. Examples include car sales, jobless claims, travel destination planning, and consumer confidence.

Simionescu et al. (2017) researched extensive data analysis and unemployment. As a result, internet data improve unemployment models and estimates in most countries. However, the accuracy of the estimates depends on the internet penetration in each country, the age structure of internet users and the stability of the constructed internet variables.

D"Amuri and Marcucci"s research (2017) measures the predictive power of Google searches in estimating US unemployment. This paper assesses the relevance of the Google index based on job searches conducted through Google to predict the US monthly unemployment rate. As a result, Google-based models perform very well in line with Naccarato et al. (2018), which investigates whether big data can predict youth unemployment rates in Italy through a time series model. The results show that Google Trends information has high accuracy.

However, research by Nagao et al. (2019) shows that the use of Google Trends does not necessarily improve forecast accuracy; there are limitations to adding keyword searches to the forecast model. Mihaela and Agota's (2021) research also shows that COVID-19 searched on Google hurts job expectations in New EU Member States from March 2020-May 2021. In contrast to Mihaela"s (2020) research which shows that indicators collected through Google Trends can prove the unemployment rate in Romania and should be considered to support government policies. In line with this, Cousins" (2020) research proves that search engine query patterns can help predict the rate of COVID-19 cases.

Petropoulos (2021) researched the use of Google Trends in predicting financial markets. As a result, Google queries provide information that can predict future market volatility over a short period (one month). Google Trends can provide helpful input in creating an Early Warning System, as social data is more responsive than official financial indicators.

Liborio and Martins (2022) conducted a study to analyze the Brazilian economy through alternative data and big data. Google Trends data is used in the economic analysis, and the Pearson correlation test is used to see the relationship. The result is that the internet is correlated (R=0.62) with household income in Brazil.

In Indonesia, research using Google Trends has been carried out by Purnaningrum and Ariyanti (2020) to determine the Covid-19 intervention in developments in the capital market. The use of an additional variable, one of Big Data, namely Google trends, is believed to increase the accuracy of research results. The results of this study indicate an intervention from the Covid-19 case on the movement of Indonesian stocks.

Akbar and Kurniawan"s research (2020) regarding TPT forecasting modelling with google trends. The results of the modelling show good MAE, MAPE, and RMSE. Then the research of Widyarsi and Usman (2021) that the Google Trends index can be used to predict the Open Unemployment Rate at the national and regional levels in West Java with reasonable accuracy. This is in line with Oktama (2021) research and Fajar et al. (2021).

2. Method

This study uses a quantitative descriptive method to describe the frequency of keywords used in the Google search engine. In the era of big data, Google Trends has begun to be widely used as a research method in health, economics, and politics (Jun et al., 2018). This method is used to read the trend of information seeking in the community. This research was conducted in 2021 based on trending keywords in that year. Query recommendations are a new approach to improve search results on the web (Zahera et al., 2013). The analysis uses google trends by determining the value of the Relative Search Volume (RSV) and the Pearson correlation test to see the relationship between the independent variable and the dependent variable.

2.1. *Variable Specification and Data Sources*

In this study, the data used is time-series data. According to Gujarati (2012), time-series data comes from one object at a certain period. The data collected is in the form of time-series data from January to August 2021. The data obtained from the COVID-19 Task Force website is the number of additional confirmed cases of COVID-19 every day. The data obtained from Google Trends are searches that trend in 2021 with the categories "What is it", "How to", and "Covid 19".

2.2. *Estimation*

The analysis in this study was carried out with the Statcal program, referring to Pearson Linear Correlation with Statcal, SPSS, Minitab and R (Gio et al., 2018).

2.2.1. *Keyword Selection*

The modelling in this research is done by first determining the independent variable data series by selecting the right search keywords. Furthermore, there are related keywords or the most popular top search queries from each category from several keywords. The assessment uses a Relative Search Volume (RSV) scale with a value of 100 being the most searched query, 50 being the topic with half the search frequency of the most popular searches, etc. Numbers represent search interest based on the highest points.

2.2.2. Scatter Plot

A Scatter diagram is a technique to plot or describe two quantitative variables. On an axis of two-dimensional Cartesian coordinates, the plane axis is the first variable, and the vertical axis is the second variable. The relationship between the two variables can be linear or non-linear, and other relationships can also be seen. If there is a dependency relationship between two variables, the first variable affects the second variable. The variable located on the flat axis (the independent variable) affects the variable located on the vertical axis (the dependent variable). In this scatter diagram, the influence between variable one and other variables can be seen. A scatter plot is a data interpretation tool used to test the relationship between two variables and determine the type of relationship between the two variables, whether positive, negative or no relationship.

