

Developing the government COVID-19 website: Lessons Learned from Jakarta

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Abstract— Almost all countries obtain significant and multidimensional challenges of COVID-19. Various countries possess varied responses and policies regarding COVID-19. Since the Indonesian government affirmed COVID-19 a national emergency on March 2, 2020, it is necessary to have official information that can be accessed by the public, which at that time did not yet have the Central Government Website. Moreover, the importance of the availability of public information/data contained in official online pages can be used by governments to formulate data-based policies. Jakarta is a pioneer in developing a government website related to COVID-19. This paper provides lessons learned from developing an official COVID-19 website of the Provincial Government of Jakarta. This paper outlines different aspects of developing an official COVID-19 website and an ideal solution to the challenges involved in developing one. This paper uses agile development methods as an evidence base to develop a website. The most interesting finding is that the corona website has been successful in attaining 27,569,404 visitors, 120 collaborators who donate 151,567 pcs of social aid. This finding confirms that this study provides a better understanding of common elements in building an official COVID-19 website. The no-nonsense method of developing an official COVID-19 website can be easily replicated and followed by other cities to consider the model in developing a similar website.

Keywords—COVID-19, smart governance, website, agile development, lessons learned, Jakarta

I. INTRODUCTION

Nowadays, the world is facing a pandemic because the coronavirus disease 2019 (COVID-19) has spread across the globe with formidable speed, infecting millions, and causing economic disruption on an unprecedented scale [1]. COVID-19 is distributed throughout all regions in Indonesia, including Jakarta, with the highest prevalence experienced challenges [2]. There are various information and regulations that have been issued by the government for preventing COVID-19 transmission, and it is expected that the public can comply. There is increasing concern that some medical misinformation and unverifiable content of the global COVID-19 pandemic are being propagated at an alarming rate on social media accounts and websites [3] [4]. Based on

previous research, reliable information on the COVID-19 pandemic is essential to improve everyone's awareness and understanding [5]; also, there is a correlation between knowledge and attitudes in dealing with the COVID-19 pandemic [6] [7] [8]. Knowledge is an essential factor for forming one's attitudes [6] consequently the government plays a vital role in developing community mindsets through qualified and credible information for combating the COVID-19 [3] [4] [9]. As a result, it is necessary to have official information that can be accessed by the public, which at that time did not yet have the Central Government Website. In line with Internet usage which is rapidly increasing along with the widespread penetration of smartphones and the development of information communication technologies (ICTs), since March 6, 2020, Jakarta is pioneering to develop a government website related to COVID-19. This condition provides a promising opportunity for the government to develop an official website in contributing to and supporting the health system in general and national surveillance of COVID-19 in particular. To this end, an official website for COVID-19, corona.jakarta.go.id, was created as a result of a collaboration between Jakarta Communications, Informatics and Statistics Office through Jakarta Smart City, Jakarta Health Office, and Jakarta Spatial Planning and Land Administration Office which provides easy access public data, information and knowledge about COVID-19 in Jakarta to the citizen [10].

This paper aims to provide a lesson learned with solid bases to develop an official website in government agencies that can be adapted to other cities, especially in Indonesia. This paper can constitute useful guidelines when dealing with the generic task of COVID-19 official website development. The rest of this paper is structured as follows. Section 2 describes the background of this study and related work, followed by the features of the corona website. Section 4 provides the method of web development, and the results and analysis will be presented in section 5. Section 6 discusses some lessons learned in the development of the corona website. Finally, the last section presents the conclusion.

II. BACKGROUND AND RELATED WORK

The building of the corona website is motivated by the continuously increasing number of people affected, public anxiety, and the need for legitimate information about COVID-19. Also, a strong motivation to develop the corona

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website is Jakarta has become the centre of COVID-19 spreading, and there was no adequate official website of the central government even though there was a website of the Ministry of Health. On the other hand, the existence of existing websites from the central government is felt to be less representative and not user-friendly compared to other countries' websites. Table I explains several websites from several cities in the world. This is a motivation and energy for the Jakarta Government to be able to provide information and education services to the public related to COVID-19 in the form of a reliable, informative, up-to-date, and user-friendly website.

