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Application development to measure PKP-PK readiness in aviation operations

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ABSTRACT

PKP-PK (*Pertolongan Kecelakaan Penerbangan dan Pemadam Kebakaran*/ Aviation Accident Relief and Fire Fighting) is the most important thing in preventing aviation accidents, with the aim of preventing or reducing losses to fatalities. Based on General Air Transportation Regulation KP Number 14 of 2015, every airport is required to provide PKP-PK services in accordance with the required airport PKP-PK categories. Thus, the feasibility of airport operations is an important factor in an airport. Measuring readiness for airport operational feasibility is important to meet general air transportation regulations KP No. 14 of 2015. With an application that can be used to measure airport operational readiness, it is increasingly providing convenience to airport managers for airport operational readiness.

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1. INTRODUCTION (10 PT)

Aviation is one of the fastest-growing commercial sectors in the world [1]. With increasing population, urbanization, and economic growth, as well as the need for further mobility, air traffic is expected to continue to experience growth in the coming years [2]. Passenger traffic increased 1.4 times, in the last two decades to 3.97 billion in 2017[3], so airport management is an important factor to pay attention to. In Indonesia, airports are managed by agencies that the government has authorized, and related government agencies include the Ministry of Transportation, PT. Angkasa Pura I (Persero), and PT. Angkasa Pura II (Persero). At an airport, there is a division in charge of aviation accident relief and fire fighting (PKP-PK).

According to the Regulation of the Director-General of Civil Aviation No. KP14 of 2015, concerning Standards for Technicians and Operations of Civil Aviation Safety Regulations, Aviation Accident Relief Services, and Fire Fighting (PKP-PK), an airport is an area on land and waters with certain boundaries, which is used as a place for airplanes to land and take off board and drop passengers, loading and unloading goods, and a place for transfer between transportation which is equipped with aviation safety and security facilities, as well as basic and supporting other facilities[4], [5]. Each airport is required to provide PKP-PK personnel, who has the license required by the directorate general in accordance with the airport category for PKP-PK. Aviation safety is the main factor that needs more attention from the government as a regulator/facilitator, airport managers as infrastructure providers, and by airlines as operators[6].

Every aviation accident, whether in a burning or unburned state, will cause losses. The implementation of the PKP-PK operation is trying to provide assistance with the aim of preventing and reducing losses, especially human casualties. During a firefighting operation, it is a crucial time that requires effective and efficient work so that efforts to help victims can run smoothly, such as vast vehicle placement, careful consideration, and the right tactics to carry out firefighting operations.

Based on this description, measuring the readiness of PKP-PK in an airport is the main thing in an airport operation. This must be done to ensure that the airport has met the operational standards related to the Director-General of Civil Aviation Regulation No. KP14 of 2015 concerning Standards for Technicians and Operations of Civil Aviation Safety Regulations, Aviation Accident Relief Services, and Fire Fighting (PKP-PK).

Information technology has developed rapidly, and the use of information technology makes it easy to solve problems more quickly and accurately[7]. Utilizing information technology can provide convenience in measuring the operational feasibility of an airport's flight, so in this study, an application was built to help measuring the readiness of PKP-PK for Flight Operations.

2. RESEARCH METHOD

This research is a qualitative descriptive study. Based on the source data obtained in this research, the data is divided into two, namely primary data originating from data collection at the airport and secondary data in the form of a collection of data from the literature related to the method used to measure airport operational readiness.

2.1. Research framework

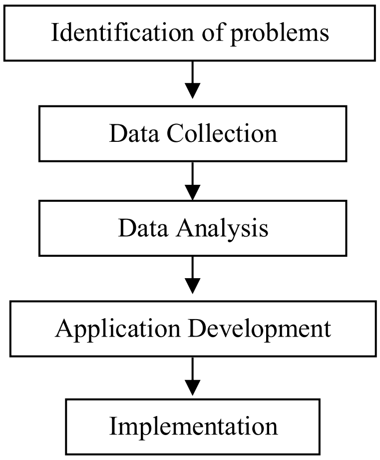


Figure 1. Research framework

At the identification stage, problems were obtained regarding the application requirements used to measure the readiness of the PKP-PK for flight operations in accordance with the Regulation of the General of Civil Aviation No. KP14 of 2015. Based on these problems, data is collected in the form of primary data and secondary data[8], which can be used as a basis for building a required system. Based on the data that has been obtained, an analysis is carried out to obtain the appropriate method for solving the problem, after the method is obtained, it can be continued by building the required application and implementing the application.

