# ANALYSIS OF PUBLIC SENTIMENT ON COVID-19 VACCINATION POLICY BASED ON TEXT MINING WITH THE NAÏVE BAYES CLASSIFIER APPROACH

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# CONTENTS



# Introduction

**One of the goals in the SDGs, which is to ensure a healthy life and promote the welfare of all people of all ages, has become difficult to maintain since the emergence of Covid-19 in Indonesia.**

# Introduction

NEWS • NATIONAL

**Decision to punish anti-vaxxers under regional administrations: Task force**

Health workers inject a civil servant with a COVID-19 vaccine during a vaccine drive simulation at the Udayana Military Command in Denpasar, Bali, on Dec. 10. (Antara/Nyoman Hendra Wibowo)

THE CONVERSATION

Disiplin ilmiah, gaya jurnalistik

COVID-19 Bisnis + Ekonomi Kesehatan Kota Pendidikan + Anak Muda Politik + Masyarakat Sains + Teknologi Budaya Lingkungan

**Indonesia's decision to prioritise COVID-19 vaccination to citizens aged 18-59 years old questionable**

Februari 2, 2021 7.43am WIB

Health workers are preparing COVID-19 vaccine Sinovac during first stage vaccination in Health Center, South Tagerang City, Indonesia, Januari 15, 2021. More than 8.000 health workers there are vaccinated. ANTARA FOTO/Fauzan/foc

NEWS • NATIONAL

**Indonesia allows emergency use of Sinovac vaccine**

Workers unload containers carrying the Sinovac vaccine for COVID-19 under National Police security at Soekarno-Hatta International Airport in Tangerang, Banten, on Dec. 31, 2020. As many as 1.8 million doses of Chinese firm Sinovac Biotech's COVID-19 vaccine, CoronaVac, arrived in Indonesia as the government eyes to roll out vaccination for medical workers in January. (Antara/Muhammad Iqbal)

**Thus, the Indonesian government has issued a policy regarding the procurement of vaccines and the implementation of vaccinations through Presidential Regulation Number 99 of 2020**

# Introduction

NEWS • NATIONAL

**Decision to punish anti-vaxxers under regional administrations: Task force**

Health workers inject a civil servant with a COVID-19 vaccine during a vaccine drive simulation at the Udayan Military Command in Denpasar, Bali, on Dec. 10. (Antara/Nyoman Hendra Wibowo)

HEALTH

**Indonesia's anti-vaxxers: Between religion and lack of information**

ADI RENALDI
THE JAKARTA POST

PREMIUM Jakarta / Thu, February 4, 2021 / 05:43 pm



**There are different perceptions in the community regarding the Covid-19 vaccination policy which is using provocative narratives and hashtags on social media.**

# Introduction

**Therefore, this study used the Naïve Bayes Classifier approach. The Naïve Bayes Classifier approach is used to classify public sentiment regarding the Covid-19 vaccination policy in Indonesia.**

# Introduction


**Wongkar and Angdresey (2019) has classified the public sentiment on Indonesia's 2019 presidential candidates. This study compared the Naïve Bayes Classifier, SVM and KNN which concluded that Naïve Bayes Classifier has the highest accuracy value of 75.58%.**

