

## **Biometric Technology System in Autogate Soekarno-Hatta International Airport for Fast and Seamless Travel**

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### **Abstract**

Along with the development of technology in airport sector and the increasing number of air transportation services, effective and efficient access is needed for users to get through the airport faster and seamless at a time. The latest technology used to make immigration process faster is the used of biometric technology. Biometrics are provided to identify and verify users travel document based on human characteristic, such as fingerprint, iris, and face recognition. This paper aims to see the effectiveness of biometric using descriptive-comparative analysis method. The research shows that 97.3% of the respondents feel biometric makes travel faster and seamless.

**Keywords :** biometric, airport, technologies, autogate, interview, descriptive-comparative

### **Introduction**

Soekarno-Hatta International Airport is the primary airport serving in Jakarta area and managed by PT Angkasa Pura II (Persero). Every year, passenger movement of the airport increases. On April 15, 2009, Soekarno-Hatta International Airport introduced new terminal to expand its capacity to fulfill the continually passenger traffic improvement. The new terminal bears the name Terminal 3 after the two older terminals, Terminal 1, which was established in 1982 and Terminal 2, which is opened in 1992 (Perdamaian, Budiarto, & Ridwan, 2013).

Terminal 3 named on 2009 was Terminal 3 Pier 1, but on 2016 changed to Terminal 3 Ultimate, however the word “ultimate” got some criticized from Indonesia citizens because using English word. Eventually PT Angkasa Pura II (Persero) removed the word “ultimate” before the terminal 3 was being operated.

Based on PT Angkasa Pura II (Persero) through the main branch office of Soekarno-Hatta International Airport noted that throughout 2017, the number of passengers reached 63,015,620 people. To get through the airport faster and

seamless at a time, every traveler can pass through the system that is effective and efficient. Biometric is a technological and scientific method based on human biological identification such as face recognition or fingerprints. Biometrics makes queues a thing of the past because biometric provides faster and seamless immigration process in airport. In fact, the developments are moving so fast that biometrics ultimately replaces all forms of travel documentation with passenger's unique physical attributes.

For thousand years, humans have used body characteristics such as face, voice, and so on to recognize each other. In the middle 19th century, Alphonse Bertillon, chief of the criminal identification division of the police department in Paris, developed and then practiced the idea of using various body measurements.(Prabhakar, Pankanti, & Jain, 2003) One of the earliest and best-known biometric technologies is fingerprint recognition. Automatic finger-print-based identification systems have been commercially available since the early 1960s.(M & Jain, 2000)

Since 2001, airports worldwide have increase number of security systems with biometric recognition. Some operate behind the scenes, as for airport staff or cabin crew use. At London City Airport, for example, staff have used biometrics to access secure areas since 2002. At Sydney airport, a face- recognition system called Smart Gate replaced passport checks for Quanta's crew in 2003(Sasse, 2002)

Although passwords and PINs (Personal Identification Number) are used for automatic recognition and authentication, this kind of systems can be misguided easily. Moreover, some passwords are very simple to be guessed or broken. Besides, longer or complex passwords are more secured but harder to remember, consequently, people tend to note them. Instead of passwords, biometric traits can also be used to identify or verify users (Akdogan, Karaoglan Altop, Eskandarian, & Levi, 2018)

A biometric system is a pattern-recognition system that recognizes a person based on a feature from a specific physiological or behavioral characteristic. Depending

on the application context, a biometric system typically for airport, focus on two tasks performance: verification and identification. (Prabhakar, Pankanti, & Jain, 2003). Verification means that the biometric is checked against a travel record in the database while identification means that the biometric presented must match a record in a database.(Sasse, 2002) Autogate consists of physical barriers (glass doors), a document reader, biometric capture devices, user interfaces (monitors, LED signals, monitoring stations), and surveillance cameras or sensors (Oostveen, Kaufmann, Krempel, & Grasmann, 2014). Autogate in Soekarno Hatta International Airport Terminal 3 uses two-step process with double door autogates, as mentioned by Oostveen there are different systems currently in use : one-step processes, integrated two-step processes with single or double door autogates , and segregated two-step processes(Oostveen et al., 2014).