Table I. Corona Websites Reference in Other Cities

City	Description
Jakarta, Indonesia	Has an official online page (https://www.corona.jakarta.go.id/id) Displays interactive (percentages, maps, and graphs) and real-time data, such as the number of positive cases, suspects, recovered both in Jakarta and nationally
Berlin, Germany	Has an official online page (https://www.berlin.de/corona/en/measures/) There is no interactive data on the official online page
Washington, D. C., US	Has an official online page (https://www.coronavirus.dc.gov/) Displays data such as the number of citizens who took the test, the number of positive cases, recovery, and death. Data also includes percentages, graphs, interactive maps.
New Zealand	Has an official online page (https://www.uniteforrecovery.govt.nz/) Displays data such as the number of citizens who took the test, the number of positive cases, recovery, and death. Data also includes percentages, graphs, interactive maps.
Beijing, China	Has an official online page (https://www.ebeijing.gov.cn/feature_2/MultilingualInfoonNCP/) Displays the latest data on COVID-19 cases that are updated daily. Contains data such as the number of positive cases, death, and recovered patients.

There are several large cross-sectional studies relating to website development. These studies have similarities and differences in the characteristics of this paper. Manuputty *et al.* [11] discussed how to develop government information systems for research permit application with the agile method and website based Laravel framework. The agile method is used for system design that successfully delivers user-centric design. In contrast, the laravel framework is used for backend system development since it is a free, open-source PHP

framework and easy to use for developers. T.S. Shiny Angel *et al.* [12] compare the website development using two different models: the traditional or waterfall model and the agile model. The results prove that the performance of the agile model is more suitable for website development, compared to the conventional software model in terms of time and cost.

III. WEBSITE FEATURES

This section provides features of the government COVID-19 website in Jakarta (corona.jakarta.go.id), as follow:

Home

Home is one of the features on the corona.jakarta.go.id website which contains all the latest information about COVID-19 such as information on COVID-19 symptoms, monitoring data for COVID-19, how COVID-19 is transmitted, things that must be done to prevent COVID-19, contact list of COVID-19 emergency telephone services, and many more publications about COVID-19.

Data

This feature contains comprehensive data about COVID-19 cases based on the report by the Jakarta Health Office, which has been reported to the Indonesian Ministry of Health. There are two sub-menus which are Monitoring Data and Data Visualization. This feature can be accessed on <https://corona.jakarta.go.id/id/data-pemantauan>. Monitoring Data is the centre for data transparency based on monitoring cases of COVID-19 in Jakarta, it shows 26 categories of data using tableau that inform the public such as the total of National and Jakarta confirmed cases, the total and the graph of suspect, probable, travelling patient, close contact, discarded, the total of rapid diagnostic test and PCR test, the graph of COVID-19 funeral and the positivity rate table of laboratory result.

Data visualization will display visualization in the form of a dashboard using the google data studio tool. The dashboard is a complement to the Jakarta Health Office's COVID-19 data. In this dashboard, external or public data sources are also used to enrich the results of the visualization. The dashboard helps the public to understand the impacts and progression of air quality, community complaints related to COVID-19, traffic congestion, the spread of COVID-19 in Jakarta during the on-going pandemic.

Map

There are four sub-menus on this feature. The first one is the case map that used to spot the spreading points of COVID-19 cases in Jakarta. This feature can be accessed on <https://corona.jakarta.go.id/id/peta-kasus>. The second is the chronological map that is used to trace the chronology and display a history of locations visited by COVID-19 patients. The third is a map of the spread, powered by ArcGIS Map of Jakarta Spatial Planning and Land Administration Office, that is used to display urban villages area affected by COVID-19. The fourth is the control zone map that is used to display strict control areas.

Collaboration

This feature contains detailed information about large-scale social collaboration (KSBB) which is designed to matchmaking people who want to make donations and who are vulnerable because of COVID-19. This feature can be accessed on <https://corona.jakarta.go.id/id/dasbor-ksbb>. There are five sub-menus on this feature: KSBB Pangan, KSBB UMKM, KSBB Dashboard, KSBB Platform, Collaborator. KSBB Pangan is an information centre regarding donation program for Jakarta citizens; it displays information about how to donate, contact a list of authorized donation partners, and donation packages. KSBB UMKM is an information centre regarding donation program for small-medium enterprises in Jakarta; it displays information about how to donate, contact list of collaboration aggregator partner, and donation packages which is applied into three kinds of packages; hygiene and health equipment facilities, capital loan, and training package. KSBB Dashboard is a summary of data on the collaborators and aid distribution. KSBB Platform is a platform for prospective collaborators to participate in Jakarta, it displays information about KSBB Program that is currently underway, map of locations in needs, and take part in donating to specific locations. Collaborator sub-menu contains a list of aggregators and collaborators who contribute to the KSBB Program.

Social Aid

This feature contains information about the COVID-19 social aid program from the Jakarta provincial government to vulnerable families affected by COVID-19 during large-scale social restrictions (PSBB). This feature can be accessed on <https://corona.jakarta.go.id/id/informasi-bantuan-sosial>.