# Introduction

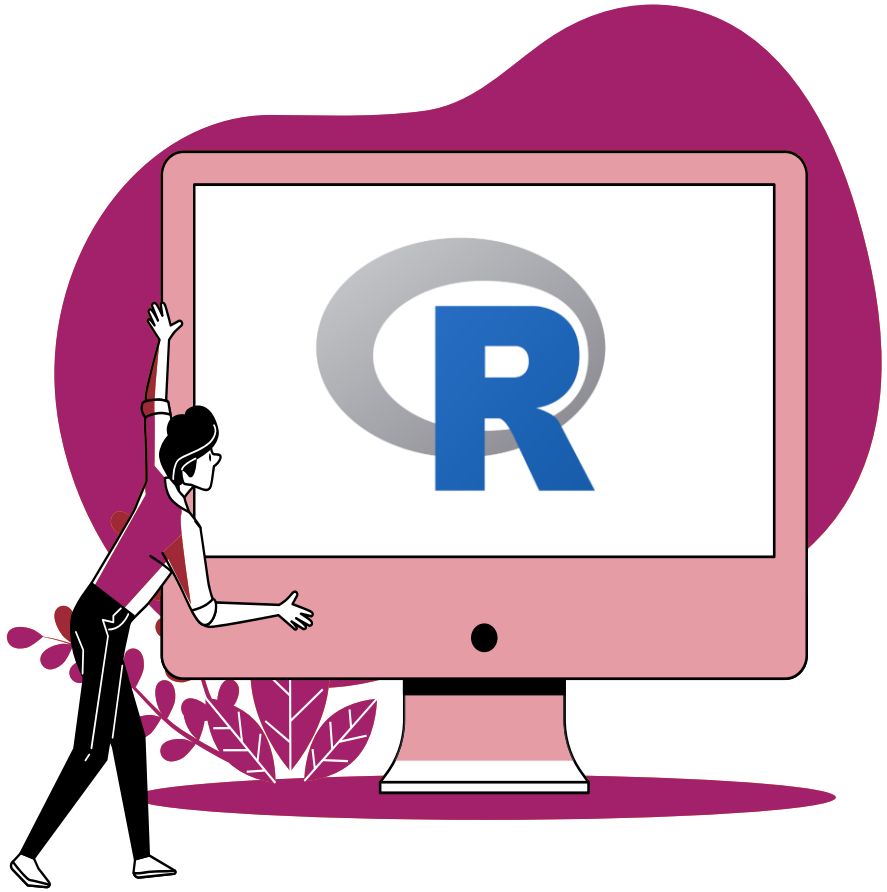
**The novelty of this research is to use text mining with the Naïve Bayes Classifier approach to determine public sentiment towards the Covid-19 vaccination policy.**

**The results of this study are expected to be used as a reference or reference for the government in convincing the public regarding the Covid-19 vaccination process towards a healthy Indonesia.**

# Method: Data

| Data Type | Sentiment | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Training | 198 | 202 | 400 |
| Testing | 52 | 48 | 100 |
| Total | 250 | 250 | 500 |

**The research data is in the form of public tweets regarding the Covid-19 vaccination policy by the government taken from Twitter social media from August 4, 2020 - February 2, 2021, totaling 500 tweets.**



# Method: Analysis Procedure

01 **Describe an overview of public sentiment**

02 **Preprocess the data**

03 **Create a bar chart to show frequently occurring words**

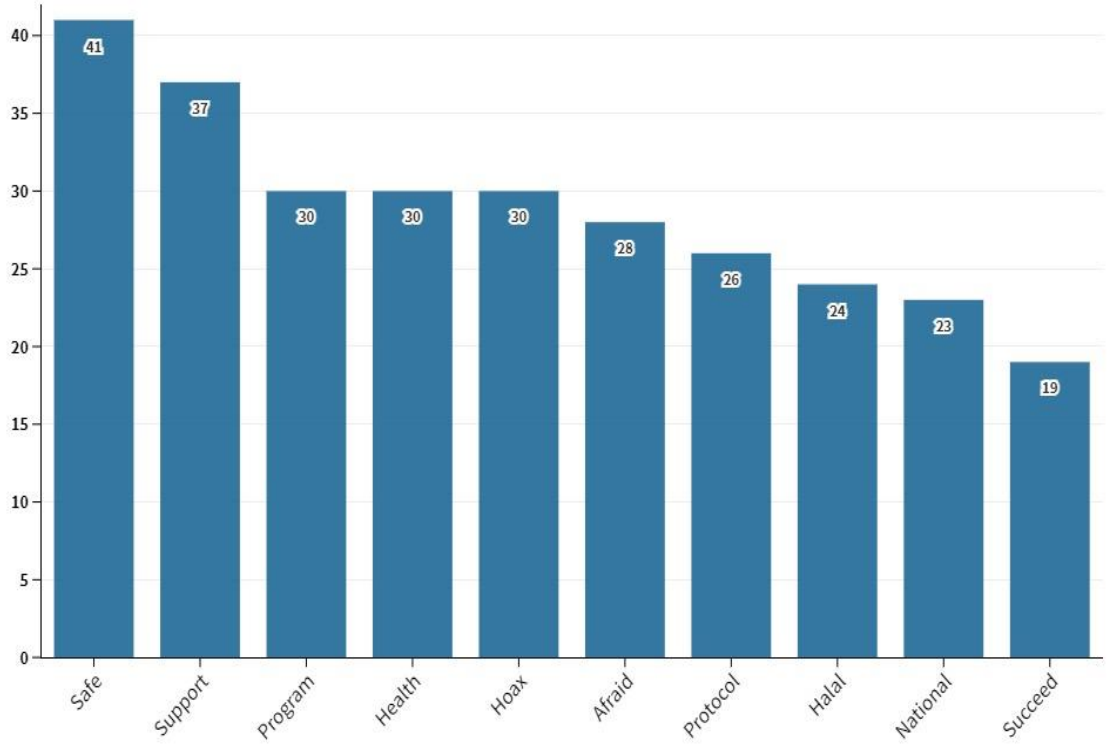
04 **Classify public comments based on sentiment categories using the Naïve Bayes Classifier**

