Internet Opinion and Sentiment of the Prosecutorial System: A Big-Data Analysis

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ABSTRACT

The rise of the Internet has made mobile phones, online networks and other wireless devices the essential channels for people's daily communications and information exchange in the modern society. It is an economical way to carry out opinion polls on a specific issue by investigating the subscribers of social platforms in terms of manpower, material resources, budgets and time. Compared with making household phone calls, online opinion surveys are therefore more closely keeping up with the progress of the times.

This study is the first attempt to make big-data analyses on law enforcement by Prosecutors Offices (LEPO). Word frequency analyses are also made to explore public opinion of LEPO on the internet in this regard. Next, it aims to effectively analyze the public sentiments towards LEPO based on the meanings of the words used by the said subscribers. Afterward, comparisons of online voice and favorability between the courts, LEPO and police authority are made. The research tools adopted in this study include "Voice Trend Observation", KEYPO (big data key engine), and

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the FANSDO (fan behavior tracker) to monitor and survey big data collected from news media and social platforms in Taiwan.   The author spent two months to observe and survey the monthly variations of online voice on law enforcement by LEPO from June 16, 2017, to June 15, 2018.

The conclusions of this study are as follows.   First, online voice and sentiment analysis can serve as supplementary information to insufficient public opinion polling.   Second, LEPO accounted for 48.82% of the sum of negative sentiments reflected from online voice, judiciary 50.13% and police authority 36.28%.   Third, approximately 170,000 pieces of online voice in relation to LEPO were found during the surveyed year.   Online voice rippled from "news media" to "forums".   Fourth, the issues concerning judicial reform such as "vexatious litigation" and "rotation of prosecutors for the 1st & 2nd instances" gained support from the public online.   Fifth, the negative sentiments expressed from online voice concerning LEPO were prone to major political events. Sixth, the analysis of sentimental ratio revealed that online public opinion showed support to prosecutors when they personally led a team and made efforts to defend social security. Seventh, online voice and favorability on "LEPO" are clearly distinct from those on courts and police authority.

The suggestions made in this study are described below.   First, it is urged to continuously analyze the public's online voice and sentiments in connection with LEPO based on the data collected from the Internet and public opinions. Second, the image of "LEPO" can be improved via effective media PR promotions.   Third, effective public sentiment analysis on law

enforcement by LEPO can help map out accurate coping strategies dealing with the media.   Fourth, it is necessary to keep paying intensive attention to the voice from rank-and file prosecutors and curb vexatious litigation.   Fifth, it is advised that the image of justice presenting by LEPO should be strengthened. On the other hand, efforts should be made to remove the conceptual associations between LEPO and political disputes and judicial injustice.   Sixth, it is suggested that researchers conducting future studies find more explicit evidence regarding the hypothesis that "the general public's confusion over the job responsibilities held by the judiciary have led to decreasing satisfaction of the judicial system".   Seventh, in response to the rise of the information era, the Ministry of Justice and its affiliated prosecutors agencies should distribute more resources to establish a new set of self-efficacy examination mechanism and model in order to timely and sufficiently deal with public issues.

I. Research Background

The prosecutors in Taiwan play the main role conducting investigations. They initiate criminal procedures such as filing a public prosecution, acting as legal representation for private prosecution, etc. During legal proceedings, proseuctors exercise their authority independently from the courts. In addition, according to Grand Justices, the identity of tenure prosecutors is protected by law so as to exercise their authority in a just and objective manner and represent the nation against illegal criminal offesnes by preventing improper interference (洪志明, 2009). Even though the prosecutorial system is protected by law for justly and objectively exercising its authority, opinion polls have shown that it is difficult to gain expected public support in terms of fairness and justice of law enforcement concerning. 王鵬翔 (2008) pointed out that "institutional legitimacy" and "legality" are the two pillars constituting public support to the judicial system. Institutional legitimacy refers to "the status recognized by the society", meaning the operations and structures of the system are in consistent with the culture and values accepted by the society (林綺雲, 2002). On the other hand, legality refers to that public institutions should perform their duties solely depending on laws and within the criteria imposed by national policies and regulations (Caldeira, 1991). 黃國昌, 陳恭平, and 林常青 (2017)

quoted the concept of "diffuse support" proposed by the politician David Easton (Easton, 1965), who considered that the foundation of "institutional legitimacy" could not be unchallengingly undermined by its temporary or short-term performance (e.g. an isolated precedent).   When the general public exhibited supporting attitudes towards adequate institutional legitimacy presented by the public sector, they would show their firm loyalty and kindness, even tolerate decisions against the public's preference.

Against the backdrop of the above-mentioned, long-term social trust and support to a public institution will become the cornerstone of institutional legitimacy while the judicial organ is promoting its business and exercising its authority.   As a result, it is important to conduct effective surveys based on scientific evidence and monitor the public's satisfaction and confidence in law enforcement by the judicial organ (Franklyn, 2012). Prosecutors Offices are the main role conducting investigations.   In criminal proceedings, investigations come after arrest of suspects by the police and before consequent judicial rulings.   Prosecutors Offices are the operating hub in judicial process so their importance cannot be emphasized more.   However, the general public often confuses Prosecutors Offices with courts in terms of their accountabilities and relationships in adiminstration. The Judicial Yuan 司法院 (2017) released its statistics demonstrating that less than 1/5 (18.2％) of the public in Taiwan last year (in 2017) were able to

identify the job criteria between Prosecutors Offices and Judges and only 21.1% of the people being surveyed knew and were able to identify the positions in administration between the two.   The public's confusion over the two roles has led to mixed satisfaction and public opinions on the Prosecutors Offices concerning law enforcement.   These are the reasons why further distinction and examination are required.

In previous studies, public opinion surveys were often conducted to analyze the public's satisfaction towards judicial services or businesses. For example, the Judicial Yuan started making satisfaction surveys on judicial services in 1999.   These surveys consisted of six dimensions, including "public opinion on existing judicial system; public's intention to solve disputes in court; formation of the public's knowledge, attitude and opinion of the judicial system; the public's knowledge of the existing judicial system; elevation of public trust in jurisdiction and court service quality through major policy implementation, and major channels for the public accessing judiciary-related information."   In the General Public Survey on Judicial Cognition of 2017 conducted by the Judicial Yuan, 5,267 people in Taiwan were contacted via landline phones.   The survey had a confidence level below 95%.   The overall sampling error went within ±1.4 percentage points (司法院, 2017).   However, the rise of the Internet era has highlighted one of the disadvantages of public opinion polling via landline phones

because such channel may exclude those who can only be reached by cell phone or online voice services (陳敦源 & 蘇孔志, 2017). Moreover, it is time-consuming for the respondents to anseswr the questions. Telephone surveys may also include those who are impatient or present a higher chance of refusal. Take the above-mentioned Judicial Yuan survey for example, the refusal rate reached as high as 41.5％ (司法院, 2017). Meanwhile, the statistics obtained from the public satisfaction survey conducted by National Chung Cheng University in 2018 showed that people who didn't accept the survey accounted for 58.1% of the total successfully connected phone calls. They refused to accept the survey because of physical/psychological factors, lack of interest or knowledge in the topic, already having received a similar interview, privacy being invaded, objection against telephone surveys, being busy, unknown reasons, and so on. In addition, the non-human incurred factors of unsuccessful connections in this survey accounted for 76.8% of the total dials (國立中正大學犯罪研究中心, 2018). Based on the above figures, successful connections merely accounted for more than twenty percent, and among these successful connections, only forty to fifty percent of the contacts accepted the survey. In this case, some significant opinions from certain groups could not be covered. Surveys via home phones may fail to objectively present the opinions of the respondents. The results of such surveys may thus be partial because of opinions being obtained from

biased sampling.　In telephone surveys, it's more difficult to tell whether or not the response, attitude or beheavior was truly reflected from the respondents. (陳義彥 et al., 2015).　These are the challenging issues impeding telephone surveys (政治大學預測市場研究中心, 2007).