2.2.3. *Pearson Correlation Coefficient*

Pearson correlation is one of the correlations used to measure the strength and direction of the linear relationship between two variables. Pearson linear correlation can be interpreted as a value that measures how close the linear relationship between two variables is, and the direction of the relationship can be known (John Maindonald and W. John Braun, 2010:67; Sanders and Smidth, 2000:524). According to Sugiyono (2014: 248), the Pearson Product Moment correlation intent on the following formula:

$$r_{xy} = \frac{n \sum_{i=1}^{n} x_i y_i - (\sum_{i=1}^{n} x_i)(\sum_{i=1}^{n} y_i)}{\sqrt{\{n \sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2\}}}$$

Explanation:

r_{xy} = Pearson Correlation Coefficient

x_i = Independent Variable

y_i = Dependent Variable

n   = Number of Samples

Tabel 1. Guidelines for Interpreting Correlation Coefficients

Correlation Interval	Level of Correlation
0,00 – 0,199	Very low
0,20 – 0,399	Low
0,40 – 0,599	Currently
0,60 – 0,799	Strong
0,80 – 1,000	Very strong

3. Result

3.1. Keywords Selection

The primary keyword of the "What is it" category is "Comorbid", which occupies the first position. After that, several related queries emerged from that base word, each of which was ranked according to the RSV value. Based on the RSV value, the top three keywords were selected, namely "What is a comorbid", "What is a comorbid disease", and "what comorbid".

The primary keyword of the "How to" category is "How to sell online", which occupies the first position. After that, several related queries emerged from that base word, each of which was ranked according to the RSV value. Based on the RSV value, the top three keywords were selected, namely "How to sell online", "How to sell online in demand", and "How to sell online at shopee".

The primary keyword for the "Covid 19" category was "How to Increase Oxygen Saturation", which took first place. After that, several related queries emerged from that base word, each of which was ranked according to the RSV value. The top two keywords were chosen based on the RSV value, namely "How to increase oxygen saturation" and "How to increase oxygen saturation of covid patients".
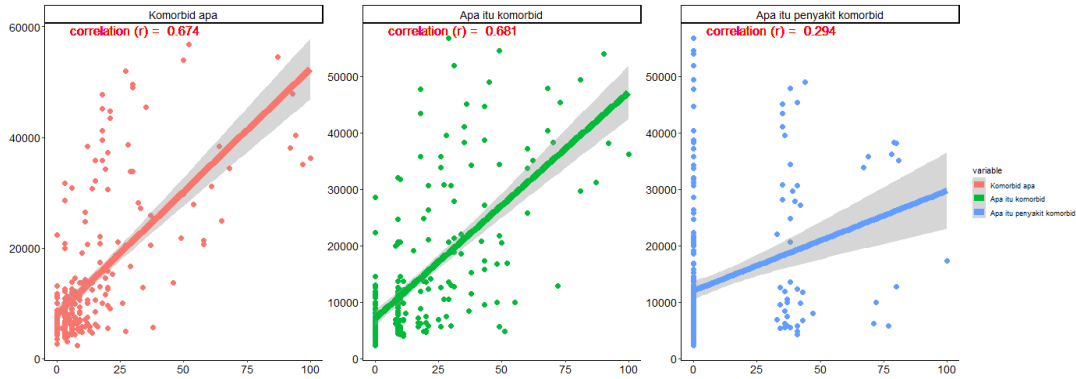
3.2. Scatter Plot

Figure 1. Distribution of data between the keywords "what comorbid", "what is comorbid", and "what is comorbid disease" on the development of daily cases of covid 19