2.1. System development model

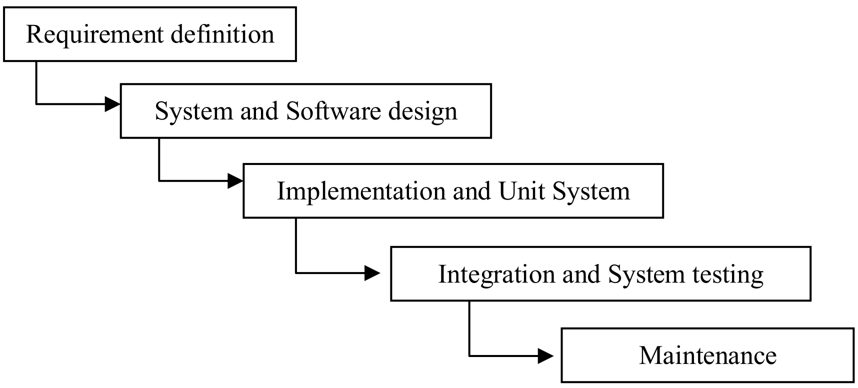


Figure 2. System development method

In addition to using the data collection method, system development is carried out using the SDLC (System Development Life Cycle) method using the waterfall model [9]. Figure 2 is an application development model using the waterfall model, where this model is commonly used in developing an application [10]. Requirement definition obtained at the data analysis stage in a research framework [11], [12], which is then continued on to the next system development, namely system, and software design which includes the process flow to the appearance of the software. The results of the system design are implemented in the implementation and unit system that is realized in one program. At the stage of integration and system testing, namely integrating between application units that have been created and tested for further use by users. Maintenance is carried out regularly to ensure the application can run properly.

2.3. Analysis Method

The analytical method used in this study uses Response Time. Response time is the ability of PKP-PK personnel and equipment that must be able to be carried out within a certain time limit when carrying out operations, in accordance with the requirements of technical and operational standards of civil aviation safety regulation's part 139 (manual of standard CASR part 139) or in accordance with the provisions of Chapter 9 Annex 14 Aerodrome ie no more than 3 minutes.

Calculation of the need for PKP-PK Airport personnel per shift based on the number of main and supporting vehicles, for backup vehicles (back up) is not taken into account. The response time is 3 minutes (180").

$$\text{Response Time Average (n)} = \frac{\textit{Total Response Time}}{\textit{Jumlah Pengujian}} \quad (1)$$

$$\text{Average achievement (\%)} = \frac{\text{Waktu Response Time}}{\textit{Rata-rata waktu Response Time}} \times 100\% \quad (2)$$

$$\text{Prosentase Response Time} = \frac{RT-(n-RT)}{RT} \times 100\% \quad (3)$$

Where:
RT : Time of Response Time (180")
n : Response Time Average (n) in 2 types of testing

3. RESULTS AND ANALYSIS

3.1. Design system

Figure 3 is the design of the system that runs on the application that was built, each user must first register and log in before being able to use the application.