　　As mentioned above, the Internet era has made mobile phones, online networks and other wireless devices the essential channels for communications and information exchange in this modern society.　It is an economical way to carry out opinion polls on a designated issue by investigating the subscribers on social platforms in terms of manpower, material resources, budgets and time. Online opinion surveys help avoid the drawbacks of surveys via making household phone calls (政治大學預測市場研究中心, 2007).　On this account, long-term monitoring online social networks or news platforms via big data could faciliate effective surveys on the degree of public attaention to the Prosecutors Offices as well as public expectations and confidence in law enforcement by Prosecutors Offices (LEPO).　Meanwhile, online big data can be used for making sentiment analyses and exploring if Prosecutors Offices realize what people have been hoping for in the aspects of social security and judicial justice.　We can also find out to what extent LEPO online favorability is affected upon the occurrence of a special event covered by media (Stephens-Davidowitz & Pinker, 2017).　Thus, the government should attach importance to public

online voice and favorability over LEPO in the Information Age.

II. Research Purposes

In 2017, the Crime Prevention Research Center of the Academy for the Judiciary organized focus group and in-depth interviews towards a target group of 28 people (inclusive of inmates, chiefs of villages, lawyers, victims' family and officers from victim protection institutions) to carry out qualitative research titled "Survey of Public Satisfaction with the Judicial System and Perceived Social Security." Following the aforesaid research, explorations via multiple methods are employed to find out public online voice over the Prosecutors Offices in this study. First, the authors spent two months from early April to the end of May in 2018 to target and monitor online groups with the application of the big data key engine KEYPO to collect information from news platforms and social media covering legal cases, law enforcement and various promotions handled by Prosecuctors Offices before producing a list. Then, periodic observations on the variations of online voice were made. Popular keywords were screened out to analyze the general public's online favorability over the Prosecutors Offices and discussions were made to probe the activity of the news associated with the keywords concerning Prosecutors Offices on online social media. Public opinions about Prosecutors Offices posted during the period between April 2017 and March 2018 were covered in this study for monitoring and

observation.　　The purposes for carrying out this study are described below:

A. Online voice serving as supplementary information to insufficient public opinion polling

One of previous studies revealed that 83.4% of the total population aged over 12 in Taiwan, or an estimate of 17.60 million people, have had experience in going online based on a 2017 sample survey (鄭天澤 & 陳麗霞, 2017).　　The statistics released by the Department of Household Registration of Ministry of Interior (內政部戶政司) (2018) showed that the total population in Taiwan reached 23,539,816 by the end of 2016, and the average daily online users reached 7.598 million with a monthly average of 12.848 million non-repeated Internet users in the same year (創市際市場研究顧問公司, 2017).　　That is, the foresaid monthly average of Internet users accounted for 55% of the total population in Taiwan.　　By deducting those who are unable to use the Internet, such as younger children, the mentally and physically disabled, seniors, etc., a higher rate could be obtained. Moreover, the population aged 25-54 accounted for 61.6% of the total number of Internet users (創市際市場研究顧問公司, 2017).　　This figure shows that Internet users are mainly young and middle-aged groups.　　In the past, polls failed to comprehensively reflect public opinion from different age groups.　　Instead, weight method was introduced.　　Hence, the results

obtained could not fully encompass the opinions reflected from young-aged

groups (劉嘉薇, 2017).　Consequently, the application of online big data for

probing the opinions of Internet users can serve as a supplementary approach

to improve the insufficiency of public opinion polling.

B. Monitoring online voice over Law Enforcement by Prosecutors Offices (LEPO)

　　The descriptions and content of judicial investigations posted on news

and social media websites may guide and form public attitudes towards

prosecutors.　In this study, the authors will collect the articles, news reports

and discussions concerning Prosecutors Offices and prosecutors on the

Internet over the past year for statistical analyses so as to depict and monitor

online voice and trend concerning LEPO.

C. Public Sentiment Reflected from LEPO Evaluations

　　In general, people do not conceal their thoughts against an event when

going online bcause of the Internet featuring anonymity.　The public

directly express their opinions towards news events the society is mainly

concerned about.　Therefore, the sentiment revealed therefrom is closer to

what's really in their minds than that collected from interviews (劉嘉薇,

2017).　Tools for text mining can help researchers make a Real-Time

Sentiment Analysis on the information collected from social media or online news platforms so as to successfully find out people's attitudes towards a certain issue (盧安邦 & 鄭宇君, 2017).   A real-time sentiment analysis is carried out based on a database consisting of at least one million pieces of online information produced every day, including Facebook, Youtube, news media, forums, blogs and so on.   Then, data standardization will enable to picture the trend of LEPO related events, showing they're positive or negative followed by the calculations of P/N ratios.

D. Comparisons in online voice with other judicial organs

In this study, comparisons in positive, negative and neutral online voice are expected to be made between Prosecutors Offices and other judicial organs such as courts, police offices, etc.

E. Analysis of online LEPO favorability by major news events during the same periods for probing the effect of those events on Prosecutors Offices

Suggestions will be made on the strategies in response to future news events of similar types based on the spread of positive, negative and neutral sentiments along the timeline, analyses of the effect created by major news events during the same periods, and information from both online voice and

opinion leaders.

III. Research Methodology

With the application of KEYPO, a big data key engine provided by a private company, the authors spent two months to explore monthly variations of online voice about LEPO by observing and surveying more than one million pieces of related daily online data posted from June 2017 to June 2018.

A. Sources

The data covered in this study is collected from more than one million pieces of daily information concerning Prosecutors Offices on news websites, forums, social media, blogs, replies, comments, share, likes/dislikes, etc. in Taiwan from June 16, 2017 to June 15 2018.   KEYPO is capable of covering 90 percent of total online social media.   A total of 200 million pieces of information were collected with an inquiry response time at about 2 seconds.

B. Research Subjects

The subjects being investigated in this study fall into four categories, including news, forums, online social media and blogs.   The category of news covers Yahoo! Kimo, Apple Daily, Chinatimes, the Storm Media, SET News, EBC News, ET Today, Next TV, the News Lens, UDN, SINA, CTI News, Liberty Times, TVBS, etc.   Forums such as LineQ, CK101, Gamme, Eyny, Baby Home, PTT, Mobile01, Gamer, FASHION GUIDE, SOGI,

Citytalk, icook, iFit, iPeen, U-CAR, Dcard, etc. are included.   As to online social media, platforms such as popular FB fan pages, FB Keyman, FB personal webpages open to the public, Youtube, Yahoo! Answers+ are also searched.   Finally, Pixnet, Chinatimes Newsblog, UDN Blog, Yam Tian Blog, Roodo, PCHOME, Xuite, Yahoo! Blog, Engadget, Inside, Inside Cyberbuzz, BuzzOrange, TechBang, etc. are the blogs to be surveyed.

In addition, the KEYPO system helps classify users into "key opinion leaders", "FB Fan Pages" and "Public Messages".   In this study, the authors only focused on "Public Messages" posted by general users in order to explore the "public issues" in relation to Prosecutors Offices.   After setting time periods for data search, the keywords such as "Ministry of Justice" and "Prosecutors" are used for a blanket collection of big data.

