The Design of the KAI Access System for Public Service Improvement in the Pandemic Era

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Abstract. During the COVID-19 pandemic one of the transportation modes that is the most vulnerable to crowds is trains. Currently, PT KAI as the train operator in Indonesia is leaning towards in optimizing its public services by making KAI Access. On the one hand KAI Access plays a very important role by facilitating online ticket ordering. However, in the pandemic situation the requirement for using trains has to be completed with vaccine certificate that is published by PeduliLindungi and not the part of KAI Access. This causes the passengers access two applications before allowed entering the station. So, in this paper, we proposed a design of the system that combines the two applications to ease passengers when using PT. KAI services. In our proposed system the passengers are only required to show the tickets that contains the complete identity of the passengers, their vaccination status, and also their contacts to enable the government to tracks them in order to prevent the spreading of COVID-19. Our proposed system is prospective to improve the quality of PT. KAI public services.

Keywords: combined applications, COVID-19 prevention, KAI Access application improvement, online ticket, PeduliLindungi
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Introduction

The occurrence of COVID-19 began on December 31, 2019, where the Chinese government reported to the World Health Organization or WHO that they were treating a number of people with suspected pneumonia that occurred between December 12 and December 29. The virus spread quickly and on January 11, Wuhan reported its first death related to a patient with this virus. The outbreak of the COVID-19 pandemic in the last 2 years has had a global impact in all sectors. Governments from all countries, the World Health Organization (WHO) and the United Nations are trying hard to reduce the number of the spread of the pandemic in various ways, starting from the determination COVID-19 self-isolation, small-scale groups such as families, large-scale groups such as isolation together in a special building; health advice such as washing hands, wearing masks, maintaining a safe distance of about 1-2 meters [1], vaccinations; to the making of laws and regulations.

However, the impact of the pandemic is extraordinary, it can be seen from the world economy becoming very unstable in a fairly short time. One of the sectors of the world economy that has received a fairly heavy impact is transportation, in this case, trains. Train as a mode of land transportation that is widely relied on in various countries because of its convenience, security, and the services provided are much better than other modes of transportation. In several countries in Europe and Asia, trains already have integrated online services that make it easier for passengers of various ages, races, nationalities, and groups to access websites and/or applications on smartphones to purchase train tickets, monitor departing and arriving train schedules, and so on.

In the current pandemic conditions, railway services must comply with health procedures from the World Health Organization (WHO). This can be seen on the page of the International Union of Railways which enforces several rules for rail services starting from how the government should behave with this mode of transportation, then what new rights and obligations must be done by station employees to make procedures for passengers in all areas. Condition. From these facts, online services for trains have met WHO health standards. Several conclusions have been drawn according to previous research regarding the impact of COVID-19 on travel behavior, such as the frequency of travel drops significantly with the implementation of preventive measures [2].

In Indonesia itself, the government has enacted laws related to Public and Economic Services during the Pandemic. However, this is still not optimal because it is different from the government’s wishes, conditions at the station are getting worse due to the crowds
that arise at the ticketing section even though there are rules in the form of maintaining a distance of 1-2 meters. Because if the passenger makes a ticket reservation through KAI Access, the passenger is required to print the ticket at the station first, besides the time used to print the ticket is too short, which is 2 hours for each departure. Queues that arise during ticket printing can be a new problem, especially for small stations and in this condition social distancing rules may not be followed. In contrast to the condition when the ticket has been printed, the passenger simply submits the ticket and the required documents to the station.

The check queue at this point is shorter than when queuing for printing tickets, which is less than 20 minutes. However, the complexity of the ticket checking queue can also have an impact on the social distancing rules due to this queue. Services are provided not only for local services but also for long-distance services while the number of control counters for each station is different, as a result, social distancing rules may be ignored at some stations to speed up queues so that passengers are not late for the train. The next impact if the station is not observant when inspecting documents is if there is a prospective passenger who turns out to have early symptoms of COVID-19 and/or falls into the category of People Without COVID-19 Symptoms, the prospective passenger can pass to the train even though he has a complete medical certificate, because the health certificate was made a few days earlier and not on the same day.

PT. KAI does provide a temperature checking service, but this is also still inefficient because once again prospective passengers have to queue and in a rush, the rules of social distancing can still be ignored. The impact that may arise from these things is that if there are passengers who experience symptoms of COVID-19 while and after using the train, there is almost no solution for tracking and tracing all passengers in the same carriage as the sufferer except by making announcements through government mass media and not all people follow the mass media. Through these facts, the author provides recommendations on the KAI access application so that it can be integrated with vaccine certificates, identity (Id) cards to letters relating to evidence of physical health (not COVID-19 sufferers) to help prospective train passengers to save time so they don’t have to long queue, also to help the government and the station if the worst condition occurs, namely there are prospective passengers who are affected by COVID-19.