There are two sub-menus on this feature: social aid and distribution. About social aid contains information regarding social aid provided by the Jakarta provincial government to vulnerable families affected by COVID-19. The distribution contains data and graphics about social aid distribution in Jakarta. It helps the public to monitor the area of social aid and masker distribution during PSBB.

Corona Likelihood Metric (CLM)

This feature is used to provide information about CLM. It is a self-assessment application using machine learning technology. This feature can be accessed on <https://corona.jakarta.go.id/id/clm>. CLM is designed to help citizens measure their risk of being positive for COVID-19 and recommend what they should do.

Information

There are four sub-menus on this feature. The first one is the policy that is used to inform the Jakarta provincial government policy timeline regarding COVID-19 response. This feature (information) can be accessed on <https://corona.jakarta.go.id/id/publikasi>. The second is a publication that used to view and download information in the form of infographics and documents about COVID-19 in Jakarta. The third is a frequently asked question (FAQ) that contains questions and answers about COVID-19 pandemic, PSBB protocol, and COVID-19 transmission prevention guidelines.

IV. DESIGN AND DEVELOPMENT

The agile development method of corona website project development was adopted, as shown in Figure 1. The developer focuses on various aspects to build the corona website so that it can provide satisfying experiences to users [22-25]. Those design and development aspects can be described as below.

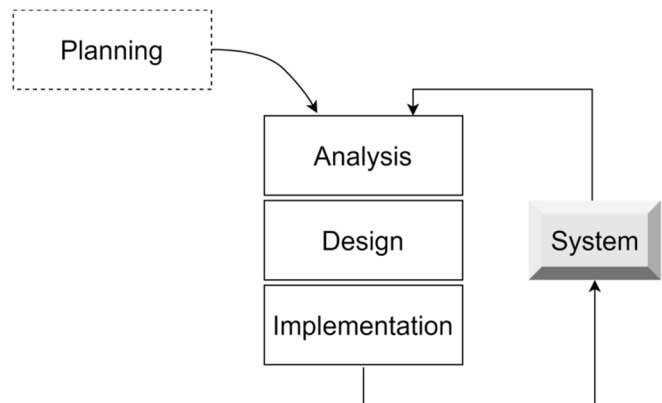


Fig. 1. The agile development method of corona website project development

Requirements

In developing the corona website, this project begins with identifying the system requirement through focus group discussions conducted between stakeholders along with feasibility analysis. It represents the requirements for the system solution which will be developed, namely functional and non-functional requirements. A functional condition is the main requirement of a system that plays a direct role in the organization's business processes. In this corona website, it includes accessibility, capacity and compatibility.

Accessibility: The system can be accessed well by a broad audience by using PC hardware, laptop, or mobile connected to the internet with no operating system limitations. It is also mandatory to use Google Chrome or Firefox browser software to access the web.

Capacity: The system can store and display various information in the form of graphics, maps, well-visualized images so that hardware with 16 GB RAM, 16 CPU cores, and 50 GB hard drive capacities are needed.

Compatibility: The system can be integrated with a database owned by the Jakarta Health Office and the Spatial Planning and Land Administration Office to produce statistical visualization reports related to COVID-19 in the form of an interactive dashboard for further observation.

Further, the non-functional requirement relates to the performance of the website, as follows:

- Operational requirement: The system is a web application created using CentOS 7.
- Performance requirement: The system can complete a loading time of approximately 1.5 seconds and can be accessed by many visitors.

- Security requirement: Standardized mechanism or flow process. It adapts the security architecture design with ISO 27001 standards.
- Cultural and political requirement: The default display of the system interface is in Indonesian, but it can be changed to English with the translation feature provided. The Indonesian Ministry of Health standardizes the statistical data produced by the Indonesian language system and other health terms. The time zone used is in WIB (GMT + 8).

Taken together, these requirements suggest that the development team needs to analyze first regarding both functional and non-functional requirements. The result of this analysis was obtained through cross-sectional team discussion, comparison with existing systems, and adjustments to the capacity of the development team.

Front End Development

From many frameworks for styling a website's interface page (frontend), Bootstrap is one of the most popular and commonly used by website developers [11]. There are several advantages of Bootstrap compared to similar frameworks, which the most common is it has prepared all the requirements of the developer in creating a website. Also, there is not much style for a developer to customize in syntax. The grid system (responsive view) has been standardized and more convenient even for a novice developer to follow.