As mentioned before, physical characteristics, such as fingerprints, face and iris recognition, are unique and differ from each person. This is the main reason behind the fact that the biometric verification and identification systems are known to be reliable and trusted (Akdogan et al., 2018). However, for a practical biometric system, it has to consider issues of performance and acceptability. In other words, a practical system must fulfill the accuracy, speed, and it must be harmless for the users, and accepted by the users or passengers (Prabhakar et al., 2003). When people find security systems difficult or unacceptable, the result is become obstructed, excessive operation costs, and disturb the security. Since 2001, airports worldwide have increase the number of security systems with biometric recognition (Sasse, 2002).

There are some conditions when biometric system cannot work properly or can be use optimally. In one condition, each person fingerprint is not the same because of imperfect conditions such as dry fingers that can make fingerprints unrecognizable, this condition can be fixed by the operator by giving the users or passengers hand sanitizer to damp the fingers, therefore, the system can recognize the data. In other condition, it is most likely because of the people or passengers habits; there are so many passengers that still think the biometric technology in

auto gate Terminal 3 is so confusing that it is not easy to use. These habitual issues can be fixed by giving information to the passengers that the biometric technology system in auto gate Terminal 3 is easy to use and save more time.

The researchers only focused on Autogate Border Terminal 3 at Soekarno Hatta International Airport for data collection and information. Auto gate Border Terminal 3 at Soekarno-Hatta International Airport can be used only for Indonesia citizens.

Soekarno Hatta International Airport especially in Terminal 3 implemented Autogate Border Control systems with biometrics to improve passenger clearance for fast and seamless travel. The purpose of this paper is to enlighten individuals preceptions of biometrics. The research of this paper was based on literature source , questionnaire method, and interviews with the airport officer in charge.

## **Method**

To address the problems of the research and to achieve its purpose, a descriptive comparative research method was used.

Descriptive method is a methodology that describes various aspects of the phenomenon. Sugiyono (2014: 53) said that descriptive research is research conducted to determine the existence of independent variables, either one variable or more variables. In its popular format, descriptive research is used to describe characteristics and/or current events. The purpose of descriptive methodology is to make description or overview systematical and factual facts and the correlation of the phenomenon. In descriptive research method, researchers can compare the phenomenon, so that is a comparative study.

Refer to Sugiyono (2014: 54) comparative research is research that compares the state of one or more variables in two or more different samples, or two different times. The methodology of research utilized in comparative research is to make a comparison between two samples at different categories or define categories differently. Therefore, the aim of this comparative methodology in this research is

to compare the utilization of biometric auto gate and non-biometric gate that has been implemented.

Object of this research were passengers that used auto gate Border in Terminal 3 Soekarno-Hatta International Airport. The researchers collected data from the passengers used questionnaires method.

Location of the research was Autogate Border and Manual Gate Border (Immigration Desk) Terminal at Soekarno Hatta International Airport located in Jalan P2, Pajang, Benda, Tangerang City, Banten 15126. These gates located side by side in one building. Researchers chose these two locations because that location suit with the criteria of this research, also because of the differences of operational system in these two gates. Auto gate Border use biometric technology in its system to do the verification and identification process, and Manual Gate Border (Immigration Desk) use manpower to do the verification and identification process.

The Researchers collected primary data during the research that perform questionnaires, documentation and interview. The researchers already interviewed one of OIC (Officer in Charge) deputy in terminal 3 and then it can obtain secondary data either through observation or through literature source.

## **Discussion and Result**

In the discussion and result session, the researchers would like to discuss the findings in sequences. The researchers will explain from the library research, questionnaire, and observation part. Based on the literature reviews and library research, it is found that biometric technology system ultimately replaces all forms of travel documentation with passenger's unique physical attributes such as: fingerprints, iris and face recognition.