05 **Calculate the sensitivity, specificity, Apparent Error Rate (APER) and accuracy value**

# Results: Data Overview

**This figure shows a bar chart of 10 positive sentiment words that often appear.**

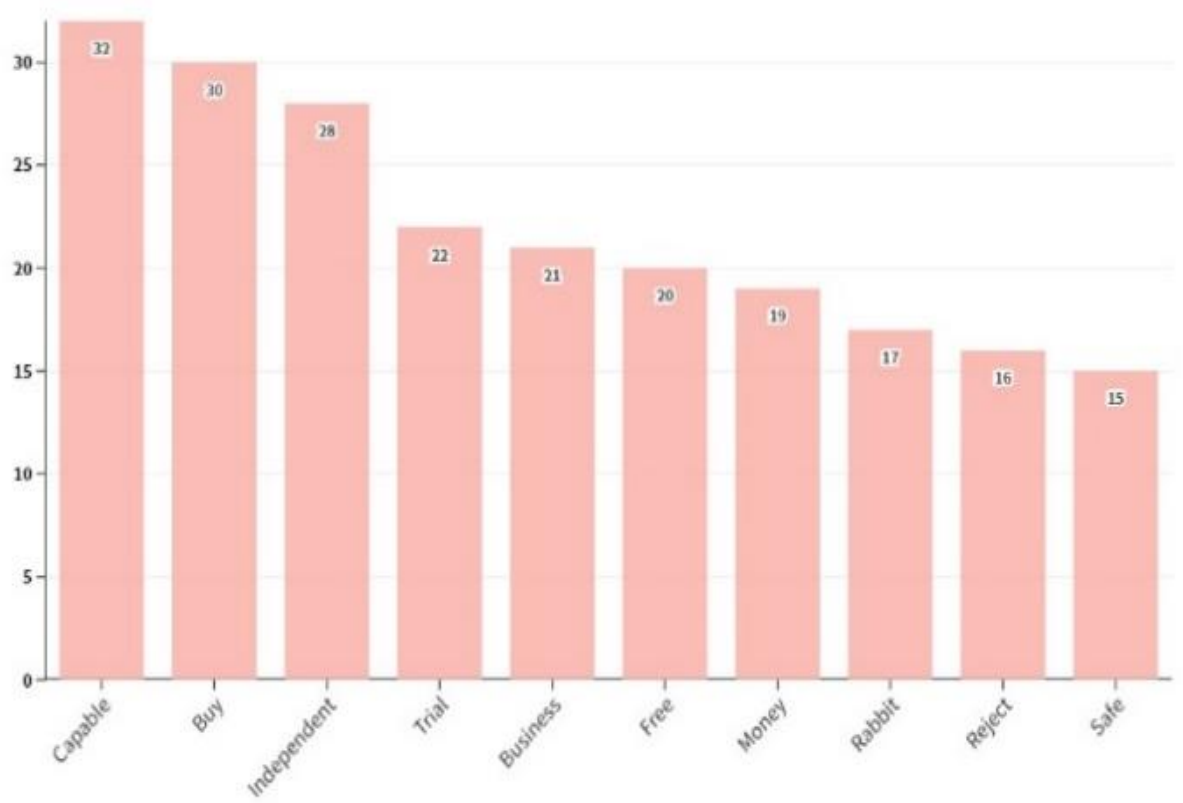
**It can be seen that the word “safe” is the word that most often appears in positive public sentiment regarding the Covid-19 vaccination policy.**



# Results: Data Overview

**This figure shows a bar chart of 10 negative sentiment words that often appear.**

**It can be seen that the word "capable" is the word that most often appears in negative public sentiment regarding the Covid-19 vaccination policy**



# Results: Sentiment Classification

**There are 1540 words produced after the preprocessing stage. All words in the training data will be used to create a Naïve Bayes Classifier model.**