To make the page more dynamic, the javascript support has been embedded in this framework. Bootstrap is one of the frameworks that are still actively supported by core developers as well as contributions from many elements of the community who want to continue to improve its framework. Overall, front end development using bootstrap as a javascript framework can make the website more responsive; also, website development is made more accessible because of the generally defined bootstrap rules.

Back End Development

Laravel framework [13] is used for developing the corona website. Its program and lines of codes can be summarized so that the developer's workload becomes more concise due to the no need to rewrite the same code. The settings are created in the controller, so that also causes the developer's job relatively faster due to the time reduction. An example of the module provided is an authentication. Laravel as a framework has prepared an authentication module to protect the backend pages so that only users who have access can get in the corona CMS. Although Laravel has prepared the authentication, the developer can easily customize it so that it suits the requirements of the website or web app to be built. With the Laravel framework, building a corona website is more cost and time-efficient than other frameworks. Laravel is also convenient to be developed due to the rules that allow this to happen, making it more comfortable in case of hand shifting. Laravel has a complete documentation aspect. Its documents can be accessed at [id-laravel.com](https://laravel.com), learninglaravel.net, laracast.com, and [Laravel-news.com](https://laravel-news.com). It also has a user-friendly framework that is more convenient to be employed. Also, Laravel guarantees the security of its framework. It also has the community. In case of the

obstacles in using Laravel, the solutions are convenient to obtain. Laravel uses the model - view - control (MVC) method, which is often used in the IT sector, so that is more convenient for website development [11].

In this study, the laravel framework is used for backend system development since it is a free, open-source PHP framework and easy to use for developers because it has summarized the PHP program code due to be used compared to another framework.

Database Design

Corona website is a web-based system with a model-view-controller (MVC) concept and using an API server that will be linked to HTTP requests via the internet. At first, the corona website still in the form of a microsite; did not use a database so that access time could be lighter. However, after trying to improve the performance of network infrastructure, the corona website ended up using the database while maintaining reduced access time. Database design also should be focused on developing a website due to the convenient aspect for identifying and managing data. It can be explained that the query is run on the database by Structured Query Language (SQL). The developer uses PHP to support the connecting of databases and running the queries. Figure 2 and Figure 3 are example code that explains the attribute and data type on the corona website database design.

```
CREATE TABLE `data` (
  `id` bigint(20) UNSIGNED NOT NULL,
  `title` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `desc` text COLLATE utf8mb4_unicode_ci NOT NULL,
  `link_id` text COLLATE utf8mb4_unicode_ci NOT NULL,
  `link_en` text COLLATE utf8mb4_unicode_ci NOT NULL,
  `type` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `status` tinyint(1) NOT NULL,
  `created_at` timestamp NULL DEFAULT NULL,
  `updated_at` timestamp NULL DEFAULT NULL
```

Fig. 2. Coding Sample of Data Table

```
CREATE TABLE `visualisasi` (
  `id` bigint(20) UNSIGNED NOT NULL,
  `order` int(11) NOT NULL,
  `title_id` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `title_en` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `description_id` text COLLATE utf8mb4_unicode_ci NOT NULL,
  `description_en` text COLLATE utf8mb4_unicode_ci NOT NULL,
  `url_id` longtext COLLATE utf8mb4_unicode_ci NOT NULL,
  `url_en` longtext COLLATE utf8mb4_unicode_ci NOT NULL,
  `thumbnail_id` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `thumbnail_en` varchar(255) COLLATE utf8mb4_unicode_ci NOT NULL,
  `published_at` date NOT NULL,
  `created_at` timestamp NULL DEFAULT NULL,
  `updated_at` timestamp NULL DEFAULT NULL
```

Fig. 3. Coding Sample of Visualization Table

Coding

In building a website, the development process was carried out through interviews with several related parties such as the Jakarta Smart City Leader and the representatives of the Jakarta Health Office to find out the problems, the requirements, and the purpose of building a corona website. The mapping documentation of user requirements will be reconfirmed to the related parties to ensure that all needs comply. The design process continues the step. In this stage, the system analyst will compile a data flow diagram, a data dictionary (data structure) and features or modules to be built. The results of the document then will be discussed with the

UI/UX designer to create a user interface to map and find the proper use of technology to build a website or application. It is continued with the development stage which developers will compile scripting to translate the needs of a website or application. Each function is compiled by developers to create a unit testing to ensure the scripting runs correctly. The results of the development of the website will then be explained to all parties, both from the product development division and related stakeholders, to get feedback for improvements or add features that have to be built. The developers will recreate the scripting code to fulfil input feedback. At the same time, for new features, the system analyst and UX/UI designer will recompile the technical document and front design (user interface). This step will continue until all requirements are met.

