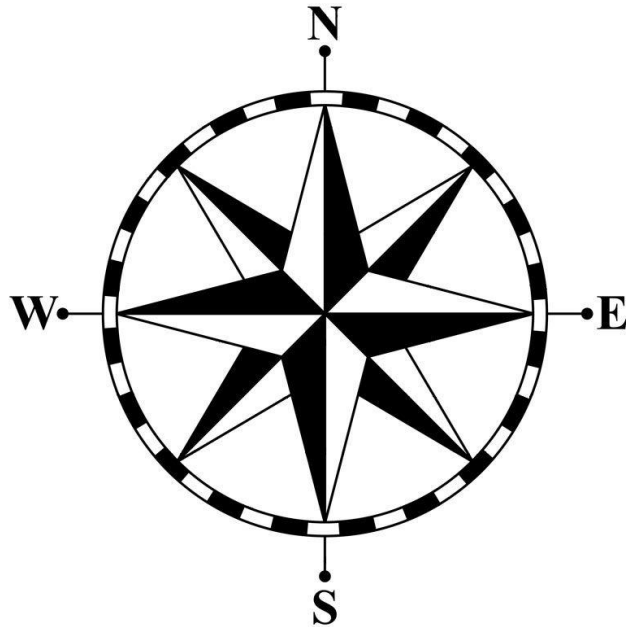# Way-Finder Consultancy



A Social Media Sentiment Analysis on President Joseph R. Biden's Presidency: Issues To Be Addressed and Recommendations For The Future.

Consultants:

| Andrew Brosnan (117341633) | Shaurya Malhotra (120222660) |
|---|---|
| Mathew Murphy (116336003) | Anoop Sabu (120222163) |
| Peter Sylvester (117345183) | |

Module: IS6140 Assignment 1.

Group 4.

Tutor: Mr. Andy Cag Lok Liu.

Lecturer: Dr. Michael O'Driscoll.

Table of Contents

# Executive Summary

This report by Way-Finder Consultancy was ordered by the US State Department as part of their comprehensive analysis of President Biden's first 100 days in office. This particular report was devised to assess public sentiment regarding President Biden's performance in the early stages of his presidency. Analysis was conducted using the 'TwitteR' package on RStudio and has assessed a combined 3,057 tweets over a span of four weeks. Data was collected on areas that were deemed to be of significant concern to the Biden administration presently and would persist throughout his presidency. Upon collection, the data was analysed using semantic analysis and RStudio functions to extract sentiment. The data was then visualised into a dashboard to support decision-making. The topics and analysis have been outlined below.

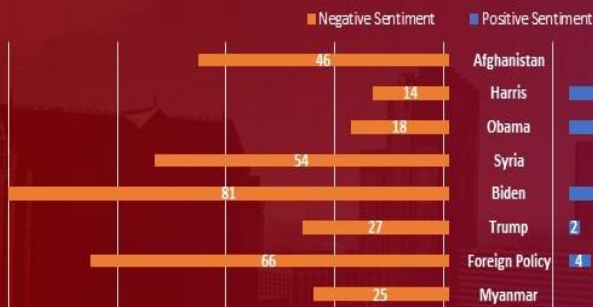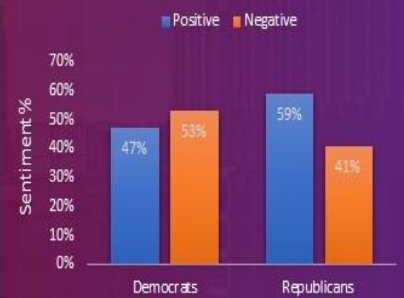| Area | Analysis | Recommendations |
|---|---|---|
| Foreign Policy | • Sentiment regarding foreign policy under the Joe Biden Administration is resoundingly negative.<br>• Sentiment regarding Vice President Harris and former President Obama is significantly more positive. | • Increase Vice President Kamala Harris's public role within Foreign Policy strategy.<br>• Draw connections between Biden's foreign policy plans with successful initiatives during the Obama administration. |
| Covid-19 Response | • Sentiment regarding President Biden's response to the Covid-19 pandemic is generally negative.<br>• Response to the covid-vaccine rollout is significantly more positive. | • Commission and disseminate positive media regarding vaccine rollout and results.<br>• Distinguish between former President Trump's rhetoric regarding the virus and the Biden Administration's guidelines. |
| Republican Party versus Democratic Party Sentiment | • The Republican Party is receiving more positive sentiment via tweets than the Democratic Party.<br>• Sentiment for both parties is comparatively negative. | • The Democratic Party under President Biden should endeavour to increase support for the party through positively trending actions like; vaccine rollout, economic stimulus and national unity.<br>• The Democratic Party should prepare for a strong performance by the Republican Party in upcoming elections to include the 2024 Presidential Election. |
| President Biden Analysis | • President Biden's popularity is largely contingent upon the Covid-19 response.<br>• Biden faces extensive opposition from a polarised demographic of Trump supporters. | • Joe Biden should aim to increase popularity among the American people through his actions in relation to Covid-19.<br>• Biden should aim to heal the divide between Trump supporters and his own. |
| Stimulus Cheque Sentiment | • US citizens have by and large been dissatisfied with the lead-up and execution regarding the deployment of stimulus cheques.<br>• Large stimulus payments are perceived as ineffective in addressing the day-to-day problems of Americans. | • The Biden cabinet should investigate alternative methods of stimulating the economy without the use of stimulus cheques.<br>• President Biden should focus on placating the demographics of US citizens that are most affected by the Covid-19 pandemic and in most need of stimulus. |