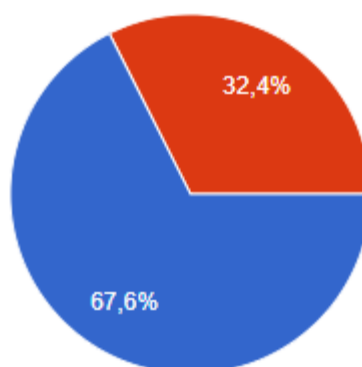
According to Akdogan, Karaoglan Altop, Eskandrian and Levi (2018) Instead of password that can be misguided easily, biometric can be used to verify and identify users that known to be reliable and trusted. Prabhakar, Pankanti, & Jain (2003) also said that biometric system typically for airport, focus on two tasks

performance: verification and identification. Biometric technology in Auto gate consist some elements, these elements also classified by Oostveen, Kaufmann, Krempel, & Grasemann (2014) In Autogate consist physical barriers, a document reader, biometric capture devices, user interfaces, and surveillance cameras or sensors.

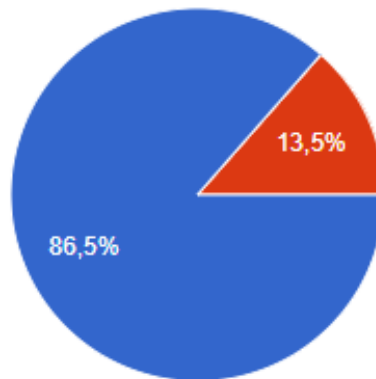
The researchers also found that biometric technology in Auto gate Terminal 3 Soekarno-Hatta International Airport uses two-steps process with double door autogates. Based on, Oostveen, Kaufmann, Krempel, & Grasemann (2014) there are three different systems that currently in used: one-step processes, integrated two-step processes with single or double door autogates, and segregated two-step processes.

Biometric technology systems have to be user-friendly and accepted by the users because if the systems and/or technologies are unacceptable, the aim/goal cannot be achieved. The aim/goal of the systems and/or technologies is to make the travel faster and seamless. Prabhakar (2003) said that the system must fulfill the accuracy, speed, and it must be harmless for the users and acceptable. Sasse (2002) also said that if the system is unacceptable by the users the result will become obstructed, excessive operation costs, and disturb the security.

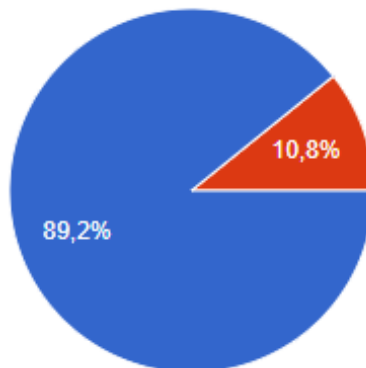
Besides doing the library research, researchers also used questionnaires to collect the data, based on our questionnaires spread to 64 respondents, but among those respondents only 37 who already used biometric technology system in Auto gate Terminal 3 Soekarno-Hatta International Airport and the followings are the results of our questionnaires:



From the diagram 1 above, show that only 67.6% who knows that biometric technology system in Auto gate Terminal 3 Soekarno-Hatta International Airport is not only for the e-passport but also for the regular passport and 32.4 % does not know.

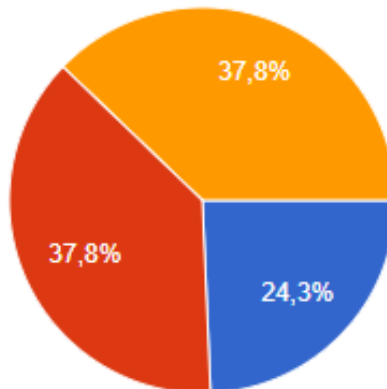


From the diagram 2 above, show that the availability of information display in Auto gate Terminal 3 Soekarno-Hatta International Airport only 75.7 % respondents knows about it existence and 18.9 % respondents does not know about it, and 5.4 % respondents said it does not exist.



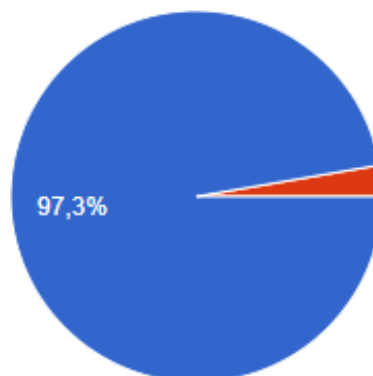
From the diagram 3 above, show that 89.2 % respondents said that the operator in Auto gate Terminal 3 Soekarno-Hatta International Airport already help them to use the Auto gate, but 10.8 % respondents said that the operator did not help them.