C. Analyses of Issues

The issues to be analyzed ranged from law enforcement and authority to the image of Prosecutors Offices reflected on the Internet.   Operational definitions included the keywords mentioned by onlie users such as "prosecutor", "prosecutors office", "procuratorate", "prosecutor's investigator", "organ of prosecution and investigation", etc.   200 million pieces of online information served as a basis for big data search.   Online big data engine search was made over the information containing the above mentioned keywords or phrases featuring the issues of   "Ministry of

Justice", "prosecution", "prosecutor", "Supreme Prosecutors Office", "High Prosecutors Office", "District Prosecutors Office", "prosecution officer", "ethics of prosecutors", "guidelines on the role of prosecutors", "prosecutor as subject of investigation", "fairness/justice of prosecutors' investigation", "investigation confidentiality", "incompetent prosecutors", "vexatious litigation", "deferred prosecution", "indictment", "prosecutor evaluation", "prosecutor evaluation committee", "prosecutor's investigator", "clerk", etc.

Meanwhile, the word "prosecutor" is often used in movies, dramas, games or foreign news.   The authors have designed the study to rule out character strings with irrelevant messages in order to make the survey closer to the reality revealing online voice over prosecutors in Taiwan.   The data being searched is in line with the above mentioned keywords but the content which is not relating to judicial system or legal affairs will be removed. Apart from the above, for thoroughly excluding irrelevant messages, irrelevant channels in the sectors of movies, dramas, games and comics are also screened out.   After searching and screening, a total of 227 channels have been excluded.

D. Tools for Analyses

The tool used in this study is KEYPO, a big data key engine provided by Key Point Insight into Big Data.   The scope of text crawling searched by KEYPO mainly covers titles, authors, text, date of post, source of post,

feedback on social media (functions such as like, share and comment, etc.), and URL.   The information collected by KEYPO was by means of API gateways officially authorized by platforms and met ethical rules and regulations.   Webpage browsing was simulated when it was to collect information from other news forums.   Meanwhile, automated web crawler was applied to traverse and analyze webpages.   Then, the blocks of the above-mentioned columns on HTML pages will undergo the process of dismantling and Extract-Tranform-Load (ETL).   The private policy on each platform varies from each other.   KEYPO follows the criteria set by each platform and provides results meeting the criteria under authorization. There are no violations against the privacy of a specific ID during the analytical process.   The original links are also provided for respecting the authors' intellectual property right.   The same principles apply for web crawling via official API gateways when it goes to public, anonymous and semi-anonymous social websites (KEYPO corp., personal communication, March 29, 2018).

Regarding machine learning and word segmentation, KEYPO follows a strict Data Science Pipeline for achieving both efficacy and accuracy. The flow includes: webpage crawling and data collection, data cleaning and analysis, semantic vector resolution, content analysis and emotional judgment, content index, value-added analysis and processing, and live feed

reporting (KEYPO corp., personal communication, March 29, 2018). The flow is shown in Figure 1.
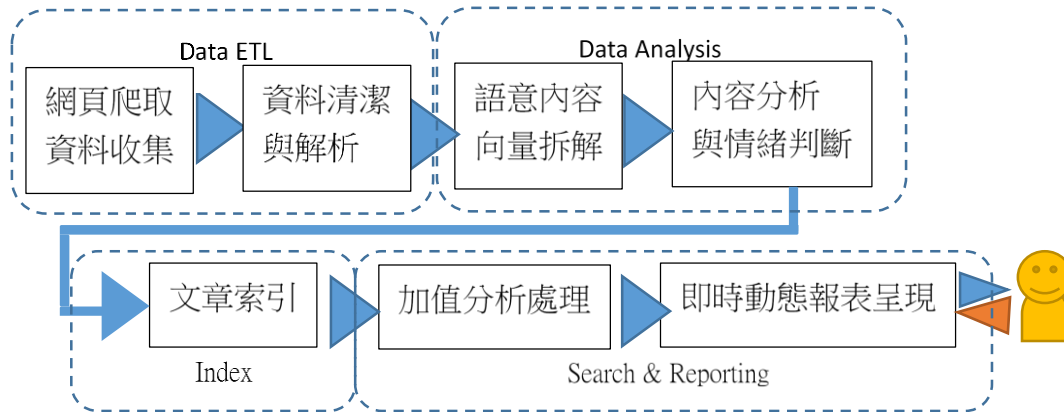

Figure 1. KEYPO machine learning mechanism (Source: KEYPO)

KEYPO adopts a series of deep learning artificial neural network models.   Deep learning is a part of a broader family of machine learning methods.   It is one of the most advanced AI technologies.   Deep learning is a class of machine learning algorithms which attempt to use a cascade of multiple layers of nonlinear processing units for feature extraction and transformation.   Recently, various deep learning frames have been developed. For example, the applications of deep neural networks, convolutional neural network, deep belief network, and recurrent neural network to the fields of computer vision, speech recognition, natural language processing, audio signal recognition, and bioinformatics have gained outstanding results.   For a more specific analysis of the context and

semantic content, such AI method is adopted.   The core of the method is

Recursive Neural Network: Long Short-Term Memory (LSTM).   This is the

mainstream sequential deep learning method at the moment.   Research has

shown that such method is particularly ideal for speech recognition, image

captioning and natural language processing.   KEYPO big data key engine

and its related machine learning methods are developed based on the above

mentioned models.   It is also transformed and strengthened to fulfill the

characteristics of Chinese and online articles.   KEYPO is researched and

developed by the Data Science Team of KEYPO Corp. which owned

integrated intellectual property right to it (KEYPO corp., personal

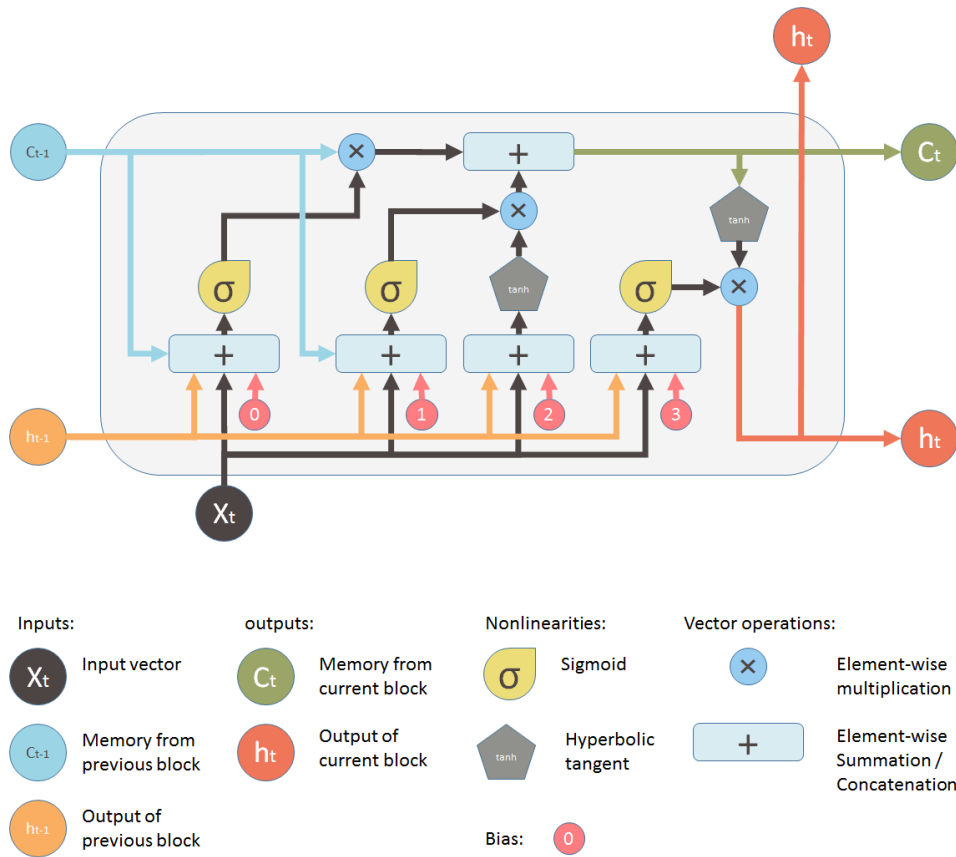communication, March 29, 2018) .   Please refer to Figures 2 and 3 below.