Dashboard

## Areas Investigated
5

## Total Tweets Analyzed
3,057

## Data Collection Period
March 8-29 2021

### 3.0. Foreign Policy Sentiment Analysis

Negative Sentiment    Positive Sentiment

| | Negative | Positive |
|---|---|---|
| Afghanistan | 46 | |
| Harris | 14 | 21 |
| Obama | 18 | 16 |
| Syria | 54 | |
| Biden | 81 | 17 |
| Trump | 27 | 2 |
| Foreign Policy | 66 | 4 |
| Myanmar | 25 | |

### 5.0. Democrats vs Republicans Sentiment Analysis

Positive    Negative

Sentiment %

Democrats: Positive 47%, Negative 53%
Republicans: Positive 59%, Negative 41%

### 7.0. Biden's Stimulus Analysis

Positive    Negative

Stimulus Sentiment %

| Data Collected Dates | Positive | Negative |
|---|---|---|
| Mar-08 | 32 | 33.6 |
| Mar-15 | 29.8 | 36.8 |
| Mar-17 | 30.1 | 31.9 |
| Mar-24 | 33.4 | 35.2 |

### 4.0. Covid-19 Response Sentiment

Positive    Negative

Sentiment %

| Data Collected Dates | Positive | Negative |
|---|---|---|
| March. 8 | 32 | 68 |
| March. 15 | 26 | 74 |
| March. 22 | 19 | 81 |
| March. 29 | 14 | 86 |
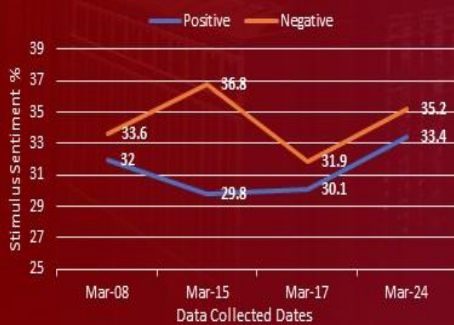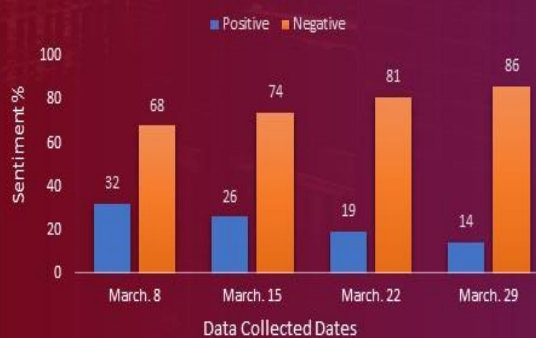
### 6.0. President Biden Analysis

american

1.0. Introduction.

This report has been commissioned by the US State Department to analyse the Executive Branch's performance in relation to five key areas impacting the United States of America under the presidency of Joseph R. Biden. To this effect, Way-Finder Consultancy Ltd. was directed to undertake a social media sentiment analysis to gather metrics on the aforementioned areas in order to form an overview of public consensus upon which future policy and decisions can be based. The analysis and recommendations made in this report have been shaped by the accumulation of over 3,000 tweets using the 'twitteR' package on RStudio. The aggregated data was also visualised to provide a dashboard of information to assist with executive decision-making. Further to this, the report has been structured to provide an analysis of the research findings in a particular area before presenting a series of recommendations that can be adopted by the Biden Administration. The areas in question are; foreign policy sentiment analysis under President Biden, attitudes toward the US Covid-19 response, the positivity and negativity directed toward the Republican and Democratic Parties, an analysis of President Biden's delivery on campaign promises in addition to an overview on views regarding stimulus cheques. Way-Finder Consultancy based its analysis and recommendations on the methodology outlined below.

2.0. Methodology

The consultancy team pursued Twitter data to extract insight on the aforementioned areas. Twitter was chosen because of its large userbase and the richness that can be extracted from tweets in terms of sentiment like usernames, text, geographical information, timestamps and dates. To access this information, the team obtained Twitter Developer APIs and used them to interface with the existing pool of tweets. These APIs were leveraged using libraries like 'twitteR' 'dplr,' 'tm,' and 'purrr' as the integrated development environment supports user