## Training Data Classification

**The sensitivity of 87.23% indicates that the model is very good for predicting positive sentiments, while the specificity of 100% indicates that the model is very good for predicting negative sentiments.**

| Prediction | Actual | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 198 | 29 | 227 |
| Negative | 0 | 173 | 173 |
| Total | 198 | 202 | 400 |

# Results: Sentiment Classification

## Training Data Classification

**Then, the accuracy percentage of 92.75% indicates that the probability value generated by the Naïve Bayes Classifier method on training data is very good for classifying the public sentiment.**

**The Press' Q value obtained is 292.41 which is greater than $\chi^2_{0.05(1)} = 3.841$.Thus, it can be concluded that the results of the classification on the training data are stable or statistically consistent.**

| Prediction | Actual | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 198 | 29 | 227 |
| Negative | 0 | 173 | 173 |
| Total | 198 | 202 | 400 |

# Results: Sentiment Classification

## Testing Data Classification

**The sensitivity of 70.59% indicates that the model is good enough to predict positive sentiment, while the specificity of 87.5% indicates that the model is very good for predicting negative sentiment.**

**Then, the accuracy percentage of 76% indicates that the probability value generated by the Naïve Bayes Classifier method on training data is good enough to be used for classifying the public sentiment.**

| Prediction | Actual | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 48 | 20 | 68 |
| Negative | 4 | 28 | 42 |
| Total | 52 | 48 | 100 |

# Results: Sentiment Classification

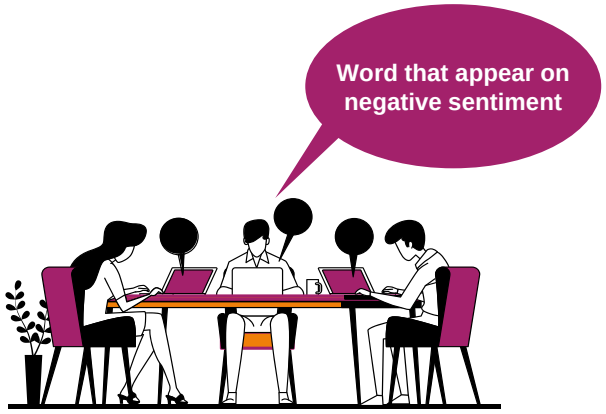
## Testing Data Classification

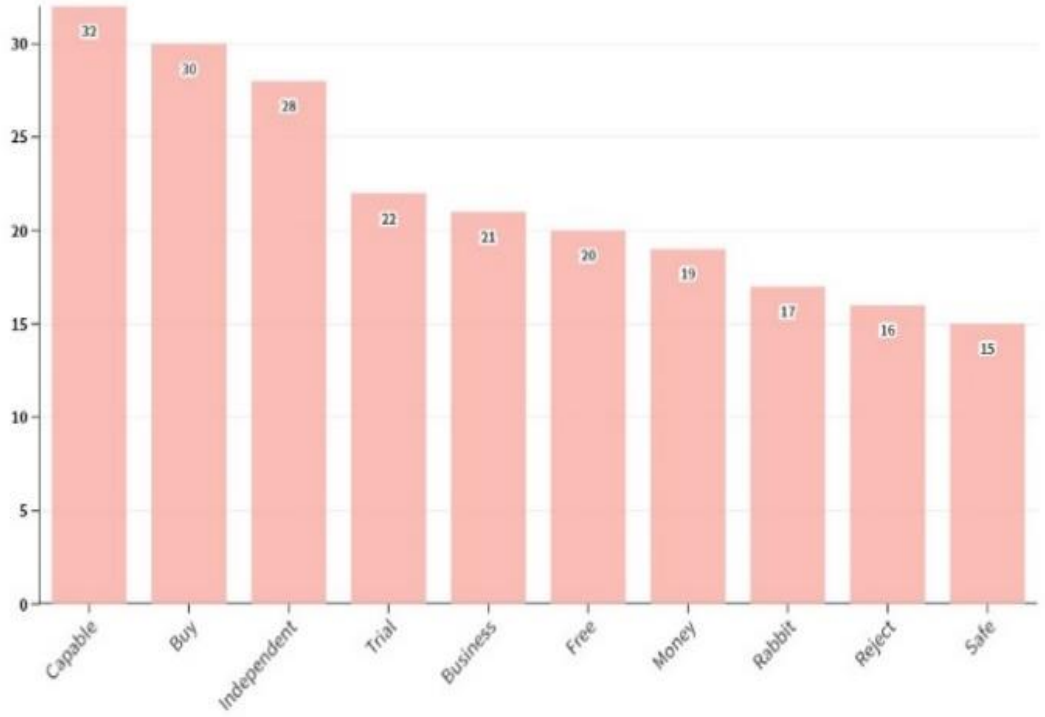
**The Press' Q value obtained is 27.04 which is greater than $\chi^2_{0.05(1)} = 3.841$. Thus, it can be concluded that the results of the classification on the testing data are stable or statistically consistent.**

| Prediction | Actual | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 48 | 20 | 68 |
| Negative | 4 | 28 | 42 |
| Total | 52 | 48 | 100 |

