Preparing a Big Data Utilization Communication Strategy

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Abstract. Covid-19 pandemic has brought lot of changes to the world, including data production. This pandemic situation, conducting surveys and censuses in conventional way becomes too risky. In this pandemic situation, conducting surveys and censuses in conventional way becomes too risky. However, the community’s need for data is even greater as the public indeed has a great interest in monitoring the development of the social and economic conditions affected by Covid-19. Big Data becomes an alternative data source in meeting this need because it can provide a variety of data that we can process into very useful information quickly. The big data utilization for all fields as well as to inform the policy-making becomes very important nowadays. However, to make clear understanding and well public acceptance on the output of big data utilization needs effective communication strategy. There are five concepts to deliver excellent communication on statistics particularly to promote big data, namely extracting and describing insights from the pool of available statistics, market segmentation, forms of communication, channels of communication, and statistical description. This article proposes effective communication strategy to increase public acceptance and awareness on big data through different communication channels by targeting different characteristics of audiences.

1. Introduction

The Covid-19 pandemic has changed many things in the world including the business process in producing statistics. Collecting data in the field becomes a big risk in transmitting Covid-19 to both the public and data officers. National Statistical Office (NSO) requires a variety of other alternative data sources for producing data and information in response to data needs. One alternative data source is big data.

Doug Laney (presently with Gartner) described big data through three Vs, namely, volume, velocity, and variety. The term of volume describes to the size of data, velocity describes to the speed of incoming and outgoing data, and variety refers to the sources and types of data. Commonly, big data is a collection of large amounts of complex data that cannot be managed efficiently by the state-of-the-art data processing technologies [7]. Various kinds of digital traces on the internet become big data that can be used to obtain information when making policies without having to go to the field. Advances in mobile devices, digital sensors, communications, computing, and storage have provided means to collect data [5].

In the era of big data, data can be accessed by anyone and for any purpose. The big data approach emphasizes the use of a combination of deductive and inductive approaches. The combination of the two approaches will produce a good understanding of a phenomenon. [26]. The use of a deductive approach in the context of big data aims to find hypotheses and knowledge from data "born of data rather than..."
born of theory" [12]. The inductive approach is used to explain previously outstanding theories or findings. The elaboration of this research approach illustrates the epistemology of big data.

The application and development of the use of Big Data has been carried out by the United Nations (UN). UN created The Global Working Group (GWG) on Big Data for Official Statistics in 2014. The UN GWG provides strategic vision, direction, and coordination of a global programme on Big Data for official statistics, including for indicators of the 2030 agenda for sustainable development. The UN GWG established task teams on the following topics; "Advocacy and Communication", "Linking Big Data and the Sustainable Development Goals", "Access and Partnerships", "Training, Skills and Capacity building", "Cross-cutting issues", "Mobile phone data", "Satellite imagery" and "Social media data".

Some of national statistical offices (NSO) in the world using Big Data to support official statistic. Until recently, the Australian Bureau of Statistics’ (ABS) progress in Big Data domain has been primarily review and monitoring of industry developments while contributing to external strategic and concept development activities [28]. Office for National Statistics (ONS) in UK publishes a lot of Big Data works like using data science for the address matching service, aerial imagery, mobile phone data, analysing low electricity consumption using DECC data, using geolocated twitter traces to infer residence and mobility, and many more.

In Asia and the Pacific, BPS Indonesia has started using signalling data from mobile phones in the production of its cross-border inward tourism statistics for those cross-border areas where there is no immigration office collecting data on cross-border tourists [21]. This work was then expanded into all cross-border inward tourism to validate official statistics produced using traditional data collection methods. Various studies in the use of big data including google mobile index data, aviation statistics, air quality index, marketplace [13], have been initiated.

Developments in data technology are not matched by public understanding of the data itself. Key trends have impacted the information market lately, spurred by technology developments, data commoditization and data services availability, and changes in information consumption modalities. But at the same time, the emergence of the ‘post truth’ world was certified by the inclusion of this term in Oxford Dictionary [2]. ‘Post-truth’ is relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief. According to Joussairi [11], Indonesia and several other developing countries are still data-blind (data illiterate) and drown in authoritarian-verbal culture despite marginalized the measurable pattern of communication.