In the "What is it" category, it can be seen that the distribution of data tends to increase from the bottom left to the top right, which means that it is positively correlated (Gio et al., 2018:35). In other words, there is a tendency when searches with the keywords "what comorbid", "what is a comorbid", and "what is a comorbid disease" increase, the cases of covid 19 also increase (positive correlation).
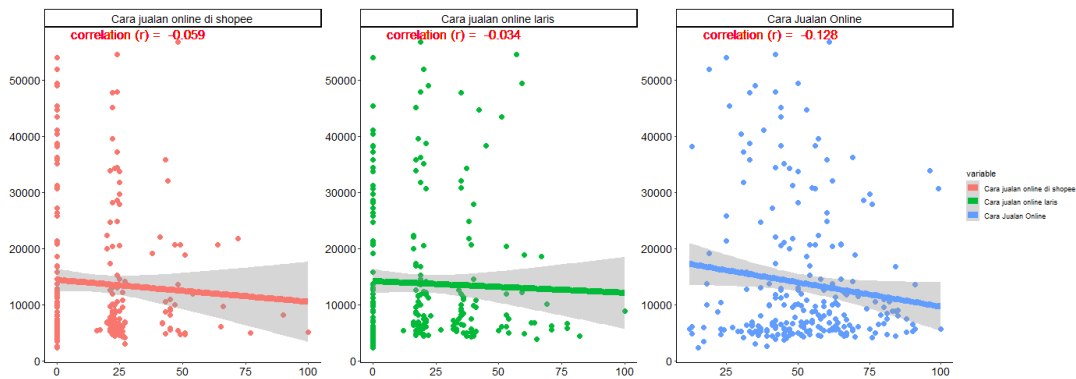

Figure 2. Distribution of data between the keywords "how to sell online at shopee", "how to sell online in demand" and "how to sell online" on the development of daily cases of covid 19

In the "How to" category, it can be seen that the distribution of data tends to decrease from the top left to the bottom right, which means that it is negatively correlated (Gio et al., 2018:35). In other words, the distribution of the data is not linear.
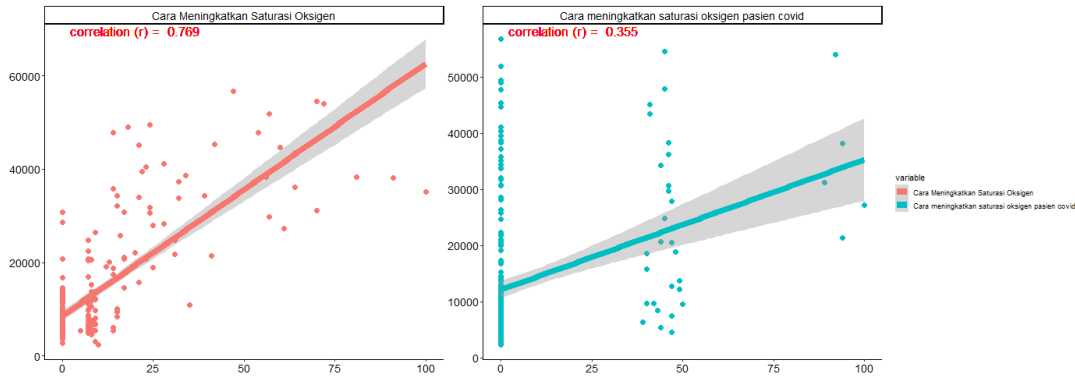

Figure 3. Distribution of data between the keywords "How to use oxygen saturation" and "How to use oxygen saturation of Covid patients" on the development of daily cases of covid 19

In the "Covid" category, it can be seen that the distribution of data tends to increase from the bottom left to the top right, which means that it is positively correlated (Gio et al., 2018:35). In other words, there is a tendency that when searches with the keywords "How to use oxygen saturation" and "How to use oxygen saturation for Covid patients" increase, the number of COVID-19 cases also increases (positive correlation).

3.3. Pearson Correlation Coefficient

Table 2. The Test Result of Pearson Correlation "What is it" Category towards Covid 2021

No	Correlation	Degree Of Freedom (df)	T Statistic	Pearson Correlation	P-Value
1	What Comorbid & Covid 19	241	14.1536	0.6737	0
2	What is Comorbid and Covid 19	241	14.4542	0.6814	0
3	What is Comorbid Disease & Covid 19	241	4.784	0.2945	0

Based on the Pearson correlation value test results, it is known that the keyword "what comorbid" has a Pearson linear correlation value of $0.673 > 0.5$. The keyword "what is comorbid" has a Pearson linear correlation value of $0.681 > 0.5$. So these two keywords are strongly correlated (Sugiyono, 2014: 250). While the keyword "what is a comorbid disease" has a Pearson linear correlation value of $0.294 < 0.5$, which means it has a low correlation (Sugiyono, 2014: 250). The Pearson linear correlation significance test results in the figure above show that the p-value is $0.000 < 0.05$ significance level, so each keyword in the "What is" and Covid-19 2021 categories has a significant correlation, at a significance level of 5%.