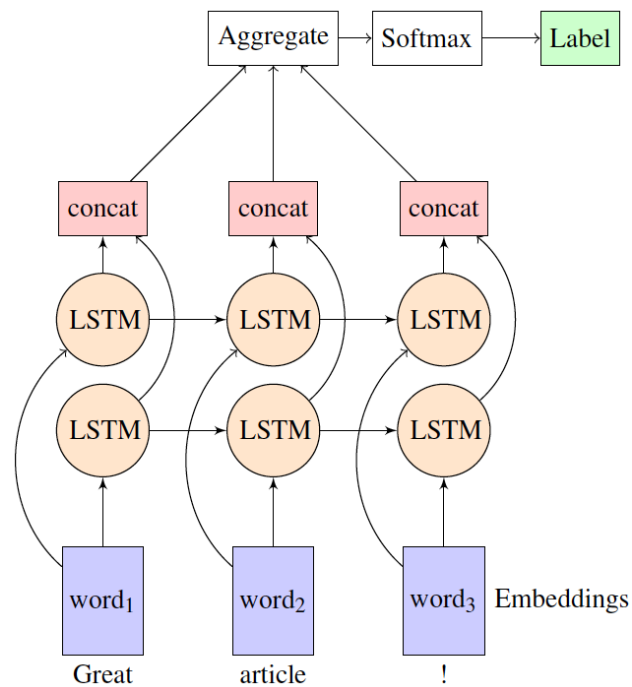Figure 2. Diagram of LSTM neural cells (Source: KEYPO)

Figure 3. Diagram of LSTM neural network Semantic analysis (Source: KEYPO)

E. Time-Series Analysis

Following online voice trend analysis via KEYPO, the authors continued making a time-series analysis over online sentiment. The data in relation to positive sentiment, negative sentiment and P/N ratio are listed. Then, ARIMA model for time-series analysis is applied to explore online voice on the dates of particular importance. Theoretically, it is more obvious and easier to observe short-term effect than long-term effect of news events. Hence, only short-term effect is probed while long-term effect is not within our reach in this study. All time series variances feature natural logarithm transformation and the coefficient in this study can be obtained via exponential transformation. That is, the reciprocal of logarithmic function is used for explanation. In addition, the ARIMA model is applied to examine the effect of time-series intervening variables. MA aims to explain short-term effects on the two types of sentiments while SAR aims to examine the four seasonal effects.

F. Research Ethics

Text from news and social networks is the theme covered in this study. Regarding information security, all data retrieved from KEYPO big data analysis system is stored on the KEYPO cloud server. This server is only available for very limited number of engineers. The database and server are strictly controlled with an account name and password. Access to the

database can only be made via specific IP addresses.   Its firewall is designed for defense in depth.   The staff of KEYPO is unable to access any information without authorization.   The KEYPO system only crawls over public posts of fanpages.   It doesn't analyze private accounts nor collect posts from private groups not made open to the public or hidden posts and comments from fanpages.   The KEYPO system uses the APIs provided by official webistes and Facebook in an ethical manner.   The system follows the privacy policy published by each website.   Links to original posts are recorded so as to show respect to the intellectual property right owned by original authors.   Besides, KEYPO data will be stored and kept.   However, the online service for searching the information provided by KEYPO is only available within a year.   The information being kept for more than one year will be archived (KEYPO corp., personal communication, March 29, 2018).

By taking the above described research ethics into consideration, the authors regard the text from online news and social networks public information which can be legally accessed.   The application of web crawler for text mining aims at collecting and compiling such public online information, which is consistent with the definition of publicity.   Therefore, the probability or intensity for the subjects facing risks, danger or discomfort did not become higher during the study than that before the survey of this study.   As a result, this study meets the ethical criteria for exempt review.

Then, the research project was submitted for a review.   On March 26, 2018, this study was approved as exempt review by National Cheng Kung University Human Research Ethics Committee, with a file number of Cheng Da Lun Shen Huei (Mien) Tze No. 107-006.

IV.   Research Findings

In 2017, the Crime Prevention Research Center of the Academy for the Judiciary carried out qualitative research titled "Survey of Public Satisfaction with the Judicial System and Perceived Social Security." It is found that satisfaction with Prosecutors Offices varied by profession of interviewees and identities at different judicial stages.   Most professionals and community representatives held an attitude of "neutral to satisfaction" towards Prosecutors Offices.   On the other hand, inmates had an attitude of "neutral to dissatisfaction" at all judiciary stages (吳永達 & 蔡宜家, 2018). The above mentioned research interpreted public satisfaction with the judicial system in terms of legal point of view.   Meanwhile, only a small size of samples consisting of experts was collected and the results obtained therefrom could not be used to infer public satisfaction in general.   For further probing the image and brand of Prosecutors Offices and supplementing the insufficiency of the previous polls, the authors surveyed online voice concerning LEPO with the application of KEYPO big data key engine based on the above said research and analyzed online favorability

towards LEPO.   In comparison with the results obtained from the above

said research by referring to major news events in the same periods covered

by it, this study attempted to explore the effect of those events on

Prosecutors Offices.   Comparisons in online voice over the judicial organs

between the above said research and this study were also made.   After

making an integrated analysis and comparisons, the conclusions and

suggestions of this study are described as follows.

A. Online voice and sentiment analysis can serve as a supplementary material for insufficiency of public opinion polls

Literature review demonstrated that public opinion polls were not

necessarily a comprehensive representation of the voice of potential younger

generations.   It was because that the surveys via household phone calls

were conducted during limited time periods when only a limited portion of

younger generations could receive the surveys at home.   And the results

obtained therefrom could not fully represent the opinions of other potential

young groups.   For confronting the challenges facing the surveys via

traditional household phone calls, big data analysis on online voice exhibits

several advantages, such as higher analytical efficiency, adequate sources of

samples, flexible control of length of time for researchers to make analyses

and decide time periods for data tracking, and finally wider space for data

mining.   Even more, the public's knowledge and trust in the Prosecutors

Offices mainly comes from the coverage of news media.　Therefore, the online voice revealing the public's viewpoints can serve as an excellent source of their feedback and thoughts.　Big data surveys can gain insight into real-time online public opinion through inquiring into what feedback the public has to share.　By referring to the major news events with increasing voice of a chosen period, countermeasures and follow-up strategies can be proposed accordingly.