viewership and interaction with objects on the environment indefinitely (Appendix 1; Jaichandran et al, 2019: 2173). This is a major value driver as it allowed the consultants to use the same script each week to reduce the number of variables that may influence the data collected, giving a more accurate representation of sentiment without any influence from external sources whether perceived or otherwise (Sarlan et al, 2014: 215). With regards to collecting data, each consultant on the team identified a particular area that warranted analysis with respect to the United States under the Biden Presidency. Each consultant had liberty to collect, analyse and visualise their data as they saw fit with three main caveats. Firstly, all consultants wrote their code to disallow the inclusion of retweets. To this effect, the 3,000 collected tweets are all original in order to minimise the role of outliers in the collected samples and to include as wide a range of sentiments as possible (Giachano & Crestani, 2016: 5, 13). The consultants also mandated the implementation of a geocode to only collect tweets from the USA in order to ensure that the sentiment collected was solely from American citizens and not influenced by external biases (Zhang & Gelernter, 2014: 39; Somula et al, 2020: 364). The final mandate was that each consultant limited their weekly queries to only 300 tweets a week in order to maintain consistency across each topic being explored and to prevent the undue influence of disproportionate sample sizes (Giachano & Crestani, 2016: 26). With the exception of the latter three, the consultants had the freedom to explore any methodology to extract tweets using RStudio. For example, some users focused their queries on certain hashtags. This made information on certain topics such as '#Covid-19' or '#Biden' easy to find but these searches usually returned such large samples that analysis was impeded and the themes being returned were often quite varied, making it difficult to identify particular patterns and thus, form recommendations (Kouloumpis et al, 2011: 538-539). Some consultants therefore, formed queries by searching for key words such as 'foreign policy,' 'international relations' or 'stimulus cheque.' These often returned tweet samples that were more on-topic

and actionable for analysis and the formation of recommendations but at the expense of quantity owing to the significantly more narrow parameters of the query (Kouloumpis et al, 2011: 539). Each week the data was collected on Wednesday at 6pm GMT which would be around midday in both time zones in the USA. Following collection, a function was created to clean and mine the data in order to remove any inaccurate, incomplete or otherwise unusable data from the sample (Appendix 2). This resulted in an average of 600 tweets per research area over four weeks. This function also assisted with the sentiment analysis of the tweets as the consultants leveraged a generic dictionary of 4,783 negative words with 2,006 positive words to give a sentiment score to each tweet (Appendix 3). The function provided a score of +1 point for every positive word and -1 point for every negative word in a tweet (Appendix 4). Some consultants conducted analysis on individual data frames which were segregated week-by-week in order to critique how sentiment regarding an area was developing whereas others would amalgamate each week into one batch and conduct analysis on the aggregated four weeks at once to reduce the influence of any singular outliers that may have skewed the data when it was collected (Sarlan et al, 2013: 215). With respect to visualising the data, the team used a suite of different software such as; Microsoft Excel, RStudio and Tableau depending on the needs of their individual area. From there, the visuals were compiled in Microsoft PowerPoint whereby the dashboard was constructed. This approach to the report was deemed to be the most efficient, effective and above all, accurate, methodology available to Way-Finder Consultancy and this should be reflected in the quality of the analysis and recommendations herein.

3.1. Foreign Policy.

This section analyses the prevailing perspectives regarding US Foreign Policy under the presidency of Joe Biden. Data was collected by searching for tweets each week including key words like 'foreign
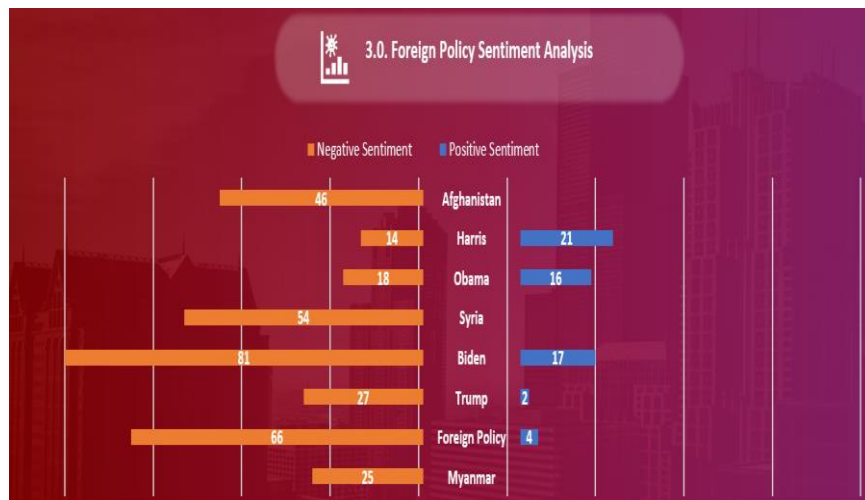


policy' and 'international relations.' Once collected and analysed, this data was visualised using a butterfly chart. This chart was chosen as it allows the viewer to easily distinguish between the positive and negative sentiment in terms of the context in which the key word was used with blue representing positive and orange representing negative (fig 3.0). This report has identified that the vast majority (87.82%) of online sentiment relating to US Foreign Policy was classifiable as negative.  The term 'foreign policy' itself was mentioned sixty-six times in a negative capacity in contrast to only four positive instances. This negativity does not appear to be as a result of one single event, rather, dissatisfaction with US foreign policy can be measured in waves such as the White House's perceived slow reaction in addressing the Myanmar Protests in the first week of March 2021 (25 instances). This was followed by stern denunciation of the Syrian airstrikes in late March 2021 (54 instances). This report also recorded a negative reaction to the leaking of US forces continuing to launch military operations in Afghanistan despite President Biden declaring to withdraw troops by May 2021 (46 instances). These issues were generally cyclical in that the consultant would record stark negative sentiment within the span of a single week but the same issue will have left the zeitgeist by the time the next week's data had been collected and analysed. The only constant in relation to foreign policy appears to be the sample's denunciation of President Biden with

eighty-one instances of the president's name being classifiable as negative in contrast to only fourteen instances being marked as positive. In contrast, other stakeholders close to the president received more positive sentiment on Twitter, namely Former President Obama and Vice President Harris (16 and 21 positive instances respectively). These considerations have assisted with the formation of the recommendations below.