The process adopts an agile development method, which can accommodate the needs of stakeholders who are volatile and very dynamic in responding to unexpected events [14]. The agile method places the responsibility on developers and organizations involved in web engineering to provide web-based solutions that meet their project objectives. A project emphasizes simple, iterative application development in which every iteration is a complete software project, including planning, requirement analysis, design, coding which are documented in the system documentation [14].

Testing and Bug Fixing

The last stage before the website being released into staging production for the public is passing a test conducted by the quality assurance (QA). It uses a white-box testing method where the QA will explain the progress, the data flow, and the users who use the website and the targets to be achieved regarding the usability of the website or application. After being given an understanding regarding the website, the QA will create a test scenario. There are two types of testing that the QA performs on Jakarta Smart City, namely, stress testing and user acceptance testing (UAT). Stress testing is a type of testing to test the reliability, strength, and availability of a website. It will be compared with the target that has to be achieved. If it has not been realized, it will be communicated with the developer to optimize assets and refactor code. As a result of the stress testing corona website, the loading time is 1.45 seconds. The last one is UAT, where the QA will create a test scenario either with automation tests or manual tests to get no errors or bugs on the website. The UAT results will then be submitted to the developer for bug fixing. This step will be repeated until the QA considers that the website is fit to be brought into production.

In summary, this section indicates that the development of corona.jakarta.go.id website make use of the agile development method because such a process goes along with providing a satisfying experience to users. It needs cross-sectional team discussion, comparison with existing systems, and adjustments to the capacity of the development team to determine the requirements of the system. In line with the agile development method, Laravel framework is used for frontend and backend system development since it is a free, open-source PHP framework and easy to use for developers because it reduced much code programming work.

V. RESULT AND ANALYSIS

The government COVID-19 website in Jakarta (corona.jakarta.go.id) was officially published on 6 March 2020. To date, around 27 million total website visitors were recorded. Further, this section also presents aspects and insights to maintain and develop the website. Those aspects can be explained as follows:

How the website work

We built the website to allow anyone to access the features, accessible both via desktop and mobile devices. The following use case diagram is central to model the behaviour of a system, a subsystem, or a class. Figure 4 presents a use case of the corona website.

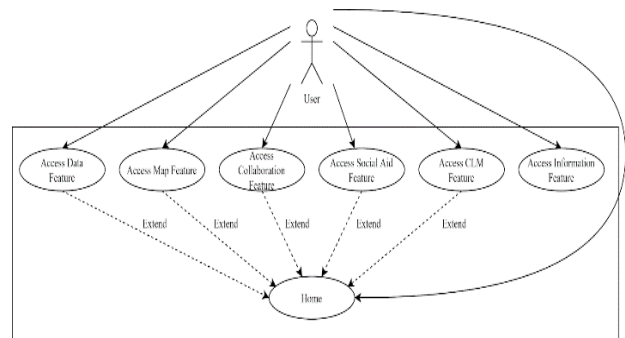


Fig. 4. Use case of the corona website

The activity diagram is used to model the sequential events in a computational process that exist in a use case. It describes how events start, decisions that may come about, and how events end. For now, all we need is an internet connection and a web browser to access corona.jakarta.go.id.

Data Analytics

The corona website is connected by google analytics to track user behavior while exploring this website. It assists the data analyst to provide some information to the developer for maintaining and increasing the quality of the website. 1)Based on the smart city's definition, there are some categories and characteristics that define the smart cities. [15] create the use of four categories: (1) technical infrastructure, (2) domain application, (3) system integration, and (4) data processing. A city is said to be smart when it combines the use of software systems, hardware, and network technologies to improve the services in several key areas such as healthcare, education, transportation, and others [16]. A smart city as an urban area also exploits operational data—the data extracted from many domains or segments to optimize operations [17]. The data analyst can analyze the data and provide recommendations to some extent, help the decision-maker in narrowing options to take. Through this foundation of technology-based definitions focused on the data, the Jakarta provincial government initiated this website. It has been developing the features overtime on the web and phone view. Figure 5 shows the most visited page in corona.jakarta.go.id.