B. Sum of online voice showing negative sentiment: Prosecutors Offices 48.82%, judicial organs 50.13% and police authority 36.28%

Regarding the issues about Prosecutors Offices, it is found in this study that the online voice showing negative sentiment accounted for 48.82% of total online voice, neutral sentiment 38.63%, and positive sentiment 12.55%. That is, the sum of neutral and positive sentiment is 51.18%, which is higher than that of online voice revealing negative sentiment.　As to the online voice showing negative sentiment on courts and police offices, the results obtained in this study are similar to those obtained by 黃國昌 et al. (2017). 50.13% of total online voice showed negative sentiment on courts while 36.28% on police authority.　The above said result on courts is lower than 63.1% obtained by Judicial Yuan (2017).　By making a similar comparison, the negative sentiment on prosecutors obtained in this study accounted for 48.82%, which is much lower than 75.4% showing distrust in prosecutors in

charge of legal suits according to Crime Research Center of National Chung Cheng University (2018).   In addition, the study finds that approximately 38.63% of the online voice showed their interest in discussing related issues without sentiment, or the discussion conveying mixed negative and positive sentiments.   Such online voice is considered neutral.   Because of different definitions of the theoretical concepts, it is not suggested to interpret such sentiment as satisfaction or trust.   The sentiments covered here can only be defined as positive/negative opinions and sentiments observed from online voice over a specific issue during a specific time period.

C. Annual online voice on Prosecutors Offices reached 170,000 pieces and spread from "news media" to "forums"

According to our survey, the total online voice on Prosecutors Offices reached 172,677 pieces, which accounts for less than 0.8% of the 200 million pieces of information in the database.   The top four channels with voice on "Prosecutors Offices" are PTT Gossiping, Yahoo News—Social Affairs, Udn News, and Yahoo News—Politics.   Negative sentiment accounted for more than 50% of each of the above said four channels.   Higher percentage denotes greater influence.   The voice from the four popular channels imposes great impact on the image and assessment of Prosecutors Offices.

Apart from the above, the online voice concerning Prosecutors Offices carried an S/N ratio less than 1, which proved that reports covered by news

media constituted a greater sector than the discussions initiated by online social media when it comes to the issues on "Prosecutors Offices". Online voice mainly spread from "news media" to "forums". Such phenomenon supports that news media can be an appropriate start for enhancing the image of "Prosecutors Offices".

D. **Online voice showed support to judicial reform such as "vexatious litigation" and "rotation of prosecutors for the 1st & 2nd instances"**

The time-series analysis on positive sentiment showed that the events occurring on 2018/01/19 and 2018/03/27 created significant effect. The event on the said two dates gained extra positive sentiment at a significant level of 3.86 and 4.07 respectively. The event corresponding to the date on 2018/01/19 was the "vexatious litigation by a female motorbike rider", and on 2018/03/27 the "rotation of prosecutors for the 1st and 2nd instances".

Regarding the "vexatious litigation by a female motorbike rider" on 2018/01/19, the headline of the news report went as follows: "*Prosecutor angry at female rider for wrong-way driving and filing lawsuit*". According to the news report, a female rider caused a traffic accident due to her wrong-way driving while she still brought a lawsuit. The rider's intention was reprimanded by the prosecutor who then charged her with malicious accusation. This resulted in positive public opinions. The comment made by Internet users revealing positive sentiment included: "*justice has made a*

comeback; the prosecutor sticks to principle; thumbs up to the prosecutor."
Online public opinion placed the blame on such vexatious litigation and at
the same time supported the prosecutor to charge the female rider with
malicious accusation.   This also reflected that the people really supported
the reform for eliminating vexatious litigation.

Furthermore, the "rotation of prosecutors for 1st and 2nd instances" is
even more closely associated with reform measures for the prosecution
system. For example, the news report made by Apple Daily on March 27,
2018 was given the following headline: "*Rotation of prosecutors an empty
talk? Outraged grassroots prosecutors flood forum*".   Following this type of
news, the comment made by Internet users like this can be read: "*Minister X,
be brave and firm if you really want to have a reform promoted.*"

"Rotation of prosecutors for 1st and 2nd instances" seems to be a highly
professional issue.   However, it involves flexible arrangement of human
resources in the prosecution system.   The report covered grassroots
prosecutors calling for substantial practice of reform.   Meanwhile, the
report offered an opportunity for readers to understand what's going on and
what the focus of argument was so that they were able to give positive
feedback.   The above condition further evidenced that the resolutions
reached at the 2017 National Conference on Judicial Reform and related
issues were able to draw people's attention and gain positive voice.

E. **Negative sentiment from online voice over Prosecutors Offices is a reflection on major political events**

The time-series analysis on negative sentiment illustrated that significant effect was found on 2017/08/20, 2018/02/02 and 2018/05/15. There was a significant increase of 6.03, 3.37 and 3.28 of negative sentiment on these three dates respectively. The major events corresponding to the date on 2017/08/20 was "the 2017 Taipei Universiade", on 2018/02/02 the "judge ordered to arrest prosecutor" and on 2018/05/15 "2nd trial on Ma Ying-jeou breach of confidentiality law". The characteristics concerning the above mentioned news events are described below.

The opening ceremony of the 2017 Taipei Univeriade was held on 2017/08/19. On that day, the conflict occurred due to pushing and shovng, which led to police arrest followed by a prosecutor putting people involved under custody by law. The following day on 8/20, the public discussed this event in an uproar on Yahoo News and PPT Gossiping, leading to rising voice. The coverage by Yahoo News is excerpted below: "*...during the opening ceremony of the Taipei Universiade at around 7:00 o'clock in the evenng, people .... were shouting, protesting and shoving. The police exercised their authority to suppress and control the public by law.... The prosecutor informed that the people involved in the conflict would be determined as red-handed offenders or be put under custody by law based on*

the situations on site….."   This event also gave rise to discussions on PTT Gossiping.   The content is excerpted as follows: "*…To sum up, the point is, instead of saying there are moles inside the police force, the position of most police is questionable…Taiwan is in need of adopting the same way of transitional justice like what Germany has done to force the police, judges and prosecutors who ever served for KMT to retire. Otherwise, justice is nothing but castle in the air…..*".

In the event of "judge ordered to arrest prosecutor" on 2018/02/02, the prosecutor held a different viewpoint from that of the judge so they had an argument in court.   Later, the news was released and titled by the media: "*Cuff me! Conflict over putting suspect into custody: Judge of Changhua District Court Ordered to Arrest Prosecutor*".   An Internet user responded: "*Prosecutor Chuang, go for it! Suppressed justice cannot be tolerated. I'm on your side!*"   On the other hand, the negative sentiment towards this event was also rising.   Here went another news headline: "*Female prosecutor brought to justice due to insulting judge in court*".   An Internet user commented: "*….general public can be treated in the same way by law. Why can't a judge order to arrest an offending prosecutor with the same judicial standards?*"

The event revealed that online sentiment was not necessarily targeted on the job or efficiency of Prosecutors Offices.   Sometimes, it can be a

reflection on major policital events (e.g. the case of Ex-President Ma Ying-jeou).   In addition, it is worth noticing that in the event of "judge ordered to arrest prosecutor" on 2018/02/02, both positive and negative sentiments were rising at the same time.   This illustrated that even though the general public identified more with the prosecutor's position simply from the perspective of justice, they still revealed general sentiments of dissatisfaction with the judicial system.   Therefore, the authors consider that the task in the first priority is to sever the conceptual link between prosecutors offices and miscarriage of justice.   The following example can shed some light on the said situation: the general public would not associate police offices with miscarriage of justice and incompetent judges.