3.2. Foreign Policy Recommendations.

This report has identified that President Biden is a very unpopular figure within US Foreign Policy. However, Vice President Harris is the only entity from the analysis that has a more positive than negative score (21 positive instances and 14 negative instances). Therefore, this report recommends that the White House increase Vice President Harris's role within US Foreign Policy strategy, at least in a public capacity. Former President Obama has also been noted as a figure with a comparatively more positive sentiment score than Mr. Biden (18 negative instances to 16 positive instances). Therefore, the White House should consider drawing connections between current foreign policy initiatives and those carried out under President Obama as the latter has significantly more positive leverage than the current administration. The introduction of these two positive figures within foreign policy discourse should improve overall public sentiment on the topic.

4.1. Coronavirus Response.

For this section, a bar chart was deemed to be the most appropriate visual to represent how positive and negative sentiment has developed over the course of data collection (fig 4.0). It has been identified from four weeks of sentiment analysis regarding the US
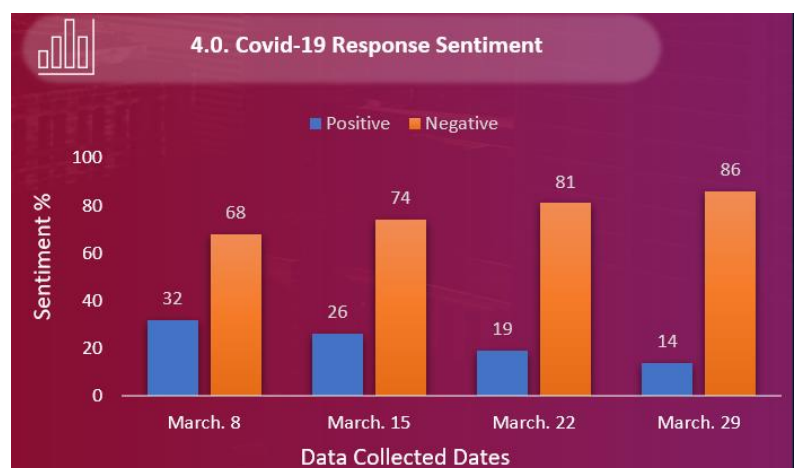
government's response to Covid-19 that outlooks in relation to the pandemic are resoundingly negative. Search terms such as 'US Covid Response' and 'US Coronavirus Response' displayed an average of 77.25% negativity. The chart highlights that negative sentiment has increased each week and continues to rise. Within these searches, 11% of the data recorded had either (Donald) Trump or (Joe) Biden mentioned within it. Along with these statistics, research shows that Trump's regular appearances within the data was mostly negative and mainly focused around the former president's perceived negligence in his initial response to the virus last year. Similarly, when President Biden is mentioned, it is also quite negative. However, this report has identified a significant upturn in positive sentiment among tweets that include the words 'vaccine,' 'vaccination,' 'shot' and 'immunity.' This implies that there is a link between the rollout of coronavirus vaccines and the president's popularity. However, there is also a link between the virus and negative sentiment through terms like 'mask,' 'quarantine,' and 'curve.' This implies that coronavirus response is a delicate topic in terms of political perception, especially for the president. In terms of views regarding how the virus is being handled, sentiment is rarely positive which implies a high degree of scepticism with respect to American leadership's ability to address the pandemic and associated problems. These issues have formed the basis for this report's recommendations.

4.2. Coronavirus Response Recommendations.

This analysis has shown that there is significant negativity regarding the response to the Covid-19 pandemic within the US with the majority of scrutiny being placed on the nation's leaders, especially President Biden. The data indicates that the president is judged by the majority of Americans for all aspects of the coronavirus response, both positive and negative. Due to the fact that the public are dissatisfied with the outcome of America's strategic response to the pandemic, this report recommends that that all branches of the executive increase their communication with the public in terms of providing more information on the government's

plans to address the rising number of cases and the ripple-effect that this has had on the lives of American citizens such as unemployment, travel restrictions and the economy. In order for the public to refrain from focusing on the mistakes previously made, the executive must make clear on how they intend to improve their strategy in the future. It may also be pertinent for the executive to focus public attention on positive government actions such as the rollout of vaccines which has been shown to positively increase sentiment for public officials. This report further recommends the creation and distribution of material that demonstrates the positive effects of vaccines for the United States, details the government's success in this area and enforces how an uptake in vaccinations is a vital mechanism in returning the US to normality.

By following these guidelines, a positive increase in sentiment should be observable.