Therefore, behind updating the methodology and data that we produce, a communication strategy is needed to reach the wider community and build people's understanding of the importance of big data. Communicating statistics is a fundamental and legitimate responsibility as part of the transparency and accountability objectives of institutions engaged in official statistics and to crowd out low quality statistics and cyclical sentiment based policy strategies [17]. Communicating statistics is a mandatory obligation for NSO regarding transparency issue or data statistics access openness. Furthermore, a standard legal education does not include rigorous training in statistics or the evaluation of scientific evidence [32]. Then the communication should be conducted seriously, with clear and helpful explaining principles, as the users and stakeholders of statistics are wide and diverse.

Martin C and MacDonald [15] said that today many science communicators are using social media to share scientific information with citizens, but, as research shown, fostering conversational exchanges remains a challenge. Plowman and Wilson [20] said that practice of public relations increasingly includes the use of social media, it is only natural that strategic communication process in form their use. Research on the social media phenomenon has demonstrated that platforms and participation have been growing rapidly. Not surprisingly, many of these social media channels are those most commonly adopted by organizations for public relations purposes [31]. Other studies on communication using social media have also been conducted, such as in the health sector, Fontaine [10] said that communicating findings of health research to the public is crucial to support self-care and to inform governmental decision making. Health scientist play a growing role in science communication with the growth of digital and social media.
As a result of the massive migration of Internet-users to social channels. This study proposes a communication strategy of big data awareness, capacity building and analysis dissemination by utilizing different internet-based communication channels, such as YouTube, and other social media.

2. Methodology

The lack of a proactive communication strategy may well have contributed to the steady and continuous reputational loss and trust in statistics, in its profession and in those statistical agent engaged in developing methodology and producing reliable and comparable national and international statistics, as a public good for sound and sustainable decision making. Statistician need to use their conceptual business knowledge and information gathering skills to build an user-centric communication strategy, seeking to understand user’s needs, the barriers they face and their working process [17]. Communicating statistics is a mandatory obligation for NSO regarding transparency issue or data statistics access openness. Furthermore, a standard legal education does not include rigorous training in statistics or the evaluation of scientific evidence [32]. Then the communication should be conducted seriously, with clear and helpful explaining principles, as the users and stakeholders of statistics are wide and diverse.

2.1. Communication Strategy

This study will prove how effective the use of social media is in communicating Big Data. Social media such as Facebook and Instagram have statistical information on each content created. Information about Big Data will be presented into interesting content in the form of comics, graphic videos and booklets. The content will be displayed on social media, Facebook and Instagram. To ensure that the big data content presented has good statistical communication criteria, all big data content is confirmed to meet the statistics communication function. According to Nyman and Andersen [17], statistics communication function relates predominantly to five main components:

- Extracting statistics intelligence in context from the pool disseminated/available statistics (the what);
- Applying tailored market segmentation (to who)
- Using various communication concepts and forms (the how)
- Applying multiple communication channels (the which)
- Descriptions and applying statistics knowledge (why)

2.1.1. Extracting Statistic Intelligence in Context

The statistics continue to evolve over time as is big data. The understanding gap about data in society between statisticians and layman will widen. Here the role of statistics is needed in communicating the resulting statistical developments including the development of big data. The important issue is to acknowledge is that the “Statisticians are best placed”, as producers of statistics and with their statistics knowledge of the business and applied methodology to guide layman to the most relevant set of statistics [17].

Publication of the resulting statistics must be accompanied by a methodological explanation in simple language so that it is easily understood by the layman. Reducing difficult technical terms can help ordinary people understand the statistics. According to Nyman-Andersen [17] The statisticians have the obligation to communicate, by extracting the relevant information in context and providing descriptive statistics using common language, explainers and narratives tailored to core user segments, which are grouped according to similar homogeneous needs.
2.1.2. Market Segmentation

The need for segmentation arises from the recognition of the diversity of users. A market segment is a group of individuals, groups or organisations who may the same interest, traits, and characteristics. Market segmentation is actual process of identifying segments of the market and the process of dividing a broad customer base into sub-groups of consumers consisting of existing and prospective customers [6]. Data users have various data needs according to their respective interests. By knowing the characteristics of each data user, we can group data users who have similar characteristics. By knowing this, an effective communication strategy can be built. There is a clear need for the statistical community to define its segmentation strategies, and its criteria for grouping users into homogeneous groups of similar needs and serve these needs [17].

