The implementation of eco building on design rest area Soekarno Hatta international airport

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Abstract. The population growth has resulted in demands for transportation needs to be able to carry out activities outside from home such as work, schooling and even travelling to other cities and countries. A transportation equipped with rest area facilities in order to facilitate the comfortable movement of resident activities. From these conditions, a rest area design is needed, especially at airports that can provide convenience and comfort for residents who want to travel to other cities and countries. This study used a qualitative descriptive method by collecting primary data, studying literature from similar projects. The rest area design at Soekarno Hatta Airport produces a rest area design that accommodates the density of visitors at Soekarno Hatta Airport by using the eco building concept in the building which is expected to provide comfort and convenience in using transportation in airport.

1. Introduction
In this age of globalization, the need for rapid transportation takes precedence over every human being in doing his activities such as working, traveling or making visits to his family, friends and colleagues [1]. This high level of mobility requires alternative transportation, transportation providers and accommodation adjusted to the needs of today's society [2]. Aircraft are one type of transportation that is more widely used because users will arrive at the destination city or country at a faster time than other transportation methods [3]. Indonesia is one of the countries in Asia that has experienced a quite high number of passengers using aircraft at airports [4]. This causes high activity and causes crowds of users in an airport, including Soekarno Hatta International Airport [5]. Look from this conditions, Soekarno Hatta International Airport must provide supporting facilities that can facilitate user activities before flying. The solution is to design a rest area at Soekarno Hatta International Airport. The design of a rest area at Soekarno Hatta International Airport uses the concept of eco building. Eco building is an architectural design that produces sustainable construction, which aims to protect the natural environment by using energy efficient technology and appropriate materials so as to minimize waste of resources [6]. Eco Building which is part of green building is one of the alternative options for eco-friendly development [7]. It is expected that by using eco-building design can reduce pollution and environmental damage which is the problems in Indonesia [8]. The design solution is expected to be related to the Sky Train Station building. By providing effective, comfortable and environmentally friendly facilities for visitors and airport managers can create ideas and ideas for the development of airport facilities and also supporting facilities to become an icon in the airport area. The scope of discussion is substantially emphasized on the aspect of the planning.
2. Methods
The research location is at Soekarno Hatta International Airport. This study uses a qualitative descriptive method by collecting primary data related to the research location, collecting literature studies from comparative studies of similar projects and literature on eco building from previous architects or researchers. The results of the literature studies can be selected and use in obtaining what methods that can be implemented in this study. Primary data were collected by conducting a survey to the research location directly in order to obtain relevant data analysis of site conditions and the building, analysis of climate, analysis of access and the environment, analysis climatology, analysis of climate, analysis noise, analysis of vegetation, analysis of the structure and materials, analysis of utilities, analysis of the need for space. The results of data collection related to the analysis will be developed into a design concept that will produce a Design rest area of Soekarno Hatta International Airport. See figure 1 below.

![Figure 1. Research area.](image)

This research is also uses the research method of collecting literature studies of similar project buildings. The first is Beijing Daxing International Airport where this airport is one of the most effective and comfortable buildings in China and around the world [9]. Beijing Daxing International Airport was designed by architect Zaha Hadid who applies modern and futuristic design concepts and also uses natural lighting by using skylights to be energy efficient, has a rain and dirty water treatment system stored in a lake or river to overcome the heat in the building [10]. The second is, Jewel Changi Airport where the airport is used as a center to become a major public attraction, emphasizing the concept of Eco Airport [11]. In 2020, Jewel Changi International Airport was named the best International Airport in the world [12]. Jewel Changi Airport uses several analyses applied in the design concept, among others, analysis of functions consisting of primary, secondary and supporting functions, conducting activity analysis in accordance with the analysis of functions used, then conducting environmental aspects analysis [13]. See figure 2 and 3 below.

![Figure 2. Jewel Changi Airport site plan.](image)  ![Figure 3. Jewel Changi Airport section.](image)
Jewel Changi Airport provides a wide range of ground facilities for airport operations, indoor parks and recreation areas, retail offerings and hotel facilities in a building. Jewel Changi Airport's facade is a dome made of glass and steel, making it an attraction of Jewel Changi Airport as one of the world's leading airports representing innovation in the lifestyle world, with a unique relationship between the park and the market. Moreover, there is no place in the world that has buildings that integrate the public domain with airport facilities that are so close. Jewel Changi Airport expanded its main functions as a transit hub, to public meeting rooms for Singaporeans and international tourists, and built a new model for the airport for activities such as shopping, entertainment, and social activities. This research is also collects articles from previous research. The first research was titled The Design of International Airport in Kabupaten Kediri with a Futuristic Architectural Approach using Zaha Hadid's Techniques of Architectural Form-Making method by conducting environmental site studies and applying Zaha Hadid techniques. The second study was titled The Concept of Planning an Airport with an Ecofriendly Theme in Bolaang Mongondow that uses quantitative methods by conducting interviews, literature studies, observations, comparison studies and supporting and conducting image studies. The third study was titled Hotel Transit in Kubu Raya with the Green Building Approach which used the study of literature, data collection and analysis and design. From several studies conducted by three (3) previous researchers. The researchers conducted a study titled The Application of Eco Building on The Design rest area of Soekarno Hatta International Airport which focused on qualitative descriptive method that discussed the techniques of collection, data analysis, survey/observation of site sites and objects to obtain data related to design objects, interviews, documenting primary and secondary data sources. Primary data is a work in the form of field studies, while secondary data is a literature study. The study of literature used is books, articles published in the form of journals and other scientific works. Design rest area of Soekarno Hatta International Airport which has hotel facilities and commercial area, implements the theme of Eco Building which aims to solve various problems such as environmental problems, pollution and environmental health so as to minimize the on-the-scene environmental crisis and global warming.