## 5.1. Republican vs Democratic Party Sentiment.

Following the contentious 2020 presidential election, this report has found from Twitter sentiment that American allegiance toward one
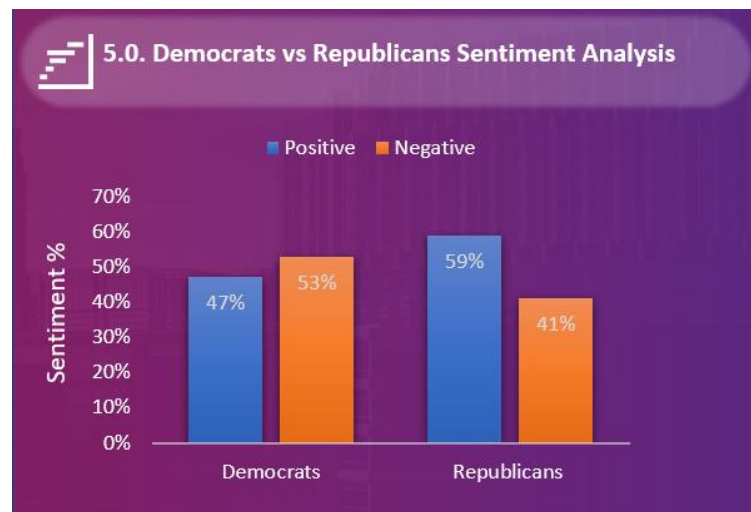


party and aversion toward the other is still extremely polarised. A bar chart was chosen to represent the average sentiment in terms of positivity and negativity regarding both parties with orange representing negative sentiment and blue representing positive (fig 5.0). Using a bar chart, the reader can easily judge the difference in sentiment between both parties through a visual comparison. Across four weeks of analysis, it was found that sentiment toward the Democratic Party was 47% positive in contrast to 59% positivity for the Republican Party. However, it was also found that negatively toward both parties stood at 53% for the Democratic Party and 41% for the Republican Party, implying that the American people are by and large dissatisfied with both of the historical American political institutions. The majority of negative

sentiment for the Democratic Party stems from delayed distribution of stimulus cheques since early February in addition to perceived hypocrisy with President Biden's approach to immigration and coronavirus response. However, the report has measured slight sentiment improvements for the party with respect to the successful rollout of vaccines in addition to a brief increase in positivity upon the release of stimulus cheques on the week of March 17, 2021. However, sentiment has seen a gradual yet persistent trend toward negativity since data collection began. In contrast, perceptions toward to Republican Party was particularly negative at the start of data collection, following the aftermath of the Capital Riots in January 2021 with another significant dip in popularity in mid-March as a result of the perceived stalling instigated by the Republicans with respect to the allocation of stimulus cheques. However, by and large sentiment toward the Republican Party increased over the four weeks of data collection implying that the Democrats can expect a strong challenge from the Republicans in upcoming elections. This consideration has formed the foundation upon which this report's recommendations are built.

5.2. Republican versus Democrats Recommendations.

The Democratic Party currently finds itself in quite a precarious position. Although the party hold a majority in the House of Representatives and a Democratic President resides in the White House, they still operate in a political environment that has been critical of their performance thus far. There is evidently a significant proportion of the American electorate that are dissatisfied with both party's performance over the course of this research and so the Democrats must focus their efforts on capturing support from this demographic to ensure a strong performance in the 2022 General Election and the 2024 Presidential Election. Although the Republicans are currently leading the Democrats in terms of social media support, the Democratic Party are currently in a more favourable position in terms of their control of congress and should leverage this in order to capture a segment of the dissatisfied majority and

seize some Republican support. Therefore, this report advises the Democratic Party leadership to use its advantageous position in the House of Representatives and Executive Branch to pass legislation in support of vaccinations, stimulus and rebounding the economy as social media analysis has identified these areas as being viewed favourably by the American electorate. Furthermore, the Democratic Party should be conscious of rising support for the Republican Party, as this will likely be a major factor in the upcoming elections. This can also be attributed to which candidates the party nominates for election next year as those with positive records in terms of supporting vaccinations, facilitating stimulus payments and helping growth in the economy will likely be acknowledged through election performance in 2022 and 2024.

Through adherence to these recommendations, the Democratic Party should be able to increase its support among the general American population.



6.1. President Biden Analysis.

This investigation takes into account the tweets created by President Biden's Twitter accounts (@JoeBiden and @POTUS). This report also extracted data from these accounts' retweets and through a synthesis of the two samples, the report was able to construct an approximation of the major campaign and presidential promises by President Biden. An analysis on the words used in this dataset is visualized in in the form of a word cloud (fig 6.0). The most commonly used words in terms of the number of times that they appeared in the collected sample are represented by bigger fonts in the word cloud along with other commonly used words with font size corresponding to the number of times it has appeared in the dataset. This makes it an effective way of judging sentiment regarding the President as the most pressing issues or topics can be easily identified from the visual. It is evident from the word cloud that the word

'American' has been used with a significantly higher frequency than other keywords such as 'Covid-19' and 'vaccine.' The heightened frequency of the word 'American' suggests that Biden has tried to bring about unity in the citizens of the United States of America by appealing to their national identity. This may be a counter to his predecessor's perceived intentions to divide the nation. Joe Biden's speech about Americans standing together as one during his inauguration ceremony further adds supporting evidence to this finding. The frequency of the words 'Covid-19 and 'vaccine' may not be as prominent, but they have still been abundant enough to highlight how Joe Biden's twitter handle has addressed the global pandemic and vaccination strategy on a consistent basis. The features of the word cloud have formed the basis for the following recommendations.