Page	Pageviews	Unique Pageviews	Avg. Time on Page
	27,469,443 % of Total: 100.00% (27,469,443)	21,192,087 % of Total: 100.00% (21,192,087)	00:02:38 Avg for View: 00:02:38 (0.00%)
1. /id	9,539,333 (34.73%)	7,414,211 (34.99%)	00:01:43
2. /id/tzin-keluar-masuk-jakarta	6,060,793 (22.06%)	4,753,708 (22.43%)	00:05:19
3. /id/peta	2,456,970 (8.94%)	1,836,597 (8.67%)	00:03:35
4. /id/peta-kasus	2,357,890 (8.58%)	1,812,062 (8.55%)	00:02:45
5. /id/data-pemantauan	1,632,287 (5.94%)	1,299,012 (6.13%)	00:02:49
6. /id/data	1,096,507 (3.99%)	862,648 (4.07%)	00:01:49
7. /id/informasi-bantuan-sosial	1,018,971 (3.71%)	663,700 (3.13%)	00:03:14
8. /id/peta-persebaran	982,162 (3.58%)	739,477 (3.49%)	00:02:40
9. /id/ksbb	578,307 (2.11%)	401,526 (1.89%)	00:02:23
10. /id/publikasi	359,462 (1.31%)	297,899 (1.41%)	00:01:38

Fig. 5. Data most visited page from 21st March – 23rd August 2020

As can be seen from Fig. 6, 34.73% of users accessed the home page to get the summary information of the daily COVID-19 data in Jakarta. The 2nd highest page views are Jakarta entrance-exit permits page where it became beneficial for the citizen to reach such as information about entrance-exit permits for Jakarta provincial government. Also, more than 25% of users wanted to know information base on maps and data monitoring features. From this information, it can be recognized what features users would like to learn more and access. We could pay attention to developing and maintaining the feature and dashboard that people most visited. It is also showing that publication page only accessed by 1.31%, in such cases, it might be more useful if we do the publication through other platforms such as Instagram, Twitter, or other social media applications.

Sessions by device

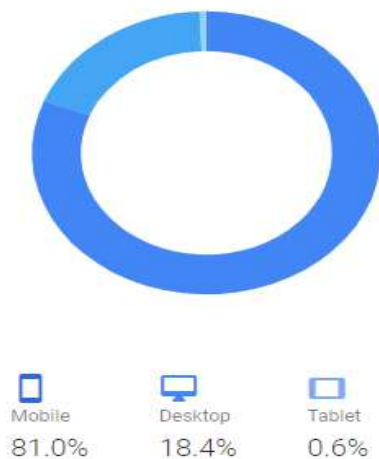


Fig. 6. Data User Session from 21st March – 23rd August 2020

From the very beginning, the data analyst has executed user analysis which proved that 81% of the total users using mobile devices to access the website, 18.4% using the desktop, and 0.6% using tablets. Figure. 6 described devices used by users in exploring the corona website. From that result, the developer focuses more on the design and development of the mobile device. It does not mean putting aside the web view design and development. However, since

almost all users use mobile devices to access the corona website, the developer should pay more attention to it. Also, during the 2011-2017 period, the number of mobile subscribers continued to increase, even though in 2018 it decreased considerably by 26.60% from 2017. The rapid growth of mobile users reflects the high public need for cellular communication devices [18].

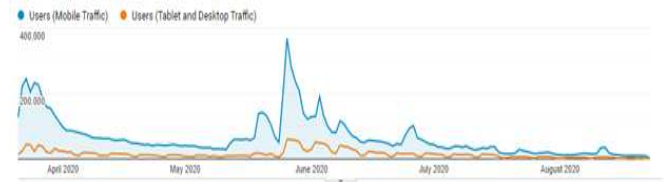


Fig. 7. Data User Session from 21st March – 23rd August 2020

There is a quite significant difference between mobile and desktop/tablet users. The trend points out that both mobile and desktop users have reached a peak in the middle of June 2020 (Figure. 7). There were several reasons behind this increase. One of them was a new feature such as CLM appeared where the use of this new feature was widely needed for the people who wanted to do self-assessment and later became one of the policies for entering and getting out of Jakarta, even though there was a change again later in the future.

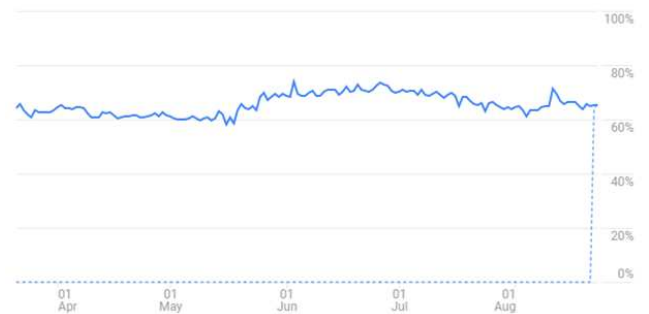


Fig. 8. Data Bounce Rate from 21st March – 23rd August 2020

Figure. 8 shows the bounce rate, which explains the percentage of visits to a single page that is not followed by further action (visitors leave immediately). It figures the number of single-page visitors per total website's visitors which is 65.86% of the average bounce rate. By the definitions theory, the lesser the bounce rate, the better it would be. It indicates that the users get comfort in surfing the website by 'clicking' to other tab or information. It becomes one of the metrics about the effectiveness of the website developed.