F. P/N ratio revealed online support over prosectuors making efforts to maintain social security

The time-series analysis suggests that the event of "combat illegal fishing in Penghu" on 2018/01/08 was the only case enjoying more positive sentiment than negative sentiment exclusive of the news event of "Frank Fu's assisted suicide".   The news report on that day went as follows: "*for implementing the 'Project of Preservation and Sustanibility of Maritime Resources", Wu XX, Prosecutor of Penghu District Prosecutors Office, led an illegal fishing invstigation task force consisting of local Criminal Investigation Corps and Agriculture and Fisheries Bureau in combating*

illegal fishing."   An Internet user remarked as follows: "*we should pay more attention to this type of news for protecting the sustability of maritime resources.....heavier penalty should be imposed.*"

In this study, it is considered that when grassroots prosecutors stood out and led a team in person for maintaining social security, the image of Proseuctors Offices on the media could then be reversed from the concept long formed showing dissatisfaction with the judicial system such as "miscarriage of justice" and "incompetent judges".   It is similar to the image of "Police Offices" formed due to their combating crimes, taking risks and working hard for the people.   Therefore, such events could trigger a higher percentage of online positive sentiments and fewer negative sentiments.   By doing so, a positive image of Prosecutors Offices can be reinforced.   This is a phenomenon that cannot be ignored.

G. Online voice and favorability on "Prosecutors Offices" different from those on Courts and Police Offices at a significant level

Online voice concerning Prosecutors Offices ripples from news channels to social media and forums, which is different from how the voice on courts spreads.   The analysis of social media activity demonstrated that public opinions over issues relating to Prosecutors Offices mainly started from the coverage of news media instead of spontaneous attention paid by Internet users.   However, when it comes to courts and police offices,

discussions initiated by Internet users were found more than the pieces of news reports.

Moreover, online voice concerning police offices was more than that of Prosecutors Offices and courts. The rippling of voice on police offices was occasionally in consistent with that on courts but it was different from Prosecutors Offices with online voice moving ups and downs. Online voice about courts was higher than Prosecutors Offices. The voice trend about courts was occasionally in consistent with that of Prosecutors Offices regarding events containing extreme conditions. The wave patterns reflecting oveall trend also varied in courts, police offices and Prosecutors Offices at a sigificant level.

Finally, online voice trend for Prosecutors Offices is positively correlated with that for courts at a moderate level while it is positively correlated with that for police offices at an insignificant level. The trend for courts goes positively associated with that for police offices at an insignificant level.

As a result, Prosecutors Offices differs from courts and police offices by the amount of online voice, spreading sequence of public opinions, linear voice trend, social media activity, and neutral and positive sentiments. There is no significant evidence supporting the cause-effect hypothesis that it is likely for the public to make consistent evaluations on these different three

roles because of the public's confusion over the job content the roles are in charge of in the judicial system.

V. Conclusions and Suggestions

This study applies big data analyses on online public opinions to serve as a supplementary material for the inadequate information collected from the traditional opinion polls carried out in the past. Traditional household phone calls required scrupulous control. For example, prudent screening had to be made towards a certain age group so as to collect samples from youger generatios (司法院, 2017) However, this approach is cost and time consuming. The information collected from younger generations in a traditional way did not fully reflect the opinions of young groups. Household surveys were usually conducted during limited time periods and could only cover the young generation who stayed at home during that certain period of time. Hence, those surveys could not manifest the true voice of the potential young population. In addition, the interviewees were often impatient to be surveyed. Upon conducting a survey, too many questions requiring longer time to respond may upset the interviewees while few questions may fail to provide a comprehensive picture portraying true voice, which may augment the possibility of missing constructive public opinions. Online voice analyses seem to be a friendlier method to younger population. The analytical results can be more effective for making cross

comparisons with those obtained from the opinion polls carried out by other external organizations (or institutions).   The inference made in this study demonstrates that all-embracing and true reflection of public opinions or the reasons known for causing public dissatisfaction are beneficial to establishing effective strategies for enhancing public satisfaction of administrative implementations.   Based on the conclusions of this study, the suggestions are made as follows.

A. Continuous online public opinion analyses for exploring online voice and sentiments regarding Prosecutors Offices

In this study, an attempt is made to apply a different method from what has been tried before for opinion polls.   It is the first time to apply big data analysis to online public opinions for investigating the LEPO reputation. The research is considered an innovative stride.   The "KEYPO Big Data Key Engine" developed in 2015 by the KEYPO Corp., founded by the Business Incubation Center of National Taiwan University of Science and Technology, is adopted to carry out AI semantic analyses. The analytical results are presented by means of infographic visuals. With the above approaches, we are able to get a panoramic view of social and public online opinions towards LEPO (國立台灣科技大學育成中心, 2017).   In the process of this research, it is found that online opinion analyses feature higher analytical efficiency, adequate sources of samples, flexible control of

length for analyses and time periods for data tracking as well as fewer

limitations (Aggarwal & Zhai, 2012).　 On top of all the above mentioned

features, analyses using big data are made at a lower cost than large-scale

opinion polls.　 Reliable opinion polls cannot be achieved without higher

costs. Government authorities normally have limited budgets for carrying out

research, which makes it challenging to survey public opinions at regular

intervals. According to the statistics released by Taiwan Buying Network (台

灣採購公報網) (2018), the average total cost for winning a bid for

conducting an opinion poll was NTD 650,801.2, with the highest amount at

NTD 1,287,500 and lowest at NTD 350,374, by referring to the figures from

survey and research companies over the years.　 The budgets varied based

on survey content and sampling criteria.　 For example, National

Development Council　國家發展委員會 (2016) once listed a budget of

NTD 900,000 to openly recruit professional survey companies for probing

public opionions over major issues and policies proposed and implemented

by the government.　 Technically, the costs and expenses for this study only

account for one-eighth of the average cost for traditional opinion polls.

This study successfully spent minimum cost to achieve the best results. This

elucidates that it's worthwhile carrying out continuous online big data

surveys on the public issues which Prosecutors Offices are concerned about.

However, it requires cultivation of specialized talents for making such

research and analyses to achieve the goal.

B. Enhancement of image of "Prosecutors Offices" may start from effective promotions via media public relations

The findings of this study unfold that online voice concerning Prosecutors Offices rippled from "news media" to "forums". This explains that media public relations can be a starting point to improve the image of "Prosecutors Offices". And this brings to the question: which media platforms should be focused on from the perspective of public relations? Based on our analysis of the ranking of media channels, the top five having the greatest amount of online voice are "PTT Gossiping", "Yahoo News—Social Affairs", "Facebook-udn", "Yahoo News—Politics" and "Udn News". As to sentiment distribution, the top four channels are "PTT Gossiping", "Yahoo News—Social Affairs", "Udn News", and "Yahoo News—Politics". Negative sentiments accounted for more than 50% on each of these channels. As to the key opinion leaders, "Yahoo News", "udn News", "Apple Daily", "Legislator Huang Kuo-chang Facebook Page", "EBC News" are the top five channels with leading voice on Prosecutors Offices.

To sum up, whenever there was voice on the news or events relating to Prosecutors Offices on the aforesaid news channels, social media or forums, the society often paid high attention to them and many people showed their

interests in making discussions and expressing their viewpoints.　　Thus, these channels can be the platforms effectively improving the image of Prosecutors Offices. They are potential to help enhance the image and positive evaluations of Prosecutors Offices.　　It is argued that Prosecutors Offices can refer to the approach adopted by National Police Agency which has established a Facebook page titled "NPA Director Office" or similar approaches for image upscaling.　　Such establishment enables immediate communications with the public via a social platform, shortened gap between Prosecutors Offices and the public, and enhanced real-life security credited to Prosecutors Offices when there are unexpected incidents.