2.1.2.1. Professional User

According to Nymand-Andersen [17], the segmentation of professional users (also called “power user”) needs for central banking statistics is divided into nine:

| Professional user segments   | General characteristics of their user needs for statistics                                                                                                                                                                                                                                                                                                                                 |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Financial analysts           | Need for more detailed statistics information and the ability to compare statistics with other sets of statistics, including from other geographical areas. Easy for the professional financial analysts to find the available statistics when they are organised and structured according to key economic and financial concepts using general economic/statistics textbook wording. Statistics should be presented by providing a high-level overview of core statistics (most frequently used) with the possibility to drill down into the statistical details. Each statistics subject section should cross-reference to methodology concepts, guidance notes. Each statistics subject should present statistics using combinations of descriptive text, graphics and statistics and it should be easy to “copy and paste” graphs and underlying data. |
| Research Centers and Think tanks | In addition to the needs of financial analysts, the research community have a need to work with long time series and to be able to (i) select, (ii) view, and (iii) create new indicators (and save the indicators, which have automatically updated values) based on combining existing statistics, (iv) create tables and graphs, including (v) descriptive statistics and trends analysis, and (vi) “copy and paste” produced tables/graphs. Researchers should be able to transform statistics into lower/higher frequencies using basic techniques, to estimate missing values using the statistics distribution and characteristics of the relevant statistics series, and to perform seasonal adjustments. The researchers should have the possibility to easily download statistics series and results in a format that can be read directly by other professional software packages, and should be able to transpose and order variables and time dimensions. |
| Professional user segments | General characteristics of their user needs for statistics |
|---------------------------|---------------------------------------------------------|
| Commercial and institutional data vendors | High volume and frequent data users/vendors are redistributors of statistics and are able to reach a large community of users, with tools and functionalities which are familiar to the clients. Data vendors need to extract large numbers of statistical series and their corresponding metadata. They are interested in all publicly available statistics. The demand for subject type statistics is fairly well distributed with no specific preference for a specific type of statistics. Data vendors have expressed the need for a fully automatic download facility (machine-to-machine) so as to frequently update their own computer systems and for making statistics available to their large client base. |
| Journalists and media | Time is of importance. Statistics need to be easily presented with a clear overview of what is new. Is there any news in the latest statistics – is the latest value high, low, above average? Are we at a turning point, how does the value compare with other countries, economic areas? What is the story? New releases need to be communicated in advance. Direct links within press releases to the underlying series. Presenting statistics by combining descriptive text, statistics and graphs according to economic concepts and subjects. |
| National and European politicians and political advisers & spin doctors | Statistics need to be easily presented visually with a clear overview of the main trends including examples of the main statistics descriptions and findings. Statistics needs to be presented in comparable terms (indexed, growth rates indicating absolute values). The official statistics should be presented in context and offer methodological advice as applicable. |
| Universities and higher educations | The universities and higher educations need statistics and metadata both as part of the lecturing on economic, financial and statistics matters and for students as part of drafting reports and thesis. This user group contains therefore two parts: One for lecturers who are highly educated and theoretically strong though less digital experienced and needs to be served with statistics and methodological notes. The other group are students of higher educations who are highly digital native and need support in understanding the methodology and the variations of statistics. Common for both is the need to work with long time series and to be able to (i) select, (ii) view, and (iii) download statistics into other software and with the feasibility to continue updating the statistics without needing to restart from scratch. |
| Banking supervision users | This external user group has the common interest to follow the Banking supervisions work and available statistics. This user group is mainly the banking industry itself but also external consultancy firms providing advice to the banking industry. The user request for statistics is different in scope and content from the monetary policy function of the ECB and 9 relates to supervisory related statistics. This market segment can be broken down into subsegments once further experience has been gained on their profile, working processes and specific needs. |
### Professional user segments

| Reporting Institutions | General characteristics of their user needs for statistics |
|------------------------|------------------------------------------------------------|
| This is the population of entities which are contributing input to the provision of statistics. Serving these users helps to ensure the quality of statistics reporting, the willingness of reporters to contribute and their ability to compare themselves with similar types of reporters (market shares and changes). |

| NSIs, IMF, G20, BIS, OECD and similar International Organisations | This is likewise an important user community as part of sharing methodology, standards and reporting templates as to ensure consistency of statistics at international level. The need relates to sharing large scale machine-to-machine statistics and metadata and to time the availability of according to detailed release calendars. |