6.2. President Biden Recommendations.

The analysis has shown how President Biden's twitter handle has attempted to instil positivity and hope in the American people by addressing the cases of concern in recent times while appealing to the national identity. Since the data includes tweets that encapsulates both his election campaign and his presidential stint so far, the words frequently used can be seen as an election manifesto that was intended to persuade citizens to vote for him. Now that Joe Biden has been sworn in as President, he must ensure that his actions now do not deviate from the promises that he made. Further analysis shows that people are sceptical of the current government's plan to curb Covid-19 cases and rollout the vaccine, especially due to the previous government's perceived incompetence in responding efficiently to the pandemic. Therefore, it is vital for the current government to continue their efforts by making sure that they engage with the citizens in a manner that promotes public health guidelines. In addition to assisting with the reduction in cases, this is evidently a major point in the foundation of President Biden's strategy. The pandemic has impacted American citizens' morale and has allowed scepticism to take precedence, therefore, the president must appeal to the American

population so that as a whole they will stand by the president when countering the pandemic and the associated socio-economic consequences. Therefore, the president should continue engaging with the terms presented from his tweets to assist with a successful first term and set the foundation upon which re-election can be built.

## 7.1. Stimulus Cheque Sentiment.

From analysing Twitter sentiment regarding the key words; 'stimulus,' 'stimulus cheque' and 'stimulus check,' (noting the two ways of spelling
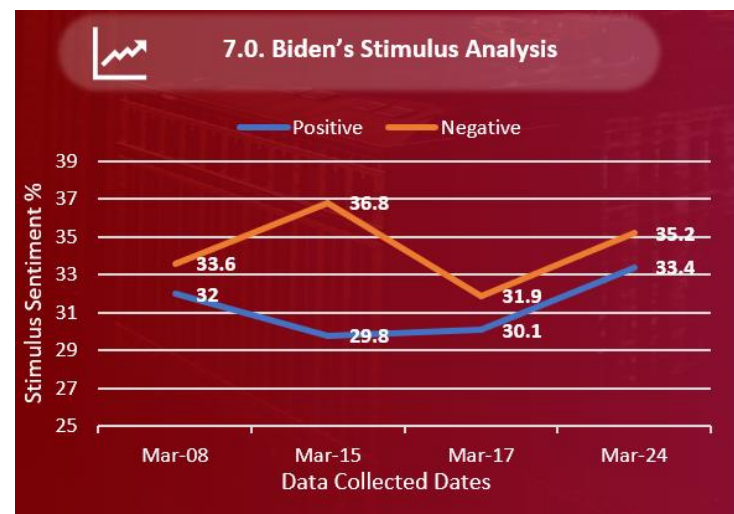


the latter in the USA) it has been found that the perception regarding the planning and delivery of stimulus cheques to the American public was predominantly negative. However, considering that the sentiment has developed in terms of positivity and negativity over the four weeks, this section uses a line chart to visualise the rise and fall of sentiment in terms of positivity and negativity (fig 7.0). The spike in negative sentiment regarding the stimulus cheques was recorded on the week of March 15th as this was the week that Congress confirmed the reduction in stimulus payment from $2000 to $1400. From the sample of collected tweets, it also appeared as though many Americans had expected to have received their cheques by that date considering that it was one of President Biden's campaign promises. During this period, there was 7% more negative sentiment recorded than positive. Perhaps unexpectedly, there was another increase in negative sentiment when President Biden signed the stimulus bill into law with many tweets noting that $1400 is not enough to pay rent, provide food for families or cover utilities. The majority of these tweets called for an increase in employment and rent freezes as opposed to one-time pay-outs. The line chart outlines that positive sentiment never exceeded negative throughout the four weeks in which data was collected. However, there was a slight increase on the week of March 24th when the stimulus cheques were actually handed

out. However, considering that positive sentiment never exceeded negative sentiment throughout the report's lifecycle, it can be taken to mean that this is an unpopular method of stimulating the economy which has informed the recommendations below.

7.2. Stimulus Cheque Sentiment Recommendations.

The method by which the US Government and President Biden has offered financial relief has largely been perceived negatively by US citizens. From the tweets analysed for this report, it is apparent that this method of dispersed, large-sum payments are an ineffective way of providing relief to those who are unemployed or otherwise impacted by the pandemic. It is also evident from the tweets that many US citizens have being negatively impacted by delays in receiving their cheques, due to the general absence of direct deposits. Based on the prevailing perspectives from the collected tweets, it would appear to be more popular for the government to invest the stimulus money in job-generating programs or setting up bursaries for those most in need as opposed to a blanket, single-payment sum of money. Americans are by and large calling for more jobs as opposed to support from the government. Furthermore, the analysed tweets imply that American citizens would be in more favour of the government implementing; rent freezes, mortgage delays or public work schemes for the most vulnerable and desolate citizens. There has also been suggestions from the collected tweets that the US adopt a European-style welfare system such as smaller, weekly covid-payments for those out of work and furloughing staff as opposed to laying off. The socio-economic impacts will likely play a role in the government's decisions regarding the abolishment, reconfiguration or continuation of the stimulus strategy. However, for this report, it is recommended that the system of stimulus cheques is discontinued in lieu of a more proportional system.