Table 3. The Test Result of Pearson Correlation "How to" Category towards Covid 2021

No	Correlation	Degree Of Freedom (df)	T Statistic	Pearson Correlation	P-Value
1	How to Sell Online at Shopee & Covid 19	241	-0.92319	-0.05936	0.35683
2	How to Sell Online Best Seller & Covid 19	241	-0.52549	-0.03383	0.59972
3	How to Sell Online & Covid 19	241	-2.00128	-0.12786	0.04648

Based on the Pearson correlation value test results, it is known that the keyword "how to sell online at shopee" has a Pearson linear correlation value of -0.059 < 0.5. The keyword "how to sell online best" has a Pearson linear correlation value of 0.033 < 0.5. Moreover, the keyword "how to sell online" has a Pearson correlation value of -0.127. The Pearson linear correlation value close to 0 indicates that the data distribution from the two variables is increasingly non-linear. In other words, the linear relationship between the two variables is getting weaker (Gio et al., 2018: 3). The Pearson linear correlation significance test results in the figure above show that the p-value is > 0.05 significance level, so each keyword in the "How to" and Covid-19 2021 categories has no significant correlation, at a significance level of 5%.

Table 4. The Test Result of Pearson Correlation "Covid 19" Category towards Covid 2021

No	Correlation	Degree Of Freedom (df)	T Statistic	Pearson Correlation	P-Value
1	How to Increase Oxygen Saturation & Covid 19	241	18.6554	0.76867	0
2	How to Increase Oxygen Saturation of Covid & Covid 19 Patients	241	5.90174	0.35535	0

Based on the Pearson correlation value test results, it is known that the keyword "How to use oxygen saturation" has a Pearson linear correlation value of 0.768 > 0.5. So these keywords are strongly correlated (Sugiyono, 2014: 250). While the keyword "How to use the oxygen saturation of Covid patients" has a Pearson linear correlation value of 0.355 <0.5, which means that this keyword has a low correlation (Sugiyono, 2014: 250). The Pearson linear correlation significance test results in the picture above show that the p-value is 0.000 < 0.05 significance level, so each keyword in the "Covid 19" category and the number of Covid-19 2021 cases has a significant correlation at a significance level of 5%.

4. Discussion

Based on the Pearson correlation test results, some variables affect and do not affect the number of confirmed cases of covid 19. Therefore, it will be discussed in full as follows:

4.1. Categories "What is it" and "Covid 19"

The time series plot in this category shows a similar data distribution pattern between the Google Trends Index and the daily cases of Covid 19. Interest in searching for information in the "What is" and "Covid 19" categories peaked between June and July and declined in October. This is also in line with the increase in Covid cases, which has entered the second wave. This condition was marked by confirmed cases of Covid-19, which reached 21,342 people on Sunday, June 27, 2021.

Based on the scatter plot diagram, it can be seen that the distribution of data tends to increase from the bottom left to the top right, which means that it is positively correlated (Gio et al., 2018:35). In other words, there is a tendency when searching with the keywords "What is a comorbid", "What is a comorbid disease", "what comorbidity", "How to increase oxygen saturation", and "How to increase oxygen saturation of a covid patient" increases, the cases of covid 19 also increase (positive correlation). The Pearson correlation value shows the keywords "what comorbid", "what is a comorbid", and "How to increase oxygen saturation" have the strongest correlation, namely 0.6737, 0.6814 and 0.7686.

These results are following research conducted by Effenberger et al. (2020) regarding searching for information with the keyword "Coronavirus" using Google Trends and comparing the Relative Search Volume (RSV) index with the number of COVID-19 cases reported by the European Center for Disease Control (ECDC). There is a positive correlation between the RSV index and the number of COVID-19 cases. This is reinforced by Cousins (2020) research on whether search engine query patterns can help predict the rate of COVID-19 cases in the United States. As a result, predictions are highly correlated with the rate of confirmed cases.

4.2. Category "How to."

In general, the data distribution pattern in this category shows a fluctuating increase. Based on the scatter plot diagram, it can be seen that the distribution of data tends to decrease from the top left to the bottom right, which means that it is negatively correlated (Gio et al., 2018:35). It is known that keywords in this category have a Pearson linear correlation value close to 0, indicating that the distribution of data from the two variables is increasingly non-linear. Interest in searching information in the "How to" category does not affect the increase in daily cases of covid 19, and the hypothesis is rejected. This is in line with research conducted by Nagao et al. (2019) that there are limitations to adding keyword searches used on Google Trends. Rovetta (2021) also reveals that Google Trends has experienced many anomalies, thus rendering the data set unusable for any statistical inference.

