

**A LANDSCAPE DESIGN RECOMMENDATION FOR CAR PARK AND
LAY-BY AREA IN SANDAKAN AIRPORT**

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ABSTRACT

Sandakan airport is an airport that has been operating domestically for 28 years. The landscape design and safety approach in Sandakan Airport can no longer provide the basic necessities to airport users. The location of study was at the car park and lay by area of Sandakan Airport. The objectives of this research were to identify Sandakan Airport users' landscape preferences and develop into a design proposal for the landscape design and safety issues at the car park and lay by area in Sandakan Airport; and to improve the first impression, sense of place and welcome to airport users. Survey, site analysis and landscape planning were carried out to upgrade the car park and lay by area in Sandakan Airport. Survey questionnaires were used to understand the preferences of Sandakan Airport users on the hardscape element, design element, theme preference and knowledge on landscape, supplementary data such as site inventory analysis were also collected. Site inventory and analysis were also done to aid in the synthesis of sustainable landscape design such as selection of plants that suits the intrinsic characteristics of certain area such as planting of shade tolerant plants at shady area and drought tolerant plants at dry soil area. The landscape design proposed had incorporate sustainable elements to lower the maintenance of the design, improvements on standards of safety for airport users and aesthetic elements to improve the appearance and quality of Sandakan Airport. It was found out the existing facilities of Sandakan Airport were getting old and thus needed a major upgrade plan to renew the area.

CADANGAN REKA BENTUK LANDSKAP DI KAWASAN TEMPAT LETAK KERETA SERTA KAWASAN MENYAMBUT DAN MENGHANTAR PENUMPANG DI LAPANGAN TERBANG SANDAKAN

ABSTRAK

Sandakan lapangan terbang merupakan lapangan terbang yang beroperasi secara domestik selama 28 tahun. Keadaan reka bentuk landskap dan pendekatan keselamatan di Lapangan Terbang Sandakan sekarang sudah tidak berupaya untuk menampung keperluan asas pengguna lapangan terbang. Lokasi kajian terletak di tempat letak kenderaan, tempat menurun dan mengambil penumpang di kawasan Lapangan Terbang Sandakan. Objektif kajian ini adalah untuk mengkaji dan menggabungkan kecenderungan pengguna lapangan terbang ke dalam projek menaik taraf reka bentuk landskap dan isu-isu keselamatan di tempat letak kenderaan, tempat menurunkan dan mengambil penumpang di kawasan Lapangan Terbang Sandakan dan untuk memberi tanggapan pertama yang baik, rasa tempat dan dialu-alukan kepada pengguna Lapangan Terbang Sandakan. Kajian soal selidik, analisis tapak dan perancangan landskap telah dijalankan untuk menaik taraf tempat letak kenderaan, tempat menurunkan dan mengambil penumpang di kawasan Lapangan Terbang Sandakan. Soal selidik kajian telah digunakan untuk memahami cita rasa atau kecenderungan pengguna Lapangan Terbang Sandakan terhadap elemen keras, elemen reka bentuk, tema lanskap dan pengetahuan mengenai lanskap. Pada masa yang sama, data tambahan seperti analisis inventori tapak juga dikumpul. Data yang diperoleh dari kajian tapak telah digunakan untuk membantu dalam sintesis reka bentuk landskap yang mapan, contohnya pemilihan tumbuhan yang sesuai dengan ciri-ciri semula jadi kawasan tertentu seperti penanaman tumbuhan yang tahan teduh di kawasan yang teduh dan tumbuhan yang tahan kemarau di kawasan tanah kering. Reka bentuk landskap yang dicadangkan telah menggabungkan elemen-elemen yang mapan untuk mengurangkan penyelenggaraan reka bentuk landskap, meningkatkan piawaian keselamatan untuk pengguna lapangan terbang dan unsur-unsur estetik untuk meningkatkan penampilan dan kualiti Lapangan Terbang Sandakan. Ia didapati bahawa kemudahan yang sedia ada sudah lama tidak dinaik taraf dan justeru memerlukan pelan penaikan taraf untuk memperbaharui kawasan Lapangan Terbang Sandakan.