C. Effective online sentiment surveys on LEPO help improve appropriateness of countermeasures via media

As previously mentioned, word frequency analyses help find out words used at higher frequencies. Then, with the application of sentiment analyses, these words can be classified into positive or negative.　　For instance, negative sentiment relating to prosecutors accounted for 48.82% in this study, which is lower than 75.4% showing distrust in prosecutors conducting investigations according to the Crime Research Center of National Chung Chen University (2018).　　This study finds that around 38.63% of online voice might not carry emotional reflection or crisscross emotions so such voice was determined as neutral. Compared with traditional opinion polls,

this study is able to present better results in finding out the true sentiments and opinions towards special events involving Prosecutors Offices so as to map out more precise countermeasures upon establishing better public relations via media.   However, because supporting theories, definitions and concepts differ from each other in studies, it is not suggested to treat negative/positive sentiments reflected from online voice as the same thing as satisfaction or trust. Therefore, negative and positive opinions and sentiments reflected from online voice can merely serve as reference for making comparisons while discussing the issues about Prosecutors Offices that the public is concerned.

D. Value voice from grassroots prosecutors and improve vexatious litigation

Opinion polls made in the past could only present abstract satisfaction with judicial reforms but they failed to explain why the public was not satisfied or what reform they were not satisfied with.   With the application of big data keyword analyses on online voice, it is able to capture and substantially demonstrate the results and expected directions of judicial reforms.   This study finds that the issues of "vexatious litigation" and "rotation of prosecutors for the 1st & 2nd instances" gained public support on the Internet.   Online opinions not only condemned vexatious litigation but also supported the prosecutor to charge the female rider with malicious

accusation.   This reflected that people truly supported vexatious litigation. In addition, the event of "rotation of prosecutors for the 1st and 2nd instances" was closely associated with the reform within the prosecution system.   The exploratory conceptual analysis points out that together with "Prosecutors Offices", online voice also mentioned some closely related concepts such as "de-court" and "judicial independence reform".

The words and sentences used by the public captured by online voice analyses explain that the public were really concerned about the issues including the reform of vexatious litigation and grassroots prosecutors calling for realizing reform policies.   It is urged to continue paying attention to the voice from grassroots prosecutors and improve vexatious litigation.

E. **Stengthen Prosecutors Offices' image of justice and sever conceptual links between Prosecutors Offices and political disputes or miscarriage of justice**

The findings of the time-series analysis on negative sentiment in this study indicate that the sentiment reflected from online voice does not necessarily stand against the job or performance of the Prosecutors Offices carrying out investigations.   Such sentiment was usually a reflection on crucial political events.   In addition, it is hard to get rid of the stereotype the public has been holding for the judicial system. Despite prosecutors' strenuous efforts for making justice done, the observations still disclosed the

voice showing inseparable links between negative and positive sentiment.
Therefore, this study considers that the first task to improve the image of
Prosecutors Offices is to remove the conceptual link between Prosecutors
Offices and political disputes or miscarriage of justice.   For example, the
public would not associate police authority with political position,
miscarriage of justice or incompetent judges in terms of general crimes.   In
this case, what should be done to eliminate such biased conceptual link?
Take the event of "combat illegal fishing in Penghu" for example, the P/N
ratio illustrates that "media exposure" should be the key issue.   To be more
specific, a brand new image of justice for Prosecutors Offices can be
gradually re-established if the descriptions such as "leading the team in
person" or "sweating and shedding blood" could appear on the media at a
greater proportion than those showing Prosecutors Offices' involvement in
political disputes.   By closely watching for the percentage of positive and
negative descriptions exposed on the media, the biased conceptual link
between Prosecutors Offices and "miscarriage of justice" or "incompetent
judges" can thus be minimized little by little and turn blurred to the public.

**F. More evidence to be provided in future research on the
cause-and-effect hypothesis that "the public's confusion over
responsibilities held by judicial system contributes to reduced judicial
satisfaction"**

Some professional institutions and practical experts have pointed out that the public often confused prosecutors with judges in terms of their responsibilities according to long-term opinion polls on judicial satisfaction in the past.   Such public confusion might form people's negative impression on the performance of one role due to the improper law enforcement by the other. Consequently, prosecutors' hardwork and efforts were not fully reflected from the rising public opinions (司法院, 2017; 高榮志, 2016). However, the big data analysis in this study found that Prosecutors Offices differed from courts and police offices by quantity of online voice, spreading sequence of public opinions, online voice linear trend, social activity, and neutral and positive sentiments.   No significant evidence supported the cause-and-effect hypothesis that the public consistently expressed their negative evaluations on the judicial system because of their confusion of the responsibilities held by different roles in the judicial system.   In other words, even if the public confused the missions and job content of different roles in the judicial system, it's not a necessary factor contributing to decreased judicial satisfaction nor it's a barrier for the public to tell the differences between the roles in the judicial system. It is advised that future studies may continue work on this issue in order to find out more specific evidence.

G. Ministry of Justice and Prosecutors Offices should apply resources

and establish a set of mechanism and model for examining

self-efficacy in response to public issues in the Information Age

In response to the rise of the Information Age, the "word frequency analysis" adopted in this study serves as the first attempt to explore the descriptions and content about prosecutors' investigations on online news media and social platforms.　Calculations of the quantity of different types of words were made after word segmentation based on the text mined.　Various concepts and indicators were then compiled and organized.　By studying the nouns, adjectives and verbs possibly mentioned by the public, investigating co-occurrence commonly shared by different words or phrases, and relying on technical assistance, unexpected misjudgements could be removed before achieving more precise observations over public opinions on Prosecutors Offices.　The techniques and functions applied in this study were a preliminary test.　A new mechanism and model for examining self-efficacy is yet to be established by the Ministry of Justice and Prosecutors Offices in response to public issues in the future.

Meanwhile, there is one more aspect the authors would like to emphasize.　KEYPO is used as the major tool to mine online voice in this study.　With the application of the built-in functions provided by KEYPO, we were able to observe wave distributions of online positive and negative voice.　By looking into the time periods responding to wave crest and

trough, the important news in relation to Prosecutors Offices can be located.

However, this attempt was only an initial observation on the distribution that

rendered the information at a preliminary stage. The underlying public

opinions, either positive or negative towards a certain policy, cannot be

roughly determined merely by the findings of this study. This is because

there might be other uncertain factors during the same time periods that

interfered with the findings presented in this study. In other words,

confounding factors could be neglected and could not be removed if we only

looked at line graphs denoting online voice.

For eliminating noise as much as possible, time-series analysis is

carried out in this study. Raw data was retrieved from KEYPO followed by

time series analysis. It is expected to observe online sentiments towards

Prosecutors Offices in a way closer to reality after eliminating the noise by

time periods. Nonethelesss, significant error inevitably occurred in the

news event of "Frank Fu's assisted suicide" after eliminating noise in

advance with great efforts. In this case, public sentiment might be

influenced because of a prosecutor's help with necropsy and the people here

might regard that it was the prosecutor trying to do something for the family

after the key character in the news died. As a matter of fact, the prosecutor

mentioned in the event of Frank Fu's assisted suicide is not Taiwanese but

Swiss when Frank Fu headed to Switzerland for euthanasia. Positive online

voice was not uttered for any special performance of our prosecutors in Taiwan but for the news being something inspiring to the public.　The Information Age signals that our government authorities should delve into public online voice and its trend.　Therefore, it is proposed that the Ministry of Justice should keep up with the rolling of time to systematically invest in research resources for big data analyses and enhance machine learning for establishing online voice models so that the improvement of information crawling and accuracy for interpretation can be attained.　After that, it would be possible to configure a set of mechanism and model for examining self-efficacy in response to public issues.