Methods
In this section, we have surveyed various literacy related to booking train tickets online to handling ticket services at stations. What we pay attention to in this journal is how tickets are created virtually by KAI Access, how PeduliLindungi handles the spread of COVID-19, and how passenger information is obtained to assist the government's efforts to prevent further spread.

Token
Token is a highly protected format used in a lightweight and self-contained way to transfer confidential information between two parties. Tokens are also used, both in programs, to strengthen authentication mechanisms. Tokens are small data streams with little meaning or use on their own but become important players in applications with proper authentication methods. Token is a highly protected format that used in a lightweight and self-contained way to transfer confidential information between two parties. Tokens are also used, both in programs, to strengthen authentication mechanisms. Tokens are small data streams with little meaning or use on their own but become important players in applications with proper authentication methods [3]. Token based authentication works by ensuring that a token sign by every request between nodes, verifying validity and requesting requests.

Data Authentication
In a network, both the receiver and the sender need to ensure that the data used in any important transmission procedure starts from one of the originating senders. Data authentication does not allow unwanted parties to share on the network, and genuine data must be able to distinguish between real data and fake data. If the data is fake, the system must be able to reject the data. These changes need to ensure data confidentiality. In cryptography, this is known as authentication [4]. Successful authentication is critical to ensuring security for both users and service providers. The main goal of this kind of organization is a robust algorithm to ensure that unwanted parties enter the system. Authentication is designed to make the process of entering new members into the server more secure [5].

KAI Access
KAI Access is the official application for selling train tickets from PT Kereta Api Indonesia (Persero) which not only provides train ticket sales services but also has various additional features for the convenience and comfort of KAI customers. KAI Access as a part of public service requires certain data from each application user, but if someone has to fill in the details before using the KAI Access application, it will be in vain. Therefore, KAI Access uses Nomor Induk Kependudukan (NIK) or ID Number as a condition for using the application. This is also intended to avoid confusion when booking train tickets because of the similarity of names, places of birth, or other things. The KAI Access server not only manages ticket bookings but also stores travel data from and to a station both remotely and locally. In addition, it also stores data for every passenger who is in the same carriage, so that in the event of unwanted things such as left behind and the like, the station manager can easily contact the owner of the left behind. In the current pandemic, the use of
passenger tracking is very much needed because if there are passengers who get sick during the trip, the stations, health centers, and the government can swiftly handle the passengers at any time at any station. It can also help the government give warnings to other passengers who are in the same carriage and or train with the sick passenger in the hope that if the sick passenger is diagnosed with COVID-19, the warning of self-isolation and recommendations for tightening health protocols can be given earlier so that the spread of COVID-19 decrease. The weakness of the KAI Access application is that this application is currently not supported by health services and or prevention of the spread of COVID-19, so passengers need to bring supporting documents if they want to travel by train (https://kai.id).

**PeduliLindungi**

PeduliLindungi is an application developed to assist relevant government agencies in tracking to stop the spread of COVID-19. This application relies on community participation to share location data while traveling so that contact history tracing with COVID-19 sufferers can be carried out. Users of this application will also get a notification if they are in a crowd or are in a red zone, namely an area or village where it has been recorded that there are people infected with positive COVID-19 or there are patients under surveillance. And this application also stores vaccine certificate data (https://www.PeduliLindungi.id/). In addition, this application also displays a medical history related to COVID-19, such as a history of antigen tests and Polymerase Chain Reaction (PCR) tests on a regular basis. With this application, the government, especially the Ministry of Health of the Republic of Indonesia, is greatly helped because controlling COVID-19 can be done online without having to send nurses, doctors, and other medical personnel to the field. If a worst-case scenario occurs, such as an application user who is indicated to be infected with COVID-19 even though vaccination has been carried out, the local government can immediately help deal with this condition by tracing the contact with who the user of this application is. The results of this search will make it easier for the government to identify who needs to receive further treatment so that the spread of COVID-19 can be stopped. Thus, the more people's participation using this application, the more it will help the government in tracing and tracking.

**Face recognition**

Face recognition is something which is the need of future and implementation of this on a large scale would benefit people in so many ways. The work presented uses a simple face recognition python module to encode the features which has been identified and matches the same with the frame of webcam. The input is an image or video and for video each frame is tested for resolution of (640,480) if this is present pre-processing takes place and then after encoding, the features are extracted by using Histogram of Oriented Gradients method. This is a faster and a better way of overcoming biometric identification whenever results are needed urgently, there are other ways to identify a person based on retina and fingerprint but as it is known that present situation of covid-19 requires social distancing and the above stated biometric identification might not cater to the need of social distancing so an easy and a safe way of identification of a person can be using face recognition technique as suggested here [6].