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LIST OF SYMBOLS, UNITS AND ABBREVIATIONS

%	Percentage
±	Plus – Minus
ACT	Australian Capital Territory
CCTV	Closed-Circuit Television
E	East
etc.	Et cetera
km/h	Kilometer per hour
MSA	Multi Sports Arena
N	North
Sp.	Species

CHAPTER 1

INTRODUCTION

1.1 Introduction

Sandakan Airport is a public domestic airport owned by the Malaysia Government (Malaysia Airports Holdings Berhad, 2013). The Sandakan Airport has runways and buildings that regulate the takeoff, landing, maintenance of civil plane and provide various facilities to passengers (Malaysia Airports Holdings Berhad, 2013). The airport is located in Sandakan, Sabah, in East Malaysia. Sandakan Airport is operated by Malaysia Airports Holdings Berhad. The area of Sandakan Airport is 8,645 m² (Malaysia Airports Holdings Berhad, 2013). The airport has the ability to cater 1.5 million passengers with approximately 13,000 aircraft movements (Malaysia Airports Holdings Berhad, 2013). Airasia, MAS (Malaysia Airlines), MASWings are the commercial airlines that have aircraft operations in Sandakan Airport (Malaysia Airports Holdings Berhad, 2013). The numbers of passenger annually has increased steadily from 1998 to 2011 which the number of passengers in 1998 was 377, 843 and the number of passengers in 2011 was 788, 515 (Malaysia Airports Holdings Berhad, 2013).

Airport should be able to provide a well maintained network of airports that can ensure the safety and mobility of all airport users (Kansas Aviation, 2009). Sandakan Airport used to be an airbase that was built to serve military purposes. This explains the simplicity and lack of attractiveness of landscape design in the airport. Furthermore the airport also lacks of safety management that may bring danger or discomfort to airport users (Mali, 2013). This justifies the need to upgrade the landscape design and safety management of Sandakan Airport.

The importance of an airport is to act as a city's gateway and a pit stop for aircraft landing and take-off. An airport also facilitates the movement of public or goods from place to place (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007; Kansas Aviation, 2009). The connectivity and accessibility among countries provided by airports flourishes the economy and society of a country (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007; Kansas Aviation, 2009).

The social importance of an airport is to act as a gateway for public to travel and expand their knowledge in other parts of the world (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007). It gives open opportunities to different cities and countries to exchange information especially in promoting local culture and knowledge (The Chinese University of Hong Kong, 2003). Besides that, airport also acts as a gateway for air transport that enables crucial social functions to be carried out, such as, transporting doctors or patients from country to country for better healing treatment (Cristureanu *et al.*, 2007).

An airport is important to national economic development as it is able to increase the transportation speed and quantity of trades among countries and cities (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007). Due to the ability of aircraft to transport goods within a short time which is known as air freight, it increases the types of goods that can be imported or exported such as high value, low weight goods, transient food or goods that require immediate delivery (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007). An airport is also able to increase the inflow and outflow of public in a city or country (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007). These public include tourists, traders and local citizen that shall in turn increase the economic activities and create more job opportunities and income in an area (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007; Kansas Aviation, 2009). This also increases the urbanization of a city as an increase mobility of public in and out of a city increases development of land around the airport (The Chinese University of Hong Kong, 2003; Cristureanu *et al.*, 2007; Kansas Aviation, 2009).

Politically, an airport gives the first and last impression of a place to ambassadors from other countries. An airport is also able to serve political liberty when there is a continuous exchange of cultural and political influences among western and

eastern countries (The Chinese University of Hong Kong, 2003). An airport is also important in military and economical operations such as the setting up of military air base and flying school to train more pilots for both domestic flights and army operations (The Chinese University of Hong Kong, 2003; Kansas Aviation, 2009).

In concern with sustainability of the landscape in Sandakan Airport, the landscape within the airport must be well planned and designed. One of the solutions to this goal is to choose plants that require low maintenance effort such as plants that require low irrigation, fertilization, pest control and thrive best with the climate, environment and soil condition in Sandakan Airport area (The O'Hare Modernization Program, 2008; Ministry of Housing and Local Government, 2011; ACT Planning & Land Authority, 2012).

1.2 Problem Statement

It was acknowledged that car park and lay-by area of Sandakan Airport is in need of proper landscape treatment and usage maximization during the peak hours (Mali, 2013). Thus, this study was conducted to facilitate landscape upgrading recommendation maximizing the usage of Sandakan Airport's car park and lay-by area.

1.3 Justification

Sandakan Airport has been opened to commercial flights for 28 years since 1985. Since then, the original facilities and appearance of Sandakan Airport has not been upgraded and improved (Mali, 2013). The appearance and airport facilities such as traffic routes, pedestrian pathways, and landscape designs have not undergone any major change since the starting of commercial use of the airport (Mali, 2013). The appearance of an airport represents the image and pride of a city. The old and outdated facilities of Sandakan Airport will simply ruin the first impression of Sandakan. The landscape design within and around the airport is simple and lack of attractiveness. Furthermore it also lacks of safety management. Therefore there is a necessity to upgrade of the facilities and landscape designs in Sandakan Airport. Since all air travellers pay their airport taxes, the fundamental services that should be provided to them is a comfortable, safe and convenient airport (Mali, 2013).