3. Results and discussion
The conclusion can be drawn from Beijing Daxing International Airport and Jewel Changi Airport's comparative study that the building system and analysis applied to the building can be adopted into the Design rest area of Soekarno Hatta International Airport which applies the concept of Eco Building. Research Location is located in Soekarno-Hatta International Airport Area, Tangerang, Banten. It is quite strategic because it is close to APMS Train Station and Soekarno-Hatta International Airport Commuter Line Station. This research location is also located between two terminals namely terminal 1 and terminal 2 Soekarno-Hatta International Airport. In the research site there are two separate lands or sites separated into two by vehicle lanes, namely on the north and south sides. The first thing that the Researchers do are conducting tread analysis in a study entitled The Application of Eco Building in the Design rest area of Soekarno Hatta International Airport to produce a mass shape of buildings that are circular and adapt to the surrounding buildings so as to create a dynamic and futuristic impression. See figure 4-6 below.
Tread analysis results in a concept of building mass where the building consists of two masses which each mass has the same function as taking the form of a circle base where each floor upwards has a reduction in shape. See figure 7 below.

![Figure 7. Mass concept.](image)

The concept of mass building produces a regional design that solves environmental problems, pollution and environmental health so as to minimize the environmental crisis and global warming by applying the concept of eco building to the design. See figure 8 below.

![Figure 8. Mass building.](image)

This design also produces a solution to noise pollution by placing the position of terminals 1 and 2 buildings right on the south and north sides of the building. See figure 9 and 10 below.

![Figure 9. View of area 1.](image)  ![Figure 10. View of area 2.](image)

4. Conclusion
In order to solve the density problem of visitors at Soekarno Hatta International Airport, the development planning of Rest Area Airport is highly recommended to accommodate visitors. The development of
Soekarno Hatta International Airport area supports the resolution of a number of problems such as visitor density, transportation, environment, and economy. Issues such as visitor density are quite concentrated in planning. To solve the problem, various theories were made adjusted to the field findings to determine the appropriate Rest Area Airport planning guidelines. From the observations it is known that the implementation of Eco-Building is something suitable for use in the planning of the Rest Area Airport. Rest Area Airport is planned to provide lodging facilities in the form of hotels, shopping centers, co-working spaces, relaxing facilities, and airline offices. The implementation of Eco-Building in Rest Area Airport building emphasizes the use of renewable energy by using solar panel system and precise design of land use. The Rest Area Airport building has connections with APMS Station which also aims as an icon of Soekarno Hatta Airport.

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References
[1] Lacey M 2008 Making the connections J. / Am. Water Work. Assoc. 100(2)
[2] Broaddus A, Litman T and Menon G 2010 Manajemen Permintaan Transportasi 130
[3] Driyono B 2019 JURNAL TEKNIK DAN KESELAMATAN TRANSPORTASI Akademi Teknik dan Keselamatan Penerbangan Makassar II 12–28
[4] Chang Y-C 2010 The development of regional airports in Asia 38 53–76
[5] Mandle P B, Mansel D M and Coogan M A 2000 Use of public transportation by airport passengers Transp. Res. Rec. 83–9
[6] Part E A S and Low O F A 2011 Eco-Buildings As Part of a Low
[7] Udomiaye E, Okon I U, Uzodimma O C and Patrick N 2018 ECO-FRIENDLY BUILDING S: THE ARCHITECT’S PERSPECTIVES Emmanuel Udomiaye, Ibok U. Okon, Odom Christopher Uzodimma and Ntaji Patrick Department of Architectural technology, Akanu Ibiam Federal Polytechnic Unwana Int. J. Civ. Eng. Constr. Estate Manag. 6 14–26
[8] Banten DLKH 2019 15 Permasalahan Lingkungan Hidup Indonesia dan Penyebabnya (Banten: DKLH)
[9] Zhu E, Zhang C and Su Y Beijing daxing
[10] Anon Beijing Daxing International Airport - Wikipedia 8322
[11] Airport A N E 2008 Issue 12 Taking the Green Approach
[12] Chutiphongdech T 2020 The Success behind the World’s Best Airport: The Rise of the Changi SSRN Electron. J.
[13] Pak J K 2017 A Detailed Analysis and Design for Future Proofing Singapore’s Changi Airport 199