AN ANALYSIS OF DAYLIGHTING FACTOR THROUGH AN APPLICATION OF DOUBLE SKIN FAÇADE (DSF) IN RELATION TO PERFORMANCE AND PHYSICAL ACTIVITIES OF SPORTS SCIENCES

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A dissertation submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Architecture

School of Architecture
Faculty of Built Enviroment and Surveying
Universiti Teknologi Malaysia

JULY 2022

DEDICATION

This thesis is dedicated to my father, who taught me that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to my mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

ACKNOWLEDGEMENT

In preparing this thesis, I was in contact with many people, researchers, academicians, and practitioners. They have contributed towards my understanding and thoughts. In particular, I wish to express my sincere appreciation to my main thesis supervisor, Dr Roshida Binti Abdul Majid, for encouragement, guidance, critics and friendship. I am also very thankful to my co-supervisor Ar NorShahida binti Azili for their guidance, advices and motivation. Without their continued support and interest, this thesis would not have been the same as presented here.

My fellow postgraduate student should also be recognised for their support. My sincere appreciation also extends to all my colleagues and others who have provided assistance at various occasions. Their views and tips are useful indeed. Unfortunately, it is not possible to list all of them in this limited space. I am grateful to all my family member.

ABSTRACT

The purpose of this study is to analyse the relationship between daylighting factor towards the physical activities of sport sciences by using Double Skin Façade (DSF) .From the beginning, Sport science education and planning have been embedded in the initial concepts design for the building proposed at Educity Iskandar Puteri from the very beginning. The location of EduCity Iskandar has been a major focus among big sport events, centered around Asia's first multi-campus education community.. The integrity of clients to ensure a high performance for sports developments among athletes, coaches or sportsmen are their priority. The proposal with the new sport institution was designed to fulfill the clients requirement which emphasize on quality sport environment. As to enhance the physical activities and performance among the user, a specific designed of double skin façade (DSF) have been developed and integrated with bioclimatic architecture to create a conducive and flexible environment to do sport science activities. Bioclimatic architecture is a way of designing buildings based on the local climate, with the aim of ensuring sufficient daylighting using environmental resources.

ABSTRAK

Tujuan kajian ini adalah untuk menganalisis hubungan antara faktor pencahayaan terhadap aktiviti fizikal sains sukan dengan menggunakan Double Skin Façade (DSF) .Sejak awal, pendidikan dan perancangan sains sukan telah diterapkan dalam reka bentuk konsep awal untuk bangunan yang dicadangkan di kawasan cadangan Educity Iskandar Puteri. Lokasi EduCity Iskandar telah menjadi tumpuan utama di kalangan acara sukan besar, berpusat di sekitar komuniti pendidikan pelbagai kampus pertama di Asia.. Integriti pelanggan untuk memastikan prestasi tinggi untuk pembangunan sukan di kalangan atlet, jurulatih atau ahli sukan adalah keutamaan mereka. Cadangan dengan institusi sukan baharu itu direka untuk memenuhi keperluan pelanggan yang menekankan kepada persekitaran sukan yang berkualiti. Bagi meningkatkan aktiviti fizikal dan prestasi di kalangan pengguna, reka bentuk khusus "Double Skin Façade" telah dibangunkan dan disepadukan dengan seni bina bioklimatik untuk mewujudkan persekitaran yang kondusif dan fleksibel untuk melakukan aktiviti sains sukan. Seni bina bioklimatik ialah cara mereka bentuk bangunan berdasarkan iklim tempatan, dengan tujuan untuk memastikan pencahayaan siang yang mencukupi dan menggunakan sumber alam sekitar yang sesuai.

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LIST OF ABBREVIATIONS

DSF	-	Double Skin Facade
DGSF	-	Double Skin Green Façade
SSF		Single Skin Facade
GW	-	Green Wall
GBI	-	Green Building Index
LEED	-	Leadership in Energy and Environmental Design
UTM	-	Universiti Teknologi Malaysia

LIST OF SYMBOLS

δ	-	Minimal error
D, d	-	Diameter
F	-	Force
v	-	Velocity
p	-	Pressure
I	-	Moment of Inersia
r	-	Radius
Re	-	Reynold Number