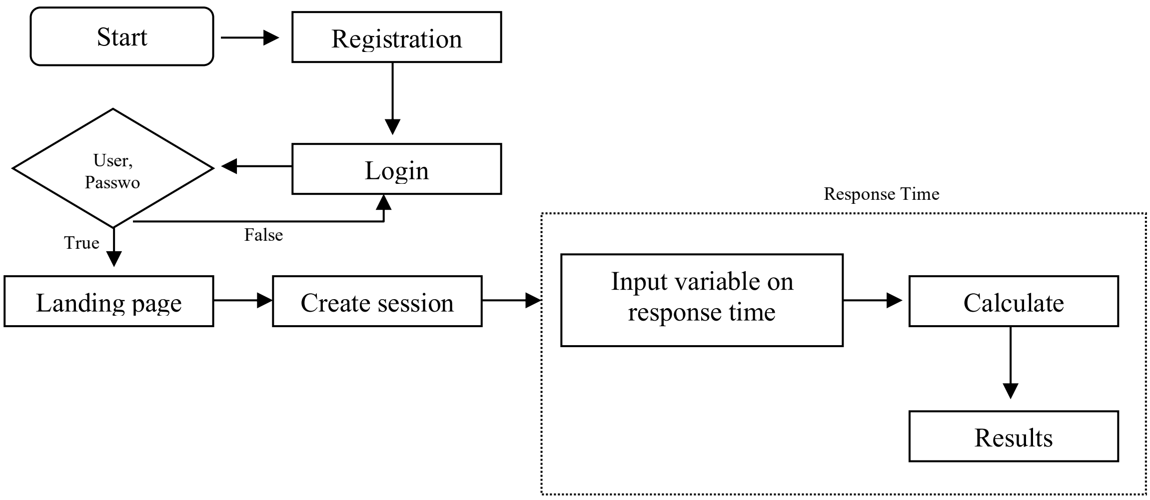


Figure 3. Design System

Each user must register first, before being able to use the application. After registering, users can log in using the registered username and password. If the user uses the correct username and password, they will be directed to the landing page, but if they are wrong, they will return to the login page.

On the landing page, the user must create a session, after the session is created the user can input the values of the variables needed to calculate the value of the response time and get the final result of the responsive time calculation.

3.2. System Development

Figure 4 is the display of the landing page of the system. Users can read the guidelines for using the application first or can start directly using the application. However, before being able to enter on that page, the user must already have an account and login using the registered account.

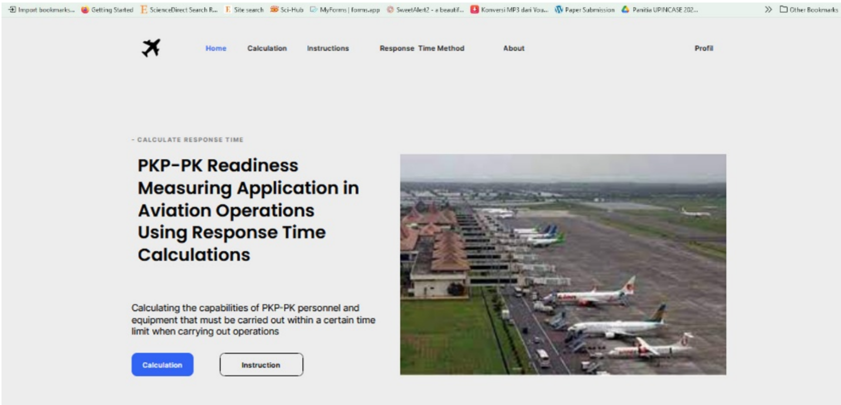


Figure 4. The main page after the user registers and log in

Users can select the calculation button to start doing calculations, which will be directed to the session creation page which can be seen in Figure 5. Each user must first create a session which can be seen in Figure 5.