This study will focus on the car park and lay by area. The landscape appearances of Sandakan Airport car park area that need improvements are the asphalt layered road that has many holes, ruined speed bumps, road surface marking and ornamental plants decorations. The lighting around the car park area must be increased to enhance the safety and comforts of airport users because it is dangerous for airport users to walk or drive around when the area is dark. The speed bump located at the lay by area need to be replaced to enhance traffic calming.

Airport users such as tourists, airport workers and locals often need to wait before boarding the airplane after checking in and/or wait for friends or family to pick them up from the airport after landing. During that period, they shall be delighted to have a beautiful view of the airport to be appreciated during waiting time instead of on waiting aimlessly. The other reason Sandakan Airport should be upgraded is because the city's airport was built to fit the capacity of airport users 28 years ago. In fact, the amount of Sandakan Airport users has increased vastly within these years as Sandakan has become a tourist attraction. The tourist attraction spots in Sandakan are the Turtle Island Park, Orang Utan Sanctuary, Agnes Newton Keith Home, Sandakan Rainforest Park, Lankayan Island, Gomantong Cave, etc. Sandakan Airport will run out of capacity sooner or later if the amount of air travellers increases every year. Thus the appearance and capacity of Sandakan Airport should be improved to provide a more attractive and new appearance by redesigning the landscape and plants arrangements within and around Sandakan Airport to sustain future needs (Mali, 2013).

1.4 Objectives

The objectives of this research are:

- i. To identify users' landscape preferences on Sandakan Airport's car park and lay by area.
- ii. To develop a landscape design proposal for Sandakan Airport's car park and lay by area based on site existing condition and preferences of Sandakan Airport users.
- iii. To identify the existing condition of the site to use as a reference to design the landscape of Sandakan Airport car park and lay by area.

1.5 Research Question

The research questions of this study are:

- i. What are the landscape preferences of users on Sandakan Airport's car park and lay by area?
- ii. What is the suitable landscape design for Sandakan Airport's car park and lay by area based on site existing condition and preferences of Sandakan Airport users?
- iii. What is the existing condition of the site?

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Landscape Design

Landscape design defines the action of organization or modification of a landscape feature for aesthetic or practical purposes (Motloch, 2001). A functional and aesthetically pleasing extension of indoor living to the outdoors landscape may be formed by combining science and arts elements.

2.2 Sense of Place

The definition of sense of place is the quality of relationship between a human and a place (Najafi *et al.*, 2011). The existence of the sense of place is crucial in preserving the integrity of human life together with the quality of environment (Najafi *et al.*, 2011).

A sense of place can be sensed through experiences and perceptions of public from place with specific or unique features (Planning Department of Dallas/Fort Worth International Airport, 2010). A sense of place can also be intensified by creating the built fabric and nature, creating connections between people and places, movement and urban form (Planning Department of Dallas/Fort Worth International Airport, 2010). A landscape design that has a strong sense of place is associated with characteristics such as openness; good, convenient vehicular circulation; general organization of elements that promote a logical, organized, pleasant environment that emphasizes the preservation and conservation of nature; and incorporation of



hardscapes to create focal points (Planning Department of Dallas/Fort Worth International Airport, 2010; Brisbane Airport Corporation Pty. Ltd., 2012).

2.3 Perception and Preference

According to Kaplan *et al.* (1989), preference and perception are closely related. The measurement of preference allows the analysis and understanding of perception (Kaplan, 1989). Perception is an important element in preference which is also influenced by previous experience which causes different individuals to have different perception (Kaplan *et al.*, 1989).