CHAPTER 1

INTRODUCTION

1.1 Problem Background

The construction typology of educational facilities calls for effective lighting conditions, including enough daylight ratio and efficient daylight quality. It is the same as Academy of Sport Sciences, they need a good indoor environment to perform some activities all day within the building. There are two issues that may be identified. The first issue is brought on by a lack of natural light, which leads to high rates of energy consumption from the usage of artificial lighting alternatives. Along with a relative increase in solar gain, the second issue brought on by more daylight is an inefficient, uneven distribution of illumination in lecture halls that results in places that are too gloomy and others that are too bright. Hence, some activities in sport sciences did not met the requirement to perform in suitable condition. These issues require residents to completely cover their shade systems and utilise artificial lighting to prevent direct sunlight and glare, which leads to an increase in energy usage.

There are two primary perspectives on sport's interaction with the environment. The first is concerned with how environmental changes affect sport, whereas the second is concerned with how sport itself might have an environmental influence. The overarching issue in both scenarios is that the earth is now being handled in an unsustainable manner, which can be interpreted as a matter of (in)equity. First, environmental challenges are connected to ethical questions of intergenerational injustice, which means that current generations' environmental activities will have a negative influence on future generations. The challenges mentioned in the start to this chapter, for example, will be felt most strongly by people living in the middle and latter decades of this century.

Sports facilities have a number of diverse environmental effects.Indoor and outdoor amenities may be distinguished when discussing and rating them. Outdoor facilities demand far more room than sports buildings do. The way this area is handled has a big impact on the ecosystem. On the one hand, poor site selection, careless handling (over fertilisation, drinking water irrigation, etc.), and needless soil sealing may result in the loss of priceless ecosystems and have an impact on the soil and water balance. On the other hand, if environmental considerations are made when planning, constructing, and maintaining an outdoor sports facility, particularly in conurbations, this can improve the area ecologically (biodiversity, microclimate, etc.) and thereby increase the allure of the surrounding residential area.

1.2 Problem Statement

Sports Sciences Activities required flexibility in term of on indoor enviroment because its required certain level of daylighting factor to perform various kind of activities. Sport Sciences programme is differ from other sports programme that emphasize of specific perfromances. Sports Sciences. DSF is significant in architecture's outside design. Buildings may benefit from its transparency in terms of aesthetics, lighting, and protection by having a ventilation system that can be used passively, actively, or in combination with both.

DSF enhances interior thermal comfort, visual comfort, natural illumination, and energy savings in addition to enhanced visualisation. Hendriksen et al. (2000) claim that since a two-skin exterior is in intimate touch with the environment, transparency is generally seen as the main architectural reason behind them. When double skin exteriors are used instead of conventional window surfaces, transparent views to the outside and daylight levels are increased.

Regarding technological buildings and the physical environment, DSF offers certain functions and advantages for engineers. The main benefit of DSF, according to Lee et al. (2002), is acoustics. DSF is used to lower sound levels in busy locations like airport terminals and metropolitan areas with heavy traffic by placing a second layer of glass screen in front of a conventional façade. Opaque windows beneath this all-

glass layer, however, will primarily trade this acoustic benefit if the air gap in the outer layer is large enough to provide acceptable natural circulation. Other than the acoustics, the shade framework located in the moderate gap between the outside glass façade and the interior façade controls sun-based extraction and solar radiation burden. Similar to an exterior shading system, it prevents solar radiation from entering the structure while drawing heat from the cavity via the outside skin using a conventional or mechanical ventilation system.

Arons (2000) asserts that the primary objectives of DSF are primarily aesthetics, passive ventilation, cost savings, sound reduction, client control and comfort, occupant productivity in relation to the environment, and better building security. Comparatively, being inside was linked to more frustration, anxiety, rage, and unhappiness 128 college track and field athletes' performances were compared across four greenness-rated areas.

1.3 Research Goal

The aim of the Research is to analyse the daylighting factor through an application of Double skin Façade to enhance physical activities & performance in the Academy of Sport Sciences.

1.3.1 Research Objectives

The objectives of the research are :

(a) To identify the relationship between daylighting factor and Double Skin Facade towards physical activities and performances of Sports Sciences

(b) To analyse the suitable indoor space requirement for sport science in relation to daylight factor

(c) To evaluate suitable daylighting for every physical activities of sports sciences by using Various Pattern of Double Skin Facade

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