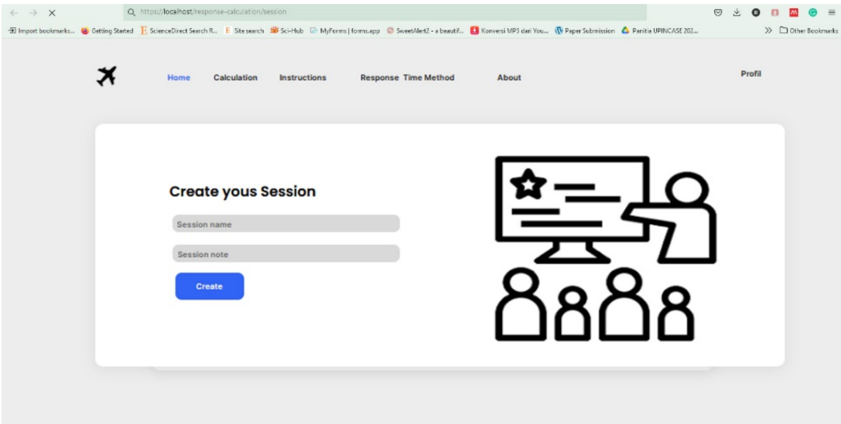


Figure 5. Create session page

Based on the created session, the responsive time calculation is stored in that session. If you want to recalculate the value of the responsive time, the user must first create a session. Each session that is made can be displayed again to see the results obtained. After creating the session, the user is directed to the input form to fill in the value of the average responsive time value which can be seen in Figure 6.

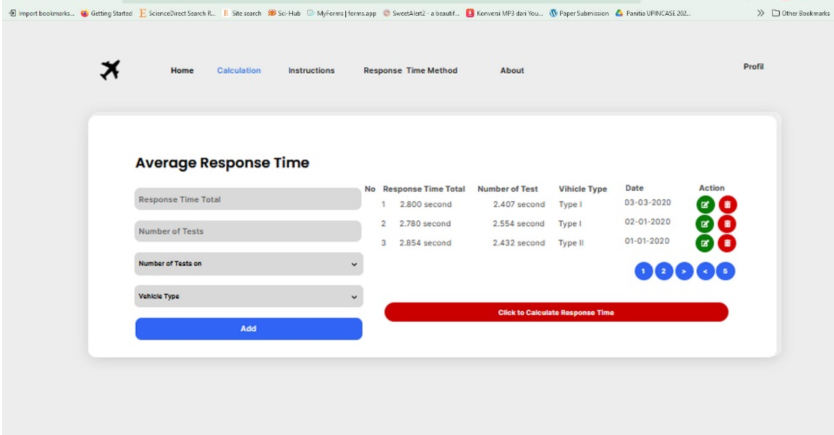
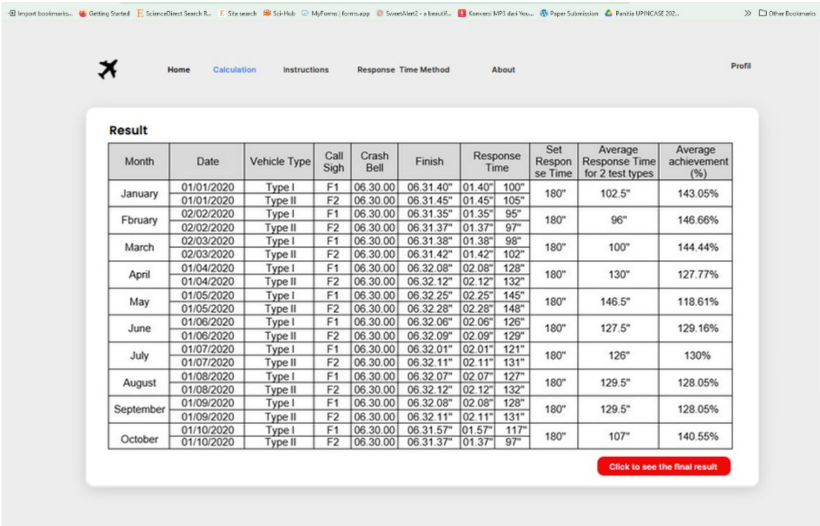


Figure 6. Variable value input page

The user must fill in the total response time, number of tests, the test date was carried out, and the type of vehicle and add it to the list by selecting the add button, as shown in Figure 6. When all data has been inputted, the user can press the click to Calculate button, until the calculation results can be seen in Figure 7.



