

Electronic Certificate Information System as Media for Distributing Certificates Online During the Covid-19 Pandemic

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Abstract. Pandemic is a challenge for all people in the world. Enforcing social distancing is a challenge in itself when it comes to holding face-to-face activities. The use of online media to hold face-to-face activities has become very common during this pandemic. Several institutions use this online media to hold useful activities during the pandemic. In every activity, the institution usually provides a certificate as proof of participation. However, this becomes an obstacle in distributing the certificate itself. With this online certificate information system, it is hoped that it can answer this problem. This online certificate information system makes it easy for the committee to distribute certificates with a QR code to validate the authenticity of the certificate.

Keywords: Online certificate, information system, QR code

1. Introduction

The Covid-19 pandemic is a challenge for all people in the world today [1, 2]. This becomes a limitation for doing face-to-face activities [3]. For eventual activities that are carried out every year, it becomes an obstacle when they have to carry it out during this condition. Information systems are one of the most optimal solutions to overcome this [4]. Seen from the development of information systems that have become a way out of face-to-face limitations during a pandemic, one of them is by using video conference applications like Zoom Meeting [5].

Several eventual activities in education are still carried out to maintain the rhythm of the education itself. One of the selected options is an online activity. For each activity, the committee will provide a certificate as one of the external media as proof of participation in the activity. The distribution of certificates during this pandemic condition becomes an obstacle where activities are carried out online, but certificates must be given via online media, and certificates must be validated for authenticity.

The way to maintain authenticity is by adding a QR Code to the certificate [6]. The user who wants to use the certificate can scan the QR Code and match the data to the database that issued the certificate. If the data attribute in the certificate is valid, then the certificate can be

declared as a valid e-Certificate [7, 8]. QR Code has a high level of encryption and reads speed, so it is chosen as a medium for securing documents [9].

2. Method

In this study, the author used a prototype method [10] to develop an e-Certificate information system. The prototype process in the research begins with gathering user needs after gathering information, conducting analysis and making mock-ups, then sending mock-ups to users to be tested. The result of user testing will be evaluated. If the result did not meet the user needs, it should be re-analyzed and revise the mock-ups [10]. The use of the prototype method in this study can be seen in Figure 1.

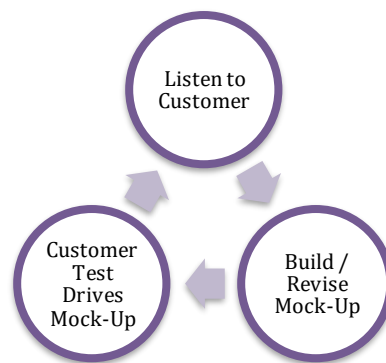


Figure 1. Prototype Method

The first step taken by the author is to get issues that occur in the customer's work environment, where the customer here is *Pusat Prestasi Nasional* of the Ministry of Education and Culture of the Republic of Indonesia. The issue obtained is how to distribute e-certificates to all students who have participated in competitions or competitions at the national level organized by them. The standards for the distribution of e-certificates include: 1) Document Number, 2) Participant Name, 3) City of Origin, 4) Participating Province, 5) QR Code for Validation and 6) Signature of Governance.

In the second step, the author makes a mock-up to provide an overview of the application to be built to the customer, then the mock-up is submitted to the customer to get feedback, so the system is built according to the needs of the customer. The next step is listening again the issue and find out what things should be improved from the first mock-up, and show it to the customer again. This step is repeated until got an application that suits the needs of the customer.

3. Results and Discussion

In building this e-Certificate Information System, the author uses UML design tools. One of them is Use Case Diagram. The use case of the information system can be seen in Figure 2.