Perception can be grouped into two basic modes which are the autocentric senses and allocentric senses (Porteous, 1996). Autocentric senses are subject centred which are the combination of pleasure and sensory quality of an individual while allocentric senses are object centred which are based on knowledge and objectification of an individual involving attention and directionality (Porteous, 1996; Kaymaz, 2012). Examples of autocentric are vision except color perception, sound and smell (Porteous, 1996). However, the perception of an individual is not only affected by that individual's physiology but also their experiences, social and culture factor (Zube, 1987; Kaymaz, 2012). In terms of landscape, different individuals may have similar landscape preference despite their social and culture influences and differences; it is rather influenced by the concept of novelty and familiarity (Kaplan *et al.*, 1989; Kaymaz, 2012). The sense of familiarity and novelty must be balanced in a landscape design. Although familiarity can make people feel comfortable and relaxed by looking at the familiarized environment. However, too much of familiarity will lose the essence of excitement and this is when people will start to search for novelty (Kaymaz, 2012). It is undeniable that there is a mutual relationship between human and their physical environment, thus it is one of the important aspects that the landscape planning and design should be based on the perception of the users of the landscape (Zube, 1987; Karameris, 2001; Kaymaz, 2012).

2.3.1 Landscape Preferences

As mentioned above, studies of preferences are closely associated to perception as the rating in preference provides an understanding of perception (Kaplan *et al.*, 1989). Landscape preference studies are carried out to investigate the degree of preference and reason of preference of certain landscape elements. Evaluations are carried out by the respondents based on processed stimuli received from the environment or landscape given or by personal experience (Taylor *et al.*, 1987; Kaplan *et al.*, 1989). Generally, individual elements are not the main focus of evaluation but the organization of space in a landscape (Kaplan *et al.*, 1989). Thus landscape designers should blend in and mix varieties of landscape elements to create a landscape design with appropriate organized space which is preferred and accepted widely by landscape users. Generally, presence of diverse and large number of natural elements such as plants and natural environmental features are preferred by public as they are basic human needs compare to man-made elements such as buildings (Kaplan *et al.*, 1989). Waterscapes; large open visible area such as lawn, water, flowering meadow; structurally more complex scenes are also preferred by public from the finding of Simonic (2003). The landscape preference can be investigated using questionnaires in surveys (Kaplan *et al.*, 1989; Karameris, 2001; Yunos, 2012; Silva *et al.*, 2013).

2.3.2 Visual Stimuli

The stimulus human receive the most is sight where it relies on the reflection of light onto space, distance, colour, texture contrast, shape, light quality, gradient and many more (Porteous, 1996; Kaymaz, 2012). One of the important considerations of landscape design is the evaluation of visual character through landscape assessment which determines the landscape quality, analysis of landscape and finds the most suitable solution or design for the landscape (Kaplan *et al.*, 1989; Karameris, 2001; Yunos, 2012; Silva *et al.*, 2013; Kaymaz, 2012). The common target of landscape preference studies are public or users of the landscape to be planned and designed which uses rating, ranking and verbal stimuli to understand or measure the degree of landscape preferences of the public (Yunos, 2012; Kaymaz, 2012).

2.4 Landscape Preference Research Methodology by Taylor, J., Zube, E. and Sell, J. (1987)

Four research paradigms on landscape assessment and perception were discussed by Taylor *et al.* (1987). These paradigms included the expert, psycho-physical, cognitive and experiential paradigms (Taylor *et al.*, 1987). It was stated that the evaluation of experts are objective and therefore is more reliable compared to evaluations of public or users who have more subjective perception (Taylor *et al.*, 1987). Compared to experts, even trained public who have no intrinsic capacity for judging value cannot judge as objective as experts who have been trained through principles of art, design, ecology and resource management (Taylor *et al.*, 1987). However, the opinions of the public must be taken into account while designing a landscape as the public are the main users of the landscape instead of the experts (Karameris, 2001). The psycho-physical paradigm is the careful controlled experiment that used to stimulate measurable reaction in subjects. Is it different from expert paradigm which uses only perceptions of expert (Taylor *et al.*, 1987). The psycho-physical paradigm involves the aesthetic evaluation by public and special interest groups (Taylor *et al.*, 1987). The major assumption in psycho-physical paradigm is the landscape elements in a landscape are treated as stimuli in evaluation of observers on the first thought or without conscious thinking (Taylor *et al.*, 1987). In this paradigm, the model of human-landscape interaction can be applied where the landscape elements acts as the dominant role to provide stimuli to the human who are passive observers to give responses such as perception or preference on the landscape (Taylor *et al.*, 1987).

2.5 Preference Matrix

It is suggested that if all components in the preference matrix such as coherence, complexity, legibility and mystery are combined in a landscape design, it will attract and increase the preference of public users of the particular landscape. The two domains of human preference can be summarized by the 2X2 matrix below, Table 2.1.

Table 2.1 Preference matrix

Level of Interpretation	Making Sense	Involvement
The Visual Array – 2D	Coherence	Complexity
Three Dimensional Space – 3D	Legibility	Mystery

Source: Kaplan (1979)

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