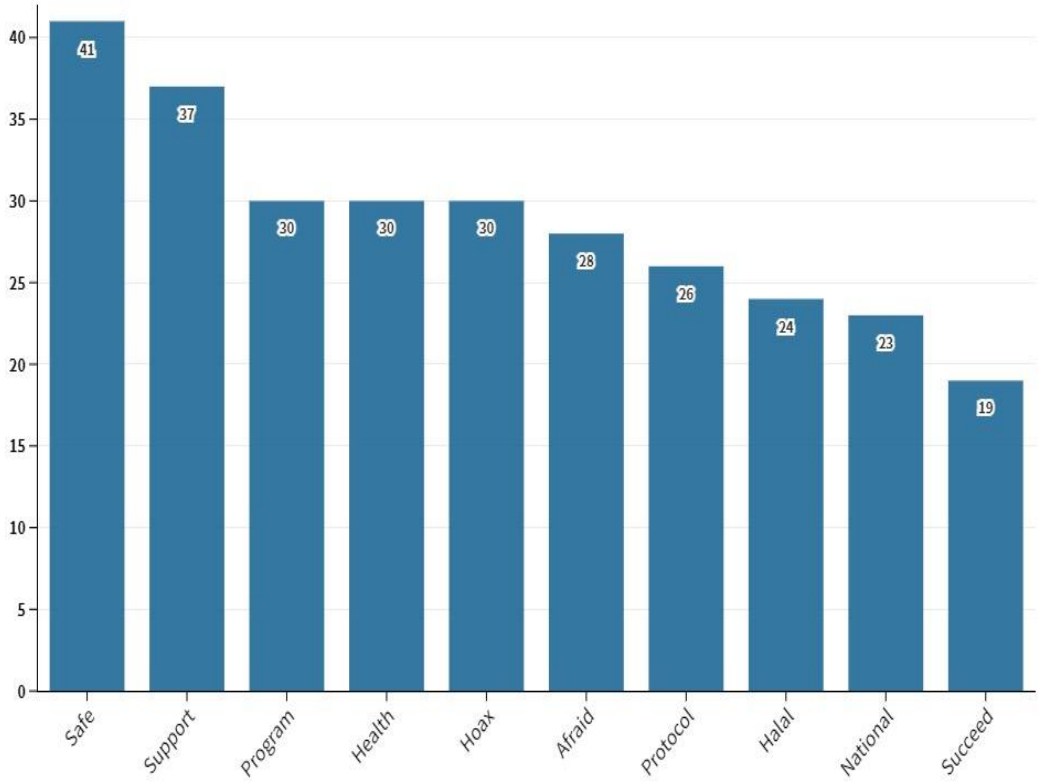
# Results: Sentiment Classification

**Based on this figure, the word with the highest frequency of negative sentiment is the word “capable”. Some people still doubt the ability of the Sinovac vaccine in dealing with Covid-19 because the efficacy of this vaccine in Indonesia is only 65.3% (Syakriah, 2021a).**