5. Conclusion and Recommendation

This study intends to determine the relationship between interest in searching for information based on trending topics in 2021 on Google Trends with the increase in daily COVID-19 cases

using data from the COVID-19 Task Force website. Although previous research and relevant literature found a correlation between searching for information through google trends and increasing daily cases of covid. Out of the three categories of trending topics in this study, there was one uncorrelated one, namely in the "How to" category. The Pearson correlation value is close to 0, which means that the data distribution is not linear.

According to Gio et al. (2018:3), the non-linear distribution of data from the Pearson correlation value is caused by other non-linear relationships, such as government policies related to the Development and Digitization of MSMEs. Since the beginning of 2021, the government seems increasingly aggressive in carrying out digital transformation programs in the MSME industry, better known as MSMEs go digital. Based on data from the Ministry of Cooperatives and MSMEs, as of June 2021, many as 13.5 million MSMEs have entered the digital ecosystem. So this is what underlies interest in searching for information in the "How to" category more influenced by government policies.

This study recommends the government to be able to use Google Trends data as a source of supporting data to determine the level of public interest in an existing issue or case and to see the public's reaction to a topic by looking at the pattern of public search interest related to the topic. The similarity in data distribution patterns between the Google Trends Index and the Daily Case of Covid 19 proves that Google Trends can be a tool to monitor the trend of increasing the number of COVID-19 cases and has the potential to assist the government in making policies.

Acknowledgments

References

Akbar, I. A., & Kurniawan, R. (2020). *Pemodelan Nowcasting Tingkat Pengangguran Terbuka Menggunakan Data Google Trends Dengan Metode Antlion Optimization-Support Vector Regression*. In Seminar Nasional Official Statistics (Vol. 2020, No. 1, pp. 760-770).

Askitas, N., Zimmermann, K.F., 2009. *Google econometrics and unemployment forecasting*. Appl. Econ. Q. 55 (2), 107–120. http://dx.doi.org/10.3790/aeq.55.2.107.

Askitas, N., Zimmermann, K.F., 2015. *The Internet as a data source for advancement in social sciences*. In: Forschungsinstitutzur Zukunft der Arbeit, Institute for the Study of Labor, IZA DP No. 8899.

Badan Pusat Statistik. 2021. *Statistik Pemuda Indonesia 2021*: Badan Pusat Statistik

Cho, S., Sohn, C. H., Jo, M. W., Shin, S. Y., Lee, J. H., Ryoo, S. M., ... & Seo, D. W. (2013). *Correlation between national influenza surveillance data and google trends in South Korea*. PloS one, 8(12), e81422.

Choi, H., Varian, H., 2012. *Predicting the present with Google Trends*. Econ. Rec. 88 (s1), 2–9. http://dx.doi.org/10.1111/j.1475-4932.2012.00809.x

Ciofani, J. L., Han, D., Allahwala, U. K., Asrress, K. N., & Bhindi, R. (2021). *Internet search volume for chest pain during the COVID-19 pandemic*. American heart journal, 231, 157-159.

Cousins, H. C., Cousins, C. C., Harris, A., & Pasquale, L. R. (2020). *Regional infoveillance of COVID-19 case rates: analysis of search-engine query patterns*. Journal of medical internet research, 22(7), e19483.

Effenberger M, Kronbichler A, Shin JI, Mayer G, Tilg H, Perco P. (2020). *Association of the COVID-19 pandemic with Internet Search Volumes: A Google TrendsTM Analysis*. Int J Infect Dis. 2020; 95: 192-197. doi: 10.1016 / j.ijid.2020.04.033

Fajar, M., Madinah, T. M., & Prayitno, H. (2021). *Peramalan Tingkat Penghunian Kamar Dengan Memanfaatkan Data Google Trends Di Provinsi Banten*. Jurnal Lebesgue: Jurnal Ilmiah Pendidikan Matematika, Matematika dan Statistika, 2(2), 226-232.

Ginting, M. L. B. (2021). *Perluasan Kesempatan Kerja Bagi Freshgraduate di Masa Pandemi Covid-19, Apa Peran Pemerintah?*. Jurnal Ketenagakerjaan, 16(2).