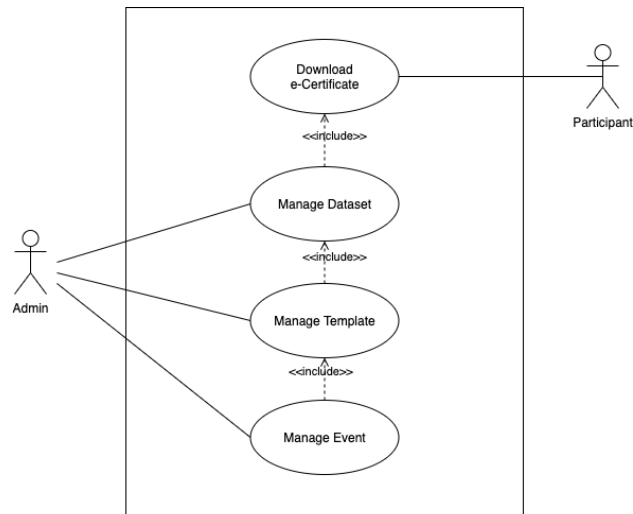


Figure 2. Use Case Diagram

The analysis was carried out by observing the customer. It was found that the information system must be used by Participants (anyone who joins in the event) to download the e-Certificate, where the participant's data would be inputted first into the system by the admin. Admin can do event management, e-Certificate template management, and participant dataset management. In Figure 3, can be seen a flow of admin to distribute certificates to the participants.

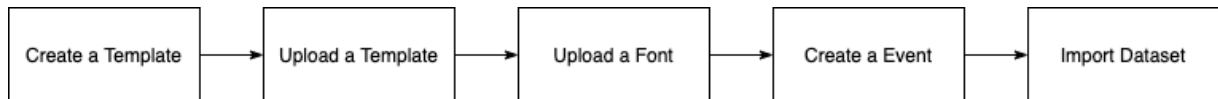


Figure 3. The flow of Admin to Distributing e-Certificate

The first step is creating a template. Admin needs to prepare a template file (Adobe Photoshop or Adobe Illustrator format) and the font used in the e-Certificate document, and the latest Microsoft Word application. Open the template file and determine which parts of the template are dynamic so that they must be left blank or deleted from the design (see Figure 4).



Figure 4. Template from Adobe Illustrator

As seen in Figure 4, the admin has determined dynamic parts shown with numbers 1 to 5. These parts must be removed from the template so that the final result of the template is as shown in Figure 5.

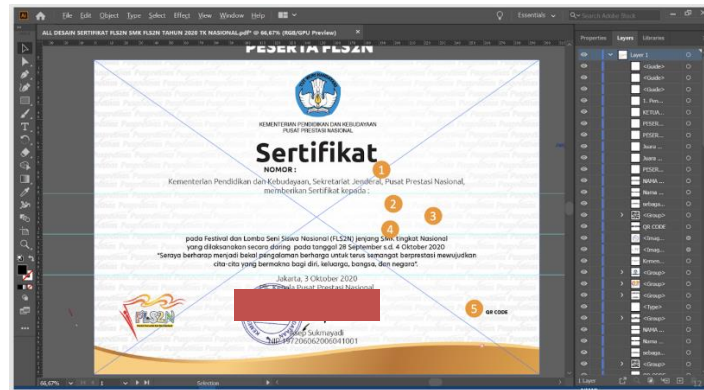


Figure 5. Final Decision of Dynamic Attribute from Template

The results from the template are saved in JPEG with maximum quality (10) in order to get high-quality e-Certificate results when the participant wants to print them. After saving the JPEG file, then set the template on the Word document in A4 format with 2.54cm top margin and 1 cm for left, right, and bottom margin then inserts the Exported JPEG image inside Header / Footer (see Figure 6).

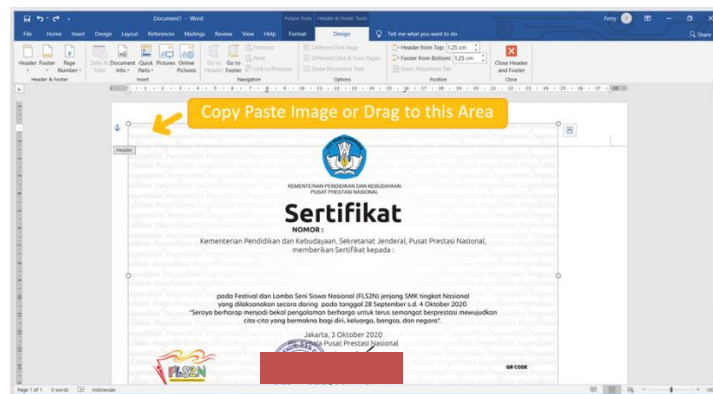


Figure 6. Create Word Template

The size of JPEG must be adjusted to fit the A4 paper size and set the position of the image Behind the Text in the Microsoft Word application. Next, complete the word file with some dynamic variables, which will be automatically changed by the system. A list of the dynamic variables that are accommodated by the system can be seen in Table 1.