From the diagram 4 above, show that the 86.5% feels that biometric technology in Auto gate Terminal 3 Soekarno-Hatta International Airport was easy to use or user friendly, but 13.5 % of respondents did not feel the same and said it was not easy to use.



From the diagram 5 above, show that the obstacles to used biometric technology in Auto gate Terminal 3 Soekarno-Hatta International Airport are: first, passport cannot be verified by system and 37.8% respondents experienced that, second, dry hands/fingers and 24.3% respondents experienced none of the above. Moreover, 37.8% respondents experience something else.

From the diagram 6 above, the researchers also found that most of respondents already feels biometric technology in Auto gate Terminal 3 Soekarno-Hatta International Airport make their travel faster and seamless, in the amount of 97.3% respondents feels that, and 2.7% respondents did not.



Based on researchers observation in Terminal 3 Soekarno Hatta International Airport mentioned about auto gate system directly used for Indonesian citizen because the system identify Indonesian citizen identities from passport data base. The researchers observe that mostly of Indonesian citizen prefer using Manual Gate Border (Immigration Desk) rather than Auto gate Border Control System with biometric system this point of view can be seen during the process of observation that take one hour in two different places; arrival immigration checkpoint and departure immigration checkpoint. For arrival immigration checkpoint, only 10 persons who used Auto gate Border Control System and for departure immigration checkpoint, only 4 persons who used Auto gate Border Control System.

Most of people who pass immigration checkpoint tend to use Manual Gate Border (Immigration Desk) rather to Auto gate Border Control System. This is because travelers not paying attention with auto gate's position that not strategic and not clearly seen, even more at departure immigration checkpoints are divided by an advertisement wall like have been seen before is Asian Games billboard, it makes people passing the auto gate. As a record in this observation, Auto gate Border Control System in Terminal 3 not only suitable for e-Passports but it suits regular passports.

Length of time to spend auto gate's system approximately 28 second and for manual gate the time that travelers spend 3 minutes, more longer than auto gate because it need human social interactions checking to verify and to identify the characters or the behavior from travelers around the world that obviously has different perspective.

Total amount of automates in Terminal 3 Soekarno Hatta International Airport are about 32 and divided by two based on arrival and departure gate, 17 for arrival gates and 15 for departure gate. This total amount of autogates can really help the passenger for fast and seamless travel but in the fact not all of Indonesian citizen realize the existence of automates.

The researchers also interviewed officer in charge (OIC) in Terminal 3 Soekarno Hatta International Airport to collect the data and said current obstacles faced by travelers are similar, for example; incomplete passport identity happens when system cannot identify information from passport database, and it force travelers to use manual gate immigration checkpoint. He also mentioned about undetected fingerprint that caused by dry hand and it can be handle by provide the travelers antiseptic. Auto gate itself only permitted for Indonesian nationality.

### **Conclusion**

According to discussion and result that has been explain, the researchers can conclude that:

1. Biometric is a technology system that can identify and verify based on human characteristic, such as fingerprint, iris, and face recognition.
2. The aim/goal of the biometric systems and/or technologies is to make the travel faster and seamless in in air transportation field (airport).
3. Based on questionnaires that the researcher used to collect the data; most of passengers that used biometric in Auto gate Terminal 3 Soekarno-Hatta International Airport feels that system and/or technologies make the travel faster and seamless.
4. Refer to the researchers observation also found that there were a problem of biometric technology in Auto gate Terminal 3 Soekarno-Hatta International Airport cannot be used optimally because of the auto gate position was not strategic and cannot clearly seen.

### **Recommendation**

1. Based on this paper, there are some of recommendation for further research in the future such as: more methodological work is needed on how biometric work in airport field for fast and seamless travel, including seasonal flight.
2. And for the regulator that regulate the biometric and/or technologies in Auto gate Terminal 3 Soekarno-Hatta International Airport can provide more

advertisement and socialize the system and/or technologies to all of the Indonesian citizens.

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