VI.　Research Limitations

The value of academic research lies in neutral and objective analyses and evaluations.　Research methods may be advantageous in a way but flawed in another.　Reliable research teams are obliged to present both advantages and disadvantages existing in an approach to readers so as to highlight the objectivity and neutrality of the academic research.　Thus, the limitations to a research method should be clearly stated in the paper so as to meet the expectations of academic ethics.　Failing to explicitly explain the limitations would have readers misinterpret the findings.　On the other hand, it would become a major issue losing neutrality and objectivity for academic research if there is a violation against academic ethics.　Hence, this should

be fully and carefully dealt with.   This is also why "research limitations" is considered a very important section in a conscientious academic paper.   In the final part, the authors are going to describe the research limitations with the application of online voice surveys.

A. Online anonymous effect

The application of big data analyses of online voice enables the collection of comments related to every piece of news in order to further interpret if they are positive or negative.   In addition to analyzing the effects of online public remarks by opinion leaders, the anonymity and uncertainty of online activities have made it inappropriate or unable to identify personal information.   Therefore, the background information of the subjects being studied here is not covered in the research.   Variations among groups by gender, age and educational background cannot be explored.   The analyses on the news events as well as variations of public opinions could only be made from a macro perspective, which is one of the limitations to this study.

As a matter of fact, the anonymous system applies to the online activities in Taiwan.   This is also a common principle shared in the world. However, anonymity has become a cause which may facilitate extremely biased, discriminating, hostile remarks with unrevealed motivations or uncontrolled emotions.   By taking research ethics into consideration, it would be very difficult for studies on online voice to probe the above

mentioned factors respectively.   That is, biased or negative remarks are normal when the anonymous system is put into practice.   What should be done to differentiate or remove the causes leading to such negative remarks? Apart from overcoming this problem at a technical level, it seems that we are not supposed to do so from the perspective of the rule of law which offers protections for human rights.

The causes forming negative comments including extremely biased, discriminating and hostile remarks can be relatively complicated.   Users might be in a pretty upset mood or they assume only an extreme position could draw people's attention in the anonymous world.   Meanwhile, Cyberwarfare has become a type of war in the modern world.   The fact which has been an objective existence for years is that hostile countries or political parties may take the advantage of online opinions to attack each other.   Hence, general online voice surveys may contain many unnecessary, inaccurate or even intentionally misleading comments.   Consequently, it is not appropriate to identify the results from big data analysis of online voice as the only standard opinions for all people.   Such results can merely serve as a supplementary material or one of the references for government authorities to promote policies.

B. Internet penetration should be taken into consideration

Online voice surveys feature immediate user response, massive

response retrieving, reduced refusals from traditional polls via household calls as well as no selection bias of interviewees. From another point of view, users who prefer to express their opinions on the Internet, or are able to use a cellphone, a tablet and PC, or are offered better infrastructure of online communications are another specific group to be surveyed.

Namely, if online voice surveys are now a necessary research model, it would be balanced and proper to adopt other research tools to explore the true voice from the more disadvantaged groups who are not capable of using or buying a cellphone, tablet, or PC.

If taking traditional phone polls into consideration, the middle- and old-age groups who "were more likely to accept phone polls and major landline phone users" may not be a part of online voice. Therefore, while carrying out online voice analyses, the opinions may not be collected or hard to be collected from middle- and old-age groups, the economically disadvantaged, or those who live in an environment with poorer Internet infrastructure. The above dilemma may form another type of biased selection. While online voice can serve as a basis for a country to map out national administration policies, such barrier should be overcome or eliminated so as to maintain a balance or equality for government administration.

Based on the aforementioned, online voice is not adopted to infer the

overall public opinions in Taiwan for reaching the findings of this study.

The aim of this study is to probe Internet users' attitudes towards the issues

related to Prosecutors Offices so as to serve as a source supplementary to the

insufficient representation of traditional opinion polls on younger

generations.   Meanwhile, the authors are also aware of the trap of selection

bias arising from big data analyses and efforts should be made to eschew it.

C. **Online voice revealing doubt on parliamentarianism**

In terms of political theories, elitism and populism stand as opposed

two ends of the spectrum.   Populism is often thought as direct pursuit of

democracy.   Hence, under the frame of direct democracy, traditional

parliamentarianism would be skipped.   Instead, the voice directly uttered by

the public would become the dominant core to form national policies.

Online voice surveys are the most direct presentations of the opionions

reflected by the public.   However, online voice does not equal to populism.

It would be like this: how do government authorities interpret the

information and map out policies therefrom in response after they retrieve

online voice?   What this paper would like to remind is online voice and big

data analyses are scientific evidence in a way.   Research teams can utilize

objective software to collect online opinions before inducing opinion

orientation and finding out possible causes via scientific and quantitative

methods.   Unfortunately, this type of analysis ultimately stands for recourse

to emotions of the general public without considering anything in line with the society that is ruled by law.

That is, online voice surveys are indeed able to reveal some information. However, does online voice serve as the "only" (or extremely critical) assessment indicator for government authorities or ruling parties for policy promotions?   This is a condition which requires in-depth thinking.   After all, parliamentarianism under the constitutional structure cannot be easily eradicated.   The reconciliation and integration between public voice and parliamentarianism can be a direction for carrying out future research with the application of online voice surveys.

D. Favorability revealed from online voice shouldn't be mingled with satisfaction

Online voice surveys differ from traditional phone polls. Questionnaires can be designed before carrying out traditional phone polls. Interviewees only had to answer if they were or were not "satisfied" to certain questions.   Answering the questions exploring public satisfaction, interviewees normally gave a yes or no.   As the design of questionnaires varies, answers like "not very satisfied" or "extremely unsatisfied" may also be an option.   To summarize, researchers may receive precise answers from interviewees to certain questions via phone polls unless they refuse to accept

the interview or directly refuse to answer a certain question.   Under this condition, it is more likely to obtain stable results while carrying out phone polls for exploring public satisfaction.

There is an obvious gap between online voice surveys and phone polls. First, in phone polls interviewees were willing to "speak out" while online voice surveys are conducted some time away from the timepoint of event ocurrence by using monitoring software to retrieve users' remarks so as to determine if their opinions are positive or negative.   The researchers carrying out online voice surveys do not interact with the subjects being investigated who have made the remarks.   Therefore, the research could only be regarded as supplementary records.

Alternatively, it is a common phenomenon to see "discrepancy" between the truth and research findings in the process of online voice surveys. The above mentioned event "Frank Fu's assisted suicide" is a typical example in this regard.   The reason why "Frank Fu's assisted suicide" enjoyed more positive voice than negative is the word "prosecutor" appearing on news reports.   However, the prosecutor mentioned in the news does not refer to anyone in Taiwan but the one in Switzerland "making a debut" for necropsy.   Our prosecutors, who did nothing, had no connections with winning such positive online voice.   Therefore, if researchers fail to carefully tell the discrepancy, they would fall into a trap of misjudgments.

This example explains that a load of limitations still exist at the technical level of online voice surveys. In fact, positive online voice only demonstrated that the people making comments mostly used positive words towards the news in discussion. It cannot be "intuitively" considered that the public was "satisfied" with the performance of Prosecutors Offices. Positive online voice can only be explained as some positive feedback given by the general public towards a certain event and it cannot be interpreted at a broader sense that the public was satisfied with "most" or "all" of the actions taken by Prosecutors Offices. Therefore, explanations on the distinctions like the ones given in the above case should be made clear in a very cautious manner.

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