8.1. Conclusion.

In conclusion, this report has identified a number of problems in relation to the United State's performance under the Joe Biden administration. This data was collected using the 'TwitteR' package for RStudio and provided Way-Finder Consultancy with over 3,000 tweets upon which the following recommendations have been based.

1. The Biden Administration should increase the role of Vice President Kamala Harris with respect to US foreign policy, even if in a solely public capacity. This report further recommends that the Biden administration draws connections between their proposed foreign policy strategies and those successfully devised by Former President Obama. Both of these approaches should result in overall more positive sentiment in terms of perception than solely Joe Biden as the face of US foreign policy.

2. There is evidently conflict between the strategies of the current and previous administrations in terms of responding to the Covid-19 pandemic. To this effect, it is imperative that the Biden administration enforce the necessity and value of public health guidelines to counter the adverse effects of the pandemic. Furthermore, this report has identified significantly more positive sentiment within the context of a rollout of the coronavirus vaccines, making this an area that the White House should leverage as a source of success to improve public perception.

3. In terms of outlooks toward both of the major US political parties, although the Republican Party are currently leading the Democrats in terms of support, there is a sizeable demographic of dissatisfied voters that the Democratic Party should appeal to. The Democrats are currently in an advantageous position as they control both the House of Representatives and the Executive Branch meaning they have the potential to enact laws that would improve public perception before the 2022 and 2024 elections. Economic growth and a successful vaccine rollout have both been identified as areas that garner

positive sentiment, implying that the Democratic Party would likely benefit from basing their legislative decisions on these areas. As a result, party sentiment will likely improve before next year's election and thereafter.

4. With respect to President Biden's Twitter activity during his campaign and early presidency, he evidently has set a political foundation regarding uniting the American population and tackling the adverse political environment that he inherited from his predecessor. President Biden will be judged on his performance on these topics for the remainder of his presidency. Therefore, tackling the issues raised from his Twitter manifesto like 'unity' and 'vaccinations' is evidently an area that the current administration must approach with significant regard.

5. With regards to stimulus cheques, it can be seen from the Twitter sentiment that throughout this report's lifecycle, the planning, delivery and aftermath was met with resounding negativity. This implies that the current strategy of one-time, single payments are insufficient in addressing the issues faced by the majority of unemployed and otherwise impacted Americans in terms of problems like paying rent, providing food for their families or paying utilities. Therefore, this report advises that the government devise a new strategy for stimulating the economy like pursuing European-style furloughing and covid-payments in addition to job-generating schemes as opposed to blanket payments. These all generated more positive sentiment. Through reforming this system, positive perception should follow.

In closing, sentiment regarding the aforementioned is clearly negative and in need of addressing. This report has outlined recommendations that should be considered by the Biden administration. Through this, positive sentiment should follow.

References.

Giachanou, A. and Crestani, F. (2016), Like It or Not: A Survey of Twitter Sentiment Analysis Methods, *ACM Computing Surveys,* 49(2), pp. 1-41.

Jaichandran, R. Bagath, B. Shunmuganathan, K. Kanagasuba, R. (2019), Sentiment Analysis of Movies on Social Media Using R Studio, *International Journal of Engineering and Advanced Technology,* 8(6), pp. 2171-2175.

Kouloumpis, E. Wilson, T. and Moore, J. (2011), 'Twitter Sentiment Analysis: The Good The Bad and The OMG!' *In: Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media,* Barcelona, Spain, July 17-21, pp. 538-541.

Pozzi, F. Fersini, E. Messina, E. and Liu, B. (2016), *Sentiment Analysis in Social Networks,* 1st ed, San Francisco: Morgan Kaufmann.

Sarlan, A. Nadam, C. and Basri, S. (2014), 'Twitter Sentiment Analysis,' *In: 2014 International Conference on Information Technology and Multimedia,* Putrajaya, Malaysia, November 18-20, pp. 212-216.

Somula, R. Kumar, D. Aravindharamanan, S. and Govinda, K. (2020), 'Twitter Sentiment Analysis Based on The US Presidential Election 2016,' in Satapathy, S. Bhateja, V. Mohanty, J. and Udgata, S. (eds), *Smart Intelligent Computing and Applications,* 1st ed, New York: Springer, pp. 363-373.

Zhang, W. and Gelernter, J. (2014), Geocoding Location Expressions in Twitter Messages: A Preference Learning Method, *Journal of Spatial Information Science,* 9, pp. 37-70.