#### 2.1.2.2. Common People

One of the biggest problems in a developing country such as Indonesia is the society’s low awareness of the data. According to Jousairi [11] Indonesia and several other developing countries are still data-blind (data illiterate) and drown in authoritarian-verbal culture despite marginalized the measurable pattern of communication. thus, the false news (hoax) are easier to spread among the society in the developing countries. Wright [31] mentioned that educational institutions, statistical offices, statistical associations, and the media are several actors that are able to contribute to statistical literacy. To build a data-driven culture, it is necessary to build data literacy in society. We need to segment society outside of 'power users’ in creating communication strategies to build data literacy.

According to Mark Anthony C [6], the traditional variables that may be used for market segmentation can be grouped into five main categories: (i) Demographic; (ii) Geographic; (iii) Psychographic; (iv) Behavioural; and/or (v) Product-Related Factors. Some social medias provide statistical information about their followers such as Facebook, Instagram, YouTube, and so on. By understanding the characteristics of each segment of the target information, we can create content that is relevant to their characteristics. For example, in the age segmented demographics, people with children's age prefer colorful visual information content in simple language. Meanwhile, people with older age tend to choose language that is more formal and informative.
Figure 1. Statistics of users by Age Group, Gender, and place in Big Data BPS Page (source: Facebook)

Figure 1 is a graph of the statistics for Facebook users reached from posts on the BPS Big Data Facebook Page. The figure proves that social media is the right place to communicate big data to the 25-34 years old segment. Such information helps making content suitable for that age group. We can also find out information about where the followers live, the city level, and the language used. From these statistics, we can also know that it is not effective to build big data literacy for the segmentation of children and adults. Some of possible strategies need to be drawn up, such as visiting schools for promotion, distributing leaflets, or using other media such as television.

2.1.3. Forms of Communication

The way in which statistics are presented is vital in facilitating the users’ understanding of the statistics, and in enhancing their usability: they must be presented according to the needs of the various user segments. There are sample tools available on the market to assist statisticians in this regard, such as web-based movies, interactive tables, new graphical tools (info-graphics statistics) and tools enabling the users to “slice and dice” statistics, touch-screen gadgets, and mobile technology. Visualizations and infographics are useful tools to assist the statistician in communicating statistics [17].
Analytical and critical thinking about statistics are therefore necessarily to be build. Versaci [29] mentioned that both skills can be developed through comics. Comic is a sequential art [9] that integrate visual and verbal communication simultaneously [8]. The vividness of comics helps conveying impactful messages with strong story telling [13]. Sones [27] stated that comics employ a language that apparently is almost universally understood. No wonder if comics could attract reluctant readers [1]. Marianthy, Boloudakis and Retalis [14] have made a summary about the strength of comics in literacy program from various sources, i.e.: motivating, visual, permanent, intermediary, popular, and development of thinking skills.

Figure 2. Infographic of Flight Data using Big Data (source : infographic BPS)
Figure 3. A comic promoting of Big Data for millennials and z generations

According to Global Digital Reports July 2020 by Hootsuite and ‘We are Social’, 54% female and 53% male are spending more time watching more shows and films on streaming services due to covid-19. 16% people are spending more time creating and uploading videos on each activity due to covid-19. Video is one of the most popular media today. Making big data video content and publications a good choice in communicating big data to the public.

Therefore, presenting statistics visually should therefore be prioritised and recognised within the field of statistics. Writing short scripts and producing statistics video and interactive publications are also useful statistical tools [17].
Figure 4. Videographic and podcast Big Data

Figure 5. Booklet Publication of Big Data
2.1.4. Communication Channel

According to Nymand and Andersen [17], statistics has to be communicated using multiple and supplementary or even partially overlapping communication channels. There is a general paradigm shift in the use of communications channels, moving from traditional communication channels to using more electronic and digital media channels.