Table 1. Available Dynamic Variable

Variable Name	Description
\${nomor_dokumen}	For document number of the e-Certificate
\${nama_lengkap}	Full name of the participant
\${institusi}	Institution of the participant

Variable Name	Description
<code>{jenjang}</code>	Educational Stage (Middle School/High School/Vocational School)
<code>{sebagai}</code>	Participant Title (as Participant / as Jury / etc)
<code>{penghargaan}</code>	Award of Participant
<code>{provinsi}</code>	Participant's Province and City
<code>{qrcode}</code>	Generated QRCode
<code>{qrnumber}</code>	Generated QRCode Number

Dynamic variables must be written preceded by a dollar sign and enclosed in curly braces. This variable is taken from imported data from the dataset and stored in the database. These variables can be saved in any location in the Word document. For a quite difficult position, the admin can create a textbox and position it according to the needs, as shown in Figure 7. To determine the location of the QRcode, the admin can place a PNG image and adjust its position in the template file. Then add the alt text with the `{qrcode}` variable to make it dynamic.

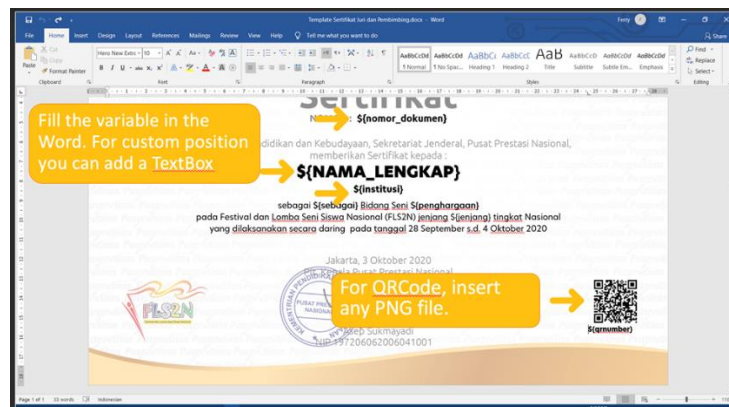


Figure 7. Fill the Variable and QRCode in The Word Template

The second step, upload the template file to the system by including the template name and file, as shown in Figure 8.

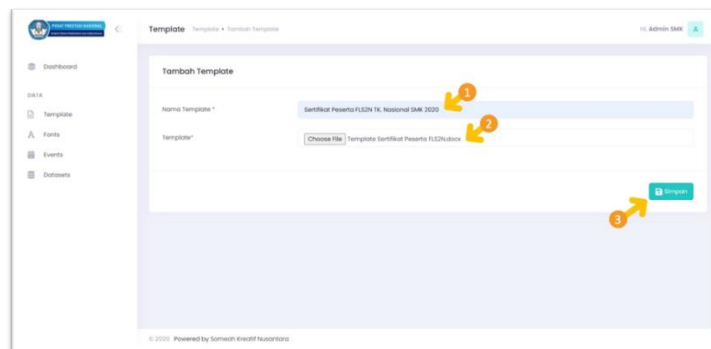


Figure 8. Upload Template to System

The third step, upload the font into the system on the Fonts menu by dragging and dropping it from Window Explorer or uploading it with the file chooser provided. The fourth step is to create an event on the Events menu with the attributes: 1) event name, 2) level, 3) event type, 4) year, and 5) template. This step can be seen in Figure 9.

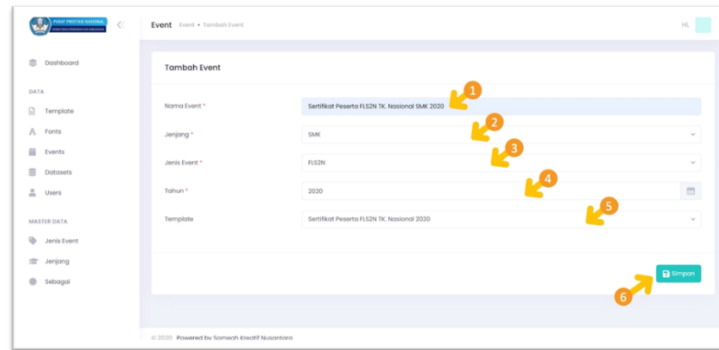


Figure 9. Create Event

In the final step, the admin can import the dataset from Microsoft Excel format with the attributes: 1) Document Number, 2) Event, 3) Level, 4) Year, 5) As, 6) Full Name, 7) Institution / School of Origin, 8) Award / Competition Field, 9) Email, 10) NISN / NIM / NIP, and 11) Province. After this dataset is completed, the admin uploads it via the Datasets -> Import menu. Admin can see the preview of the e-Certificate by clicking the Preview button on the dataset, as shown in Figure 10. Admin can change it manually if there is an error in the attributes that have been set or the position of the dynamic variables of the templates that have been made.