# Appendix 1

```r
1   ## Packages used for the Twitter Analysis
2   install.packages("purrr")
3   install.packages("twitteR")
4   install.packages("ROAuth")
5   install.packages("stringr")
6   install.packages("RCurl")
7   install.packages("plyr")
8   install.packages("tm")
9   install.packages("SnowballC")
10  install.packages("wordcloud")
11  library(wordcloud)
12  library(purrr)
13  library(twitteR)
14  library(dplyr)
15  library(ROAuth)
16  library(stringr)
17  library(RCurl)
18  library(plyr)
19  library(tm)
20  library(SnowballC)
21  library(ggplot2)
```

# Appendix 2

```r
22  ## Sentiment Analysis Function
23  score.sentiment = function(sentences , pos.words, neg.words , .progress='none')
24  {
25    require(plyr)
26    require(stringr)
27    scores = laply(sentences,function(sentence,pos.words,neg.words)
28    {
29      sentence =gsub('[[:punct:]]',"",sentence)
30      sentence =gsub('[[:cntrl:]]',"",sentence)
31      sentence =gsub('\\d+','',sentence)
32      sentence=tolower(sentence)
33      word.list=str_split(sentence,'\\s+')
34      words=unlist(word.list)
35      pos.matches=match(words,pos.words)
36      neg.matches=match(words,neg.words)
37      pos.matches= !is.na(pos.matches)
38      neg.matches= !is.na(neg.matches)
39      score=sum(pos.matches)-sum(neg.matches)
40      return(score)
41    },pos.words,neg.words,.progress=.progress)
42    scores.df=data.frame(scores=scores,text=sentences)
43    return(scores.df)
```

## Appendix 3

```
46  # List of Positive and NEgative words
47  pos.words <- scan('/Users/shauryamalhotra/Desktop/positive.words.txt', what = 'charcter', comment.char = ';')
48  neg.words <- scan('/Users/shauryamalhotra/Desktop/neg.words.txt', what = 'charcter', comment.char = ';')
```

| neg.words | chr [1:4783] "2-faced" "2-faces" "abnorm… |
| pos.words | chr [1:2006] "a+" "abound" "abounds" "ab… |

## Appendix 4

```
50  # Conducting sentiment analysis based on scores
51  Democratsscore <- score.sentiment(tweet1_df$text, pos.words, neg.words,.progress = 'text')
52  Republicanscore <- score.sentiment(tweet2_df$text, pos.words, neg.words, .progress = 'text')
53  Bidenscore <- score.sentiment(tweet3_df$text, pos.words, neg.words, .progress = 'text')
54  Mikescore <- score.sentiment(tweet4_df$text, pos.words, neg.words, .progress = 'text')
55  foreignpolicyscore<- score.sentiment(tweet5_df$text, pos.words, neg.words, .progress = 'text')
56  covidcore<- score.sentiment(tweet6_df$text, pos.words, neg.words, .progress = 'text')
57  stimuluscore<- score.sentiment(tweet7_df$text, pos.words, neg.words, .progress = 'text')
```

| 1 | 0 | Apparently we are living in the global Fourth Reich, k… |
| 2 | −1 | @GadSaad @TheDemocrats China emissions never hu… |
| 3 | −1 | @GadSaad @TheDemocrats Lies.lies. lies!!!! |
| 4 | 0 | RT @RepBeatty: No one should be kicked out of home… |
| 5 | 0 | @TheDemocrats are xenophobic science deniers. #Blu… |
| 6 | 0 | @leigh_fall @TheDemocrats @POTUS He was NOT a g… |
| 7 | 0 | RT @TheDemocrats: The first slate of @POTUS's judici… |
| 8 | 1 | RT @WJCork: @JoeBiden @KamalaHarris @RepAlGreen… |
| 9 | 0 | @TheDemocrats @POTUS And I needed no help from … |
| 10 | 1 | RT @TheDemocrats: If Republicans in Congress actual… |
| 11 | 1 | @TheDemocrats @POTUS So basically identity politics… |
| 12 | 0 | @SenSanders talks about #H1B VISA ABUSE: https://t.… |
| 13 | 0 | @GadSaad @TheDemocrats China alone produces mo… |
| 14 | −1 | @GadSaad @TheDemocrats How does anyone take he… |
| 15 | 0 | @nyc311 @NewYorkFBI @NSAGov @NYCMayorsOffice … |
| 16 | −2 | @GadSaad @TheDemocrats The weird logic of her arg… |
| 17 | 0 | RT @RepBeatty: No one should be kicked out of home… |
| 18 | 0 | @khendriix_ @KadyMuhammad1 @GadSaad @TheDe… |
| 19 | 0 | RT @RepBeatty: No one should be kicked out of home… |
| 20 | 0 | No one should be kicked out of home or forced to go … |
| 21 | −1 | @ontherunhappy @TheDemocrats @POTUS Your fist … |
| 22 | −1 | RT @webcodepro: @Gabby_Hoffman I just left two voi… |
| 23 | −1 | @GadSaad @TheDemocrats Unfortunately, one of the … |
| 24 | 1 | RT @GadSaad: One of the most powerful people in @… |
| 25 | 0 | #BidenLies @POTUS. #DemocratsLie @TheDemocrats  … |
| 26 | −1 | RT @Flamethrowaah: @GadSaad @TheDemocrats A fe… |
| 27 | −1 | @GadSaad @TheDemocrats Embarrassing |
| 28 | −1 | RT @alexbleo1: @GadSaad @TheDemocrats She talks … |
| 29 | −2 | @TheDemocrats We should fire @theDemocrats becau… |