Gio, P. U., & Caraka, R. E. (2018, June 28). *Pedoman Dasar Mengolah Data Dengan Program Aplikasi Statistika Statcal*. https://doi.org/10.31227/osf.io/796th

Gio, P. U., Nazriani, D., & Kurniawan, R. (2018, May 3). *Korelasi Linear Pearson dengan STATCAL & R*. Retrieved from osf.io/qjdhc

Google, 2021. *Lihat yang trending di 2021 – Indonesia. https://trends.google.co.id/trends/yis/2021/ID/*

Gujarati, D. N., Porter, D. C., & Gunasekar, S. (2012). *Basic econometrics*. Tata mcgraw-hill education.

Jayani. (2021). *Penetrasi Internet Indonesia Meningkat saat Pandemi Covid-19*. https://databoks.katadata.co.id/datapublish/2021/10/06/penetrasi-internet-indonesia-meningkat-saat-pandemi-covid-19

Jun, S. P., Yoo, H. S., & Choi, S. (2018). *Ten years of research change using Google Trends: From the perspective of big data utilizations and applications*. Technological Forecasting and Social Change, 130(February 2017), 69–87. https://doi.org/10.1016/j.techfore.2017.11.009

Karman, K. (2013). *Riset Penggunaan Media Dan Perkembangannya Kini*. Jurnal Studi Komunikasi dan Media, 17(1), 93-112.

Libório, M. P., Ekel, P. I., & da Silva Martins, C. A. P. (2022). Economic analysis through alternative data and big data techniques: what do they tell about Brazil?.

Limilia, P., & Pratamawaty, B. B. (2020). *Google Trends and information seeking trend of covid-19 in Indonesia*. Jurnal ASPIKOM, 5(2), 188-205.

Maindonald, J. (2010). *Parametric vs Nonparametric Models for Discrimination & Classification*.

Ngadi, N., Meliana, R., & Purba, Y. A. (2020). *Dampak Pandemi Covid-19 Terhadap Phk Dan Pendapatan Pekerja Di Indonesia (the Impact of Covid-19 on Worker Layoffs and Income in Indonesia)*. Jurnal

Nugroho, Y. D., & Sandyawan, I. (2020). *Analisis Kasus Covid-19 Berbasis Google Trends Di Indonesia Pada Masa New Normal*. In Seminar Nasional Official Statistics (Vol. 2020, No. 1, pp. 349-358).

Oktama, P. D. W. (2021, November). *Nowcasting Jumlah Penumpang Kereta Api di Indonesia Menggunakan Indeks Google Trends*. In Seminar Nasional Official Statistics (Vol. 2021, No. 1, pp. 958-967).

Patel, M. S., Halpern, J. A., Desai, A. S., Keeter, M. K., Bennett, N. E., & Brannigan, R. E. (2020). *According to internet search volumes, success of prostate and testicular cancer awareness campaigns compared to breast cancer awareness month: a google trends analysis*. Urology, 139, 64-70

Petropoulos, A., Siakoulis, V., Stavroulakis, E., Lazaris, P., & Vlachogiannakis, N. (2021). *Employing Google Trends and Deep Learning in Forecasting Financial Market Turbulence*. Journal of Behavioral Finance, 1-13.

Rizaty. (2021). *Statistik Indonesia: Tingkat Pengangguran Anak Muda Semakin Tinggi Saat Pandemi*. https://databoks.katadata.co.id/datapublish/2021/08/31/Statistik Indonesia-tingkat-pengangguran-anak-muda-semakin-tinggi-saat-pandemi

Rovetta, A. (2021). *Reliability of Google Trends: Analysis of the limits and potential of web infoveillance during COVID-19 pandemic and for future research*. Frontiers in research metrics and analytics, 6, 28.

Simon, Kemp. 2021. *Digital 2021: Indonesia*. https://datareportal.com/reports/digital-2021-indonesia

Sitompul, P., Mahmudah, D., & Damanik, M. P. (2021). *Pemanfaatan Media Sosial dan Pemenuhan Kebutuhan Informasi Ketenagakerjaan Di Kalangan Angkatan Kerja Muda Pada Masa Pandemi COVID-19*. Jurnal Studi Komunikasi dan Media, 25(2), 203-222.

Widyarsi, L., & Usman, H. (2021). *Penggunaan Data Google Trends untuk Peramalan Tingkat Pengangguran Terbuka di Tingkat Nasional dan Regional di Provinsi Jawa Barat*. In Seminar Nasional Official Statistics (Vol. 2021, No. 1, pp. 980-990).

Zahera, H. M., El-Hady, G. F., & Abd El-Wahed, W. F. (2013). *Query recommendation for improving search engine results*. In Information Retrieval Methods for Multidisciplinary Applications (pp. 46-53). IGI Global.