On the other hand, the high bounce rate does not mean there is something error about the website, such as the quality of the content or speed of loading access. It could be another reason. This corona website presents quite a lot of features and information; most users seem to tend to look for something specific so that they only view the same page every day.

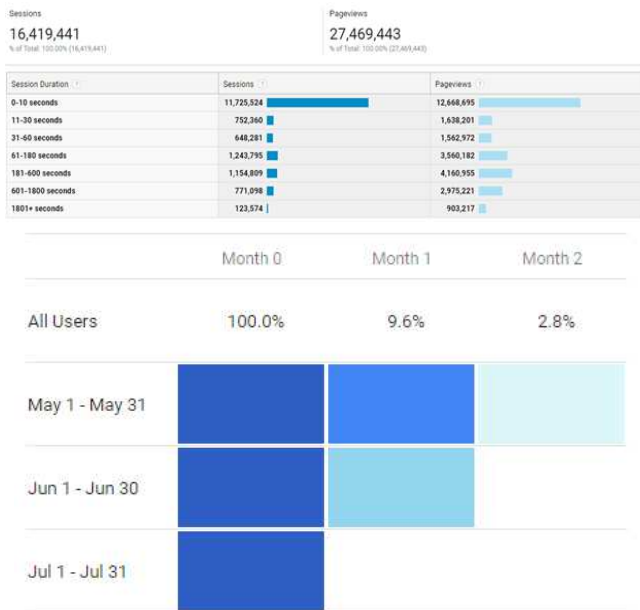


Fig. 9. Data User Analysis from 21st March – 23rd August 2020

User analysis is fundamental due to measuring how interesting and useful the website is in the eyes of the users. The data analyst requires maintaining the existing features and keeps the website useful for the users. The average number of user retention for the first month is 9.6% where compare to the industry or private company application, and the number is relatively low (Figure. 9). It still becomes the homework to increase user retention and reach out to more new users. The data analyst also learns from others at the beginning, such as how they create the visualization, what particular data that is open to the public, and what features they make.

Developing the official website of COVID-19 utilizes digital technologies. It takes responsibility to play an essential role in guaranteeing rights protection via local public service provision, including the most vulnerable populations living in informal settlements or slums [19]. The government takes this opportunity to accelerate digital transformation. The fundamental foundation is the base principle of the government who has the obligation in the level of data transparency and information disclosure for the public. A site needs to have clear goals, and these will be reflected in the way it is built [20]. The corona website was designed to deliver better public service and information which has user-friendly interfaces so that citizens of all age categories would be its end users. Websites should always be monitored to make sure they are available, are not slow to download, do not have broken links (the dreaded 404), work with all browsers (at least all the versions of Internet Explorer, Mozilla Firefox, Opera and Google Chrome) and are up to date. These are the essential elements of having a respectable reputation online [20].

LESSONS LEARNED

This section provides lessons learned from multiple perspectives made when developing a corona website. Some lessons learned are obvious and tradeoffs with the development, others could be leveraged as best practices and knowledge sharing across functional features of the website.

Lesson Learned 1

Jakarta government applies corona.jakarta.go.id as a website address to simplify so that it will be easy to remember. Interestingly, that corona name was adopted as a domain by several cities in Indonesia, even as many as 16 of 80 official city websites exist (Table II) [21].

Table II. Government Corona Websites Reference In Other Indonesian Cities

No	City	URL
1	Bekasi	https://corona.bekasikota.go.id/
2	Kudus	https://corona.kuduskab.go.id
3	Demak	https://corona.demakkab.go.id/
4	Wonosobo	https://corona.wonosobokab.go.id/
5	Bantul	https://corona.bantulkab.go.id/
6	Belitung Timur	http://corona.belitungtimurkab.go.id/
7	Mataram	http://corona.mataramkota.go.id/
8	Indragiri Hulu	https://corona.inhukab.go.id/
9	Sukoharjo	http://corona.sukoharjokab.go.id/
10	Kebumen	https://corona.kebumenkab.go.id/
11	Banyuwangi	https://corona.banyuwangikab.go.id/
12	Tegal	https://corona.tegalkota.go.id/
13	Muara Enim	https://corona.muaraenimkab.go.id/
14	Siak	https://corona.siakkab.go.id/
15	Solok Selatan	http://corona.solselkab.go.id/
16	Gorontalo	http://corona.gorontalokota.go.id/

Lesson Learned 2

The contents of the corona website are created as easy as possible from the menus until the terms used. Table III shows a result of benchmarking analysis to the 16-government corona website in other cities in Indonesia using the corona name as a domain, interestingly, the CLM feature in corona.jakarta.go.id is only owned by Jakarta. Data and information feature almost all cities have.