Table 2. Illustration of traditional channels and supplementary digital communication channels.

| Traditional Channels                        | Digital (Electronic) Communication channels                                      |
|--------------------------------------------|-----------------------------------------------------------------------------------|
| Articles, booklets, etc. on statistics      | Electronic publishing (e-reading on electronic devices)                            |
| Paper-based publications – publication offices | Dedicated internet websites (e.g. statistics portals – one-stop electronic shop) |
| Conferences, seminars, workshops, etc. on statistics | Video, movies, documentaries on statistics (YouTube channels)                     |
| Economic/financial magazines                | Internet search optimisation, tagging statistics                                   |
| Press releases                             | Tablets, smartphones and handheld devices                                         |
| Speeches and briefings                      | Visualisation icons                                                               |
| Press conferences                          | Dynamic visualisation and info-graphics                                            |
| Newspapers (both mainstream and specialised) | Widgets to embed/refer to statistics in external websites and electronic/social me |
| Posters at specific events                  | Electronic games and cartoons                                                     |
| Radio                                       | Electronic replication of statistics graphs and charts, news                       |
| Institutional websites                     | Electronic automatic translation services                                         |
| Statistics hotline                          | Interactive and searchable databases                                              |
| Television news                            | Building application programming interface (API) - Electronic Data Interchange      |
| Regular radio programmes                    | Webinars                                                                          |
| Other traditional channels                  | RSS and news feeds, direct e-mailing                                              |
|                                            | Social media, of which (as examples):                                             |
|                                            | · Twitter, Wikis, video-sharing websites                                          |
|                                            | · Social media related to statistics                                              |
|                                            | · Facebook                                                                        |
|                                            | · Blogs                                                                           |

Based on 2020 Global Digital Report by Hoosuite and We are Social, per July 2020, active social media users in the world have reached approximately 3.8 billion users or about 49% of world population. In Indonesia itself, the active social media users per January 2020 is about 160 million users or about 59% population of Indonesia. On average, Indonesian people spend approximately 3 hours and 26 minutes for Social Media. However, amongst all social media, Youtube is the most famous social media...
platform with 88% access by Internet users aged 16 to 64 in Indonesia. Nowadays, social media is the most effective and efficient communication tool.

Some of the social media used in this study include Facebook, Instagram, and Youtube. Each social media has unique demographic characteristics of its users. Each type of social media has its advantages and disadvantages. Martin and MacDonald [15] said that Instagram more readily supports the implementation of interpersonal communication strategies than Twitter, making Instagram the preferred platform for promoting conversational exchanges.

Figure 6. Page Big Data BPS on Facebook
Figure 7. Live Youtube Social Media Analytics for Big Data Official Statistic

Figure 8. Sharing knowledge through zoom about big data
2.1.5. Statistical Description

According to Nymand and Andersen [17], statistical users compare and provide cross-country analysis between geographies and / or economics. Although the same statistical concepts are used in international statistics, methodology applied at the national level sometimes in contrast to international standards and reporting which will have an impact on international statistical comparisons. the best way to address the comparability deficit is to highlight methodologies deviations in the meta-data and to reflect the methodology applied in many footnotes and end notes.

3. Result

From the various communication content that has been created and posted on social media that has fulfilled all the main components of the statistical communication function, we can see how much people can be reached. Social Media provides statistics on the posts we made. We can see how well we communicate the big data from the posts we made. With these statistics we can evaluate how the communication we build with the community is going well or not. The statistical figures obtained will be displayed based on the type of information content created, namely comics, videographics, and booklets.

3.1. Comic Big Data

The Big Data comic posted on Instagram managed to reach 27,462 accounts in one week since it was posted. The impressions that were successfully obtained were 31,645 times opened. Besides that, Big Data comic received 2,426 likes and 59 shares. Readers provide various comments on Big Data comic posts. 64% of comments are positive, the public likes big data education in comic form, 23% is neutral, and 13% is negative. Negative comments lead to public criticism of the government in handling Covid-19. This usually happens when the statistics that we discuss relate to current issues in government.