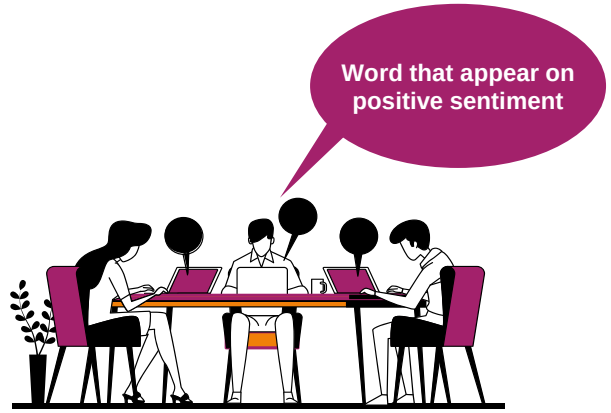


# Results: Sentiment Classification

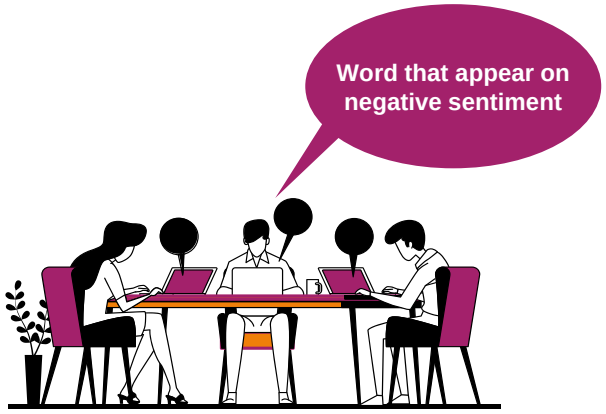


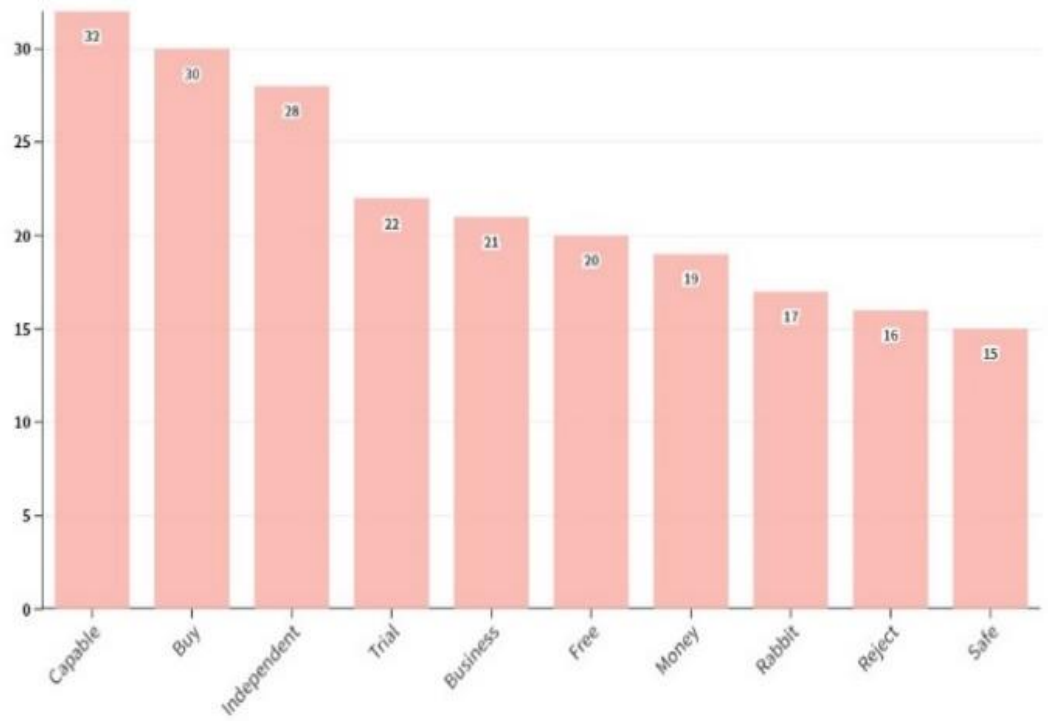

**However, the word “safe” in Figure 1 is the word that has the highest frequency of positive sentiment. This means that some people still believe that the Sinovac vaccine is safe to use.**



# Results: Sentiment Classification

**In addition, the words “buy” and “independent” rank second and third in negative sentiment. This was triggered by the government's plan to allow independent vaccination (Handayani and Kurniawan, 2021). Apart from the independent vaccination policy, the government is also trying to work with the private sector to cut costs (Syakriah, 2021b).**



# Results: Recommendation

**The government and society should be able to be open to each other in listening to and giving criticism regarding the Covid-19 vaccination policy to accelerate the end of the Covid-19 pandemic towards a healthy Indonesia which is in line with the SDGs achievement targets in the health sector**

# Conclusion

- The results of the classification of training and testing data were stable or statistically consistent
- The model is good enough to be used for the classification of positive sentiment for training data and negative sentiment for testing data.
- Overall, the Naïve Bayes Classifier method is a method that is quite appropriate to use to classify public sentiment regarding the Covid-19 vaccination policy because the accuracy value in training and testing data is quite high.

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# THANK YOU