Table III. Similar Corona Website Feature Benchmarking Result in Indonesia

Feature	Total
Data	15
Map	8
Collaboration	1
Social Aid	4
Corona Likelihood Metric	0
Information	16

It is a necessary thing to improve the quality of the website and user satisfaction. The developers keep maintaining the development of the website to be still up to date, for example, while changing the terms of COVID-19 patients. Those terms were altered to suspect, probable, travelling patient, close contact, and discarded on 17th of July 2020 based on Minister of Health Decree number HK 01.07/MENKES/413/2020 about COVID-19 prevention and control guidelines that are validated on 13th of July 2020.

Lesson Learned 3

Besides providing COVID-19 official information, this website also serves as a realization medium for social collaboration in disaster countermeasures of economic, social, and other aspects in the form of funding distribution from citizen to city which is known as KSBB. It makes this

website a one-stop service platform. By having this website, it has automatically expedited the process of “demand-supply matching” between donors and recipients. The donors can see the real needs with concrete prioritization on a real-time basis by using this website. Then, the donators can specify the exact aids that they want to contribute.

Lesson Learned 4

Jakarta's COVID-19 surveillance system. The corona website that was developed for COVID-19 is an entity in Jakarta's surveillance system. All important elements of health in handling COVID-19 will not be able to work alone without the support of the regional government, cross-sector and society itself, one positive, negative case report, suspects are the work of dozens of health workers supported by hundreds of communities. Various data about COVID-19 that have been collected at Jakarta Health Office were then processed and analyzed by the data analytics team of Jakarta Smart City before presented and disseminated to citizens and government institutions through the website.

Lesson Learned 5

As a data-driven policy, the corona website (Figure 10) plays a significant role in the program holders and policymakers for the basis of deciding so that policy provides public health and welfare benefits to the broader community.

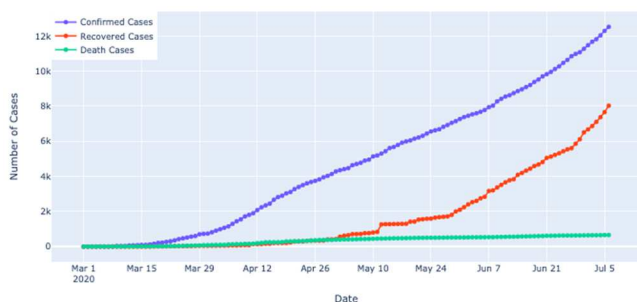


Fig. 10. Corona Website Data Page

Furthermore, some reflections and limitations are presented regarding the development of the government's COVID-19 website. In the initial phase, the development of the corona website in the form of a microsite used the WordPress framework. However, along with the increasing need for data and information related to the epidemiology of COVID-19 in Jakarta, the WordPress framework is considered unable to accommodate the needs for very dynamic information in large numbers, resulting in a change in form from microsite to website. Therefore, the framework adaptation was also carried out from WordPress to the Laravel framework. As a result, the developer should allocate more time to set up the coding environment so that there are no problems with the implementation tools during system development. Communication between agencies is carried out online due to the condition of the COVID-19 pandemic. As a result, there are many requests and input submitted via WhatsApp. The actual time for each deliverable is usually not as planned due to the high workload and a limited number of developers and programmers.

CONCLUSION

The present study aims to provide lessons learned with solid foundations to develop an official COVID-19 website in Jakarta that can be adapted to other cities, especially in Indonesia. The current lesson learned highlights the importance of the agile development method. The paper has also shown that making the official website plays an essential role in guaranteeing rights protection via local public service provision, including the most vulnerable populations living in informal settlements or slums. The most interesting finding is that corona name is adopted as a domain by several cities in Indonesia, even as many as 16 of 80 official city websites exist. The CLM feature in corona.jakarta.go.id is only owned by Jakarta compared to 16 official city websites and the data and the information feature almost all cities have. Overall, this paper strengthens the idea that the government who has the obligation in the level of data transparency and information disclosure for the public should develop community mindsets through an official website in contributing to and supporting the health system in general and national surveillance of COVID-19 in particular. The lesson learned can help the next step of software development in any government service sector. Further research should be carried out to compare the software development method in the government sector to get sufficient evidence results.

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