![Sentiment Analysis](image.png)

**Figure 9.** Sentiment Analysis Result Instagram
On Facebook, the number of accounts reached was 6,185. There were 73 reactions in Big Data comic posts. This shows the enthusiasm of the public in big data literacy through comics.

![Comic Big Data performance on Facebook](image)

**Figure 10.** Comic Big Data performance on Facebook

Nowadays, comics for promoting statistics philosophically is still a rare case. People with positive opinion have given full support to conduct statistical literacy using comics. Comics could help lessen the burden in statistics learning [23].

### 3.2. Videographic Big Data

Big data videographics contain information about the methodology used in collecting various data from big data. Video graphics about Big Data communication content on Instagram managed to reach 21,393 accounts and impressions of 24,872 accounts. Apart from that, it got 269 likes. Video graphic content is quite liked by Instagram users, but for many people comics are preferred because they are considered to have a simpler format.

### 3.3. Booklet Big Data

Publications on the findings of Big Data are compiled in a booklet which is designed to be simple and attractive so that it is easily understood by the wider community. Some of the Big Data information that has been published includes Google Mobile Index, Air Quality Index, Flight, and the marketplace during the Covid-19 pandemic. The booklet publication ‘big data review of the impact of covid-19’ ranks fourth
with the most hit views during 2020 on the BPS website. Big data publications have received a total of 20,464 views.

Table 3. Hit View of BPS publications on BPS official website

| No | Publikasi                                       | Tgl Rilis | Hit View |
|----|------------------------------------------------|-----------|----------|
| 1  | Hasil Survei Sosial Demografi Dampak Covid-19 2020 | 1/6/2020  | 49,700   |
| 2  | Statistik Indonesia, Penyediaan Data Untuk Perencanaan Pembangunan | 28/2/2020 | 45,752   |
| 3  | Statistik Indonesia 2020                        | 29/4/2020 | 38,664   |
| 4  | Tinjauan Big Data Terhadap Dampak Covid-19 2020  | 1/6/2020  | 20,464   |
| 5  | Pendapatan Nasional Indonesia 2015-2019         | 12/6/2020 | 17,702   |
| 6  | Laporan Bulanan Data Sosial Ekonomi Januari 2020 | 13/1/2020 | 13,900   |

4. Discussion

4.1. Social Media Maintenance
One of the hardest parts of building literacy is consistency in the maintenance medium. Visitor traffic on social media must be able to maintain content continuously. We have to look at the right time to post as well as answer various questions raised by the public about data. The new Facebook Big Data fan page was created at the beginning of October and has increased the number of followers quite well.

![Figure 11. Growth in the number of followers on Facebook big data (source: Facebook)]
Having official social media account means that NSO must be prepared to face people directly. There will be a lot of people that give their comment in the post. It varies from the inquiries, positive feedbacks, as well as negatives. Furthermore, the social media administrators must be responsive and of course, careful in answering. Because every answers from administrator is seen by people whom are accessing the social media. It is also needed to make branding regarding what kind of official account that is going to be built.

We must define our target users when set up our contents. People aged 18-34 years old are the most effective social media users to reach. People under the age of 17 are good targets for investing in statistical knowledge but we need to be able to tailor content that is appropriate and fun for teens and children.

Big data is still new knowledge for common people, but building the importance of literacy about big data in society in this digital era is very important. Knowledge and technology are constantly evolving. The community is expected to be ready to face all changes that occur, including the development of science.

5. Conclusion

Social Media is an alternative communication tool that is effective and efficient. By following the five main components of the statistical communication function, big data information content for the public can be conveyed effectively and efficiently. To promote big data to the public needs to build a dissemination strategy that fits different characteristics of the target audiences. The strategy includes providing infographics, video graphics, booklets, and learning videos, through different media platforms. To attract the millennials and z generation, knowledge transfer through popular social media such as Instagram and YouTube is preferable. Furthermore, to reach out the academics and the general public, web-based seminar is the best option.

The next study will explore more about what types of social media content are most in demand by social media users. By understanding this, the information we provide will reach a wider community. Big data literacy in society will be well developed.

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