IMPROVING ENVIRONMENTAL QUALITY OF HYBRID HOME AND WORKING SPACES FOR USER COMFORT

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DEDICATION

This thesis is dedicated to my beloved family and best friends. A special feeling gratitude to my late-father and my beloved mother whose words of encouragement and support during the process. Thank you for always been there and continually give emotionally and physically support to me until the thesis is completed.

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ABSTRACT

Working from home will become the new norm in the future. The work-from-home adjustment has led to significant changes in the people spend more time travelling to and from work. This saved time has now been put back into private homes. Those who work from home have more time with their families and more time to mingle with friends outside of work. The COVID-19 epidemic inadvertently forced the worldwide workforce into a large working remotely experiment, as businesses throughout the world instantly established working from home ('WFH') agreements to sustain operations. As a result of the Covid-19 pandemic, up to 40% of employees and firms were forced to work from home. Other than that, the current architectural design layout space does not have proper design and lack of technical and material support which inhibits their ability to produce optimum work. The main master plans concept for the site project is related to the concept of urban villages which by reorganize the infrastructure, both old and new, in a manner thatintegrates all of the main functions of each zoning and ensures efficient management around Technopark UTM. The aim of this study is to propose a hybrid home and working space in UTM Technovation Park which focus on the implication of green element in improving the environmental quality performance towards user comfort. As a result, the objective of this research is to look into the different types of co-working spaces and facilities that can be beneficial for just a growing start-up while working from home, to analyse the characteristics of home office environment that fosters user comfort, and to design a hybrid home/work environment that can encourage healthy work/life balance. The fundamental research structure will be divided into four stages: determining the research topic, information gathering, data processing, and lastly, summary. Primary data will be derived from the simulation analysis result in Daylight factor to improve the environmental quality of the space by using Velux software and secondary data were derived in existing literature reviews, journal articles, books or reading materials, other internet-based articles and case studies. The