Figure 10. Preview e-Certificate

In Figure 11 can be seen the flow for downloading e-certificates for participants. The first step is to open this e-Certificate information system via a web link, then search the data by NISN, NIM, or NIP, or by email address. Click the download button then the system will ask for the valid email or valid NISN for data validation. After that, the link for download the e-Certificate will be sent to the email of the dataset.



Figure 11. Flow for Download e-Certificate by Participants

In Figure 12 can be seen the main page of the e-Certificate information system. After the participant validates using email, the system will send a link to download the certificate.

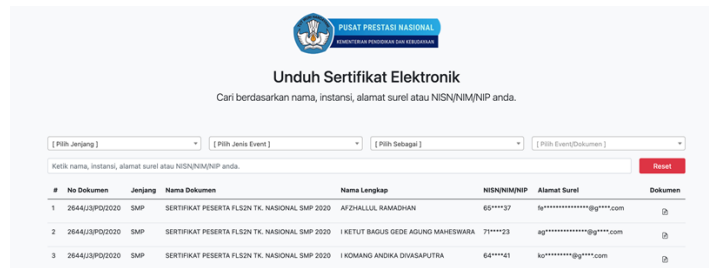


Figure 12. Main Page for Participant Downloading The e-Certificate

If the participant's email matches the dataset, the system will send an email containing a link to download the e-Certificate. When the link is clicked, the e-Certificate with QR Code will be downloaded. In Figure 13 can be seen an email containing a link to download the e-Certificate.

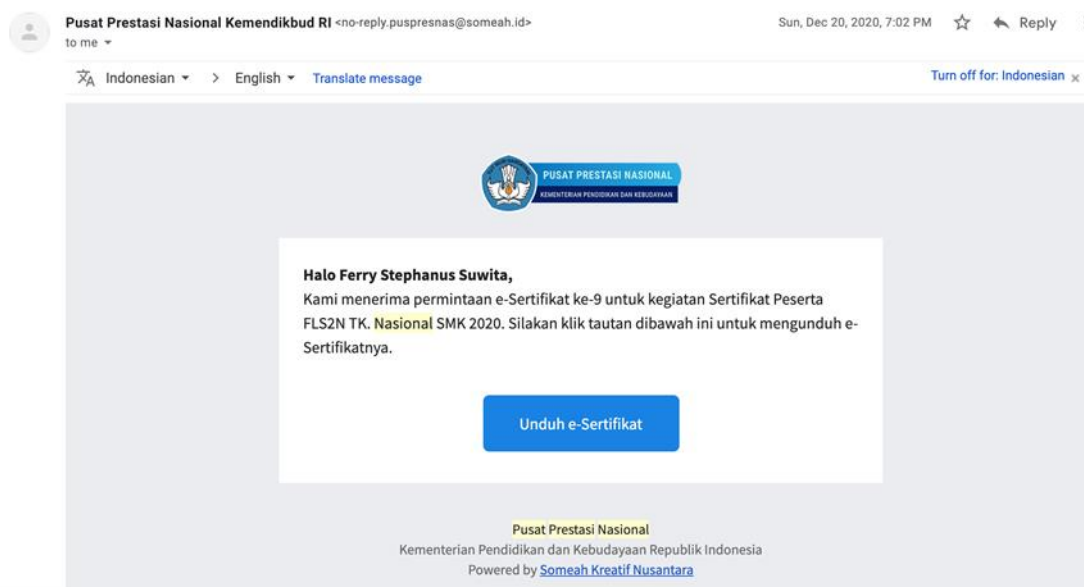


Figure 13. Link Download from Email

4. Conclusion

The Covid 19 and New Normal pandemic periods do not prevent activities because they can be carried out online. The distribution of certificates as one of the expected outputs of each activity can be accommodated by an information system. The E-Certificate Information System that has been built can be a solution to make it easier for activity organizers to distribute certificates. In this system, managers make it easy to create certificate templates and import datasets of activity participants. The e-certificate is also equipped with a QR code that functions to validate the validity of the e-certificate. It is hoped that the use of this information system can continue not only in pandemic conditions because, in the future, but the data will also be stored properly and become history for its participants.

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