**Results and Discussion**

**The Proposed Design to Improve the KAI Access System**

KAI Access is the official application for selling train tickets from PT Kereta Api Indonesia (Persero) which not only provides train ticket sales services but also has various additional features for the convenience and comfort of KAI customers. One of them is an online train ticket payment system. At this time, ordering KAI tickets can be done through the KAI Access procedure used in the booking KAI tickets, passengers only add their ID Number on the KAI application and can already order tickets. Here the authors propose an idea to KAI access’ ticket booking system so it can be safer to use. In this section, we use the existing KAI Access design, but there are several parts that we are trying to add, namely the button that is synchronized with the vaccine certificate data from the account owner. Our design can be seen in Figure 1 and Figure 2.

![Figure 1. The display of the original KAI Access application.](image1)

![Figure 2. Our proposal to improve the KAI Access application.](image2)
On the ‘account’ menu there will be a new button in the form of a vaccine certificate. Inside the button, the user can see the first and or second vaccine letter. The button also displays the last time the user performed an antigen test. Vaccine certification data is obtained from the PeduliLindungi server. The system process on the KAI Access that we propose is slightly different because here we combine data from three servers: Population and Civil Registration Server or DISPENDUKCAPIL, KAI Access, and PeduliLindungi, this can be seen in Figure 3.

![Figure 3. The mechanism of the application.](image)

We focus on the KAI server as the central server, in this case, we use the similarities of the three servers, namely ID Number. According to the applicable laws and regulations, ID Number currently has personal data from birth to death including blood type, place of birth, date of birth, and so on. The ID Number on the DISPENDUKCAPIL server is only used as evidence that a person is indeed an Indonesian citizen and is registered on the server so that person can exercise their rights and obligations as an Indonesian citizen. But on the KAI and PeduliLindungi servers, the ID Number is only used to log in to the user's account and this is very inefficient. So, we want to optimize the data in the ID Number to improve public services and encourage the public to get their rights as they should. The block diagram that we proposed above shows how the system works from the user's perspective. We use the camera on the smartphone as a tool in recognizing faces on ID cards and the current faces of application users. The input is a photo of an ID Number card and a selfie photo with the ID Number card. After the photo data is available, the data will be sent to the KAI server. The KAI server will process data in the form of ID Number which will be compared with the one in the population and civil registration. The ID Number data can also be used to check vaccine certificates on the PeduliLindungi server. If all data has been obtained, it will be stored on the KAI server. On the other hand, the KAI server will continue to synchronize with the civil registry server and the PeduliLindungi server because health evidence in the form of vaccine letters and health support letters on the PeduliLindungi server must always be updated by the user.

Figure 4 shows the process of the application system working when the user first accesses the application. First, users must install the KAI Access application on the smartphone they are using. After installing the application, the user must enter data such as ID Number and photo ID. In terms of securing user data, identity verification is carried out by taking selfies with the ID cards held. After taking a selfie, all data will be sent to the server owned by KAI Access and will be synchronized with the data owned by the Population and Civil Registration Server and PeduliLindungi servers. Verification of population data from the Civil Registry server and verification of vaccination data from the PeduliLindungi server are used to ensure that passengers have been vaccinated or not. After all, data is verified and stored on the KAI server, users can order tickets through the application. The use of face recognition for ticket verification at the train station not only reduces the need of bringing the hardcopy-version of it, but also to ensure that the travel can be smoother especially for the passengers. It is a step to go to a smart nation [7].
**The Work of the System at Station**

At this time KAI passengers when they want to enter the passenger train must scan a Quick Respond (QR) with the care to protect the application to say that the passenger has been vaccinated or not. After scanning the QR at the front door of the passenger station, the temperature is checked by the officer and checking the antigen test letter brought by the passenger. After all the data completed, passengers are allowed to enter the station while waiting for the arrival of the train. After the train arrives, the passenger must show a ticket in the form of a QR which is contained in the KAI Access application. After all these stages, new passengers can board the train. The author here wants to discuss if the entire system above can be more summarized so that there can be time efficiency for passengers.