Month	Date	Vehicle Type	Call Sigh	Crash Bell	Finish	Response Time		Set Respon se Time	Average Response Time for 2 test types	Average achievement (%)
January	01/01/2020	Type I	F1	06.30.00	06.31.40"	01.40"	100"	180"	102.5"	143.05%
	01/01/2020	Type II	F2	06.30.00	06.31.45"	01.45"	105"			
Fbruary	02/02/2020	Type I	F1	06.30.00	06.31.35"	01.35"	95"	180"	96"	146.66%
	02/02/2020	Type II	F2	06.30.00	06.31.37"	01.37"	97"			
March	02/03/2020	Type I	F1	06.30.00	06.31.38"	01.38"	98"	180"	100"	144.44%
	02/03/2020	Type II	F2	06.30.00	06.31.42"	01.42"	102"			
April	01/04/2020	Type I	F1	06.30.00	06.32.08"	02.08"	128"	180"	130"	127.77%
	01/04/2020	Type II	F2	06.30.00	06.32.12"	02.12"	132"			
May	01/05/2020	Type I	F1	06.30.00	06.32.25"	02.25"	145"	180"	146.5"	118.61%
	01/05/2020	Type II	F2	06.30.00	06.32.28"	02.28"	148"			
June	01/06/2020	Type I	F1	06.30.00	06.32.06"	02.06"	126"	180"	127.5"	129.16%
	01/06/2020	Type II	F2	06.30.00	06.32.09"	02.09"	129"			
July	01/07/2020	Type I	F1	06.30.00	06.32.01"	02.01"	121"	180"	126"	130%
	01/07/2020	Type II	F2	06.30.00	06.32.11"	02.11"	131"			
August	01/08/2020	Type I	F1	06.30.00	06.32.07"	02.07"	127"	180"	129.5"	128.05%
	01/08/2020	Type II	F2	06.30.00	06.32.12"	02.12"	132"			
September	01/09/2020	Type I	F1	06.30.00	06.32.08"	02.08"	128"	180"	129.5"	128.05%
	01/09/2020	Type II	F2	06.30.00	06.32.11"	02.11"	131"			
October	01/10/2020	Type I	F1	06.30.00	06.31.57"	01.57"	117"	180"	107"	140.55%
	01/10/2020	Type II	F2	06.30.00	06.31.37"	01.37"	97"			

Figure 7. Test table of response time

Figure 7 is a table page of the results of the calculation of the response time test. Using equation (3), the average response time achieved in the last 10 months in 2020 and the average percentage time for achieving the response time target in the last 10 months in 2020 can be determined.

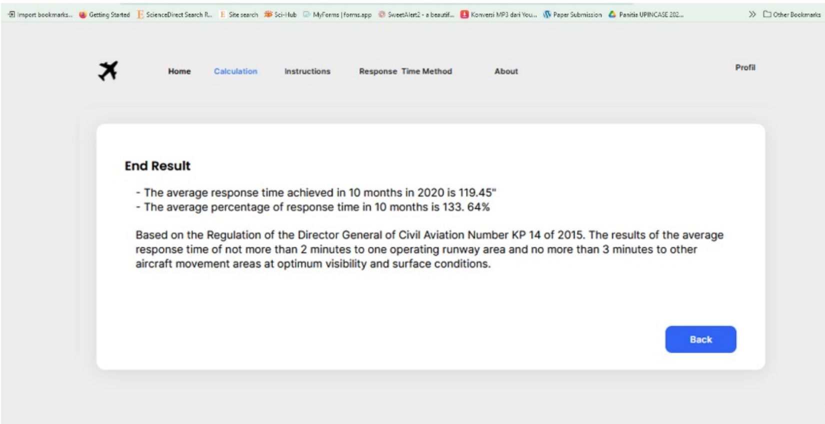


Figure 8. Flight operational feasibility final report page

Figure 8 is the result of obtaining the final score on the feasibility of flight operations in accordance with the regulations of General of Civil Aviation No. KP14 year 2015. The results of the average response time of no more than 2 minutes to one of the operating runway areas and no more than 3 minutes to other aircraft movement areas, so that from the test results the feasibility of airport operations has complied with the regulations of General of Civil Aviation No. KP14 year 2015.

4. CONCLUSION

The feasibility of flight operations is very important in supporting the safety of passengers while at the airport. Testing the feasibility of flight operations takes time and effort, with this application it can provide benefits to users in conducting flight operational feasibility tests in accordance with the regulations of the General Civil Aviation No. KP14 of 2015. So that it can ensure that the airport is suitable for use with the facilities it already.

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