First, the data of passengers who have purchased tickets through the KAI access application has been verified previously, so if the passenger has not done so, they cannot book tickets. After the passenger arrives at the station, it is enough to scan the QR once at the entrance. This was followed by a body temperature scan and facial verification of passengers who ordered tickets with facial data on the server owned by KAI and the civil registration office. If the photos of the faces are the same, then a body temperature scan is carried out with a thermal camera. If all verification results match and the body temperature is below 37.5°C [8] then the gate will open but if the facial data is different or the body temperature is higher than 37.5°C then the alarm in the officer's room will sound. When the alarm sounds, the officers at the station will come to the prospective train passengers. This is to determine what problem occurs when the alarm goes off. If there is a discrepancy between the data on the ticket and the passenger's face, the policy will be taken by the officer at the station and if the body temperature is above 37.5°C then the passenger can be advised to the nearest health facility to ensure the health of prospective train passengers.

Entry Permission Processing will take input data from the QR Reader via a QR code that is read from the train passenger's smartphone. The next data input is a thermal camera and face recognition. The thermal camera will see the passenger's body temperature and facial recognition will compare the passenger's facial data with the data on the KAI server. All inputs will be managed by Entry Permission Processing and will produce an output in the form of an open gate if the passenger's face data is the same as that on the KAI server and the body temperature is below 37.5°C. If one of them does not match, the alarm at the security officer's office will sound. Passengers can also see the results of thermal camera scans and facial recognition on the display available above the gate. After all, processes are carried out, passenger data will be stored on the KAI server, and passengers are allowed to enter the carriage as stated on the train ticket.

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**Figure 4.** The system process works when the user is about to use the application.
Figure 5. KAI Access user procedures while at the train ticketing section.

Figure 6. Workflow of entry permission processing.

So, the addition of the system described above is expected to reduce the crowd at the station entrance. This can reduce the time of the QR scan process, which originally had to scan the QR from PeduliLindungi and KAI access, now only one scan is enough. For the users, they don't have to install and operate two different applications, just one application can be used. Finally, in terms of security, the passenger body temperature scan which was originally carried out by officers at the station has now been replaced by a Thermal Camera and also passenger identification by Face Recognition, this is to minimize the presence of stowaway passengers. This mechanism may bring better situation for not only the passenger, but also the workers who server them especially at the train station. It is a kind of a balance between social and economic [10].

Based on our proposal, the three servers have to communicate, exchange, send, and receive the related data to allow a passenger board to the train. This is not only about how the data is exchanged or send or receive, but also how to secure it from any attacker. We use token-based authentication Application Programming Interface (API). The token is obtained from the combination of the email of the owner of the token access and the timestamp when the token access was created. It will then be encrypted using SHA256 method. All services will be carried out through cloud to ease the process whether for the passengers or the operators and the workers [11]. The mechanism of the data exchanging is described in form of pseudo-code in Figure 7.
Input Data User
Sent data User & Token to Population and Civil Registration Server
Get data User from Population and Civil Registration Server
if Data User = Data Population and Civil Registration Server
   Store to KAI Server
   Send data User & Token to PeduliLindungi
   get data from PeduliLindungi
   if Vaccine = Get data Vaccine
      Store to KAI Server
   else Not Vaccine Yet
   Get data from Camera
   if data Face = Data Population and Civil Registration Server
      Store to KAI Server
   else data Not Valid
      get Verification again
User allow to Book Ticket
Generate QR
Get data QR from Smartphone User
if QR code = QR code KAI Server
   Get data Face
   if Data Face = Data Face from KAI server
      Get data Heat
      if Heat <= 37.5
         Gate Open
      else Turn On Alarm
   else data Not match
      Try Get Data Face
   Else data Not Valid/Not Registered/Unknown
Try again

Figure 7. Pseudo-code for data exchanging among servers and the exchanged data.

Conclusion
KAI Access as a public service application has good features and supports government programs in the form of integrated services that are easy, cheap, and efficient in the field of land transportation. For KAI Access and the railway operator to better support government programs during the current COVID-19 pandemic, it is important to have access to health during travel. Through the combination of train passenger data and vaccination data from the PeduliLindungi application, KAI Access can facilitate train passenger travel. To support this, the main key used is the NIK contained on the KTP (identity card) which is stored, managed, supervised, recorded, and issued by the Civil Registry. From the station site as a place for service providers who have a high risk of triggering a crowd, we suggest the use of a QR Code that has synchronized data from three servers so those ticket readings are not accompanied by physical evidence of health letters as well as the addition of a facial recognition system and thermal camera in the ticketing section. so that it is expected to shorten the ticket inspection time and reduce the queues to enter the station. It can also reduce the physical contact that must be made between passengers and security guards. In terms of security, it can also be expected to minimize stowaway passengers who will enter the train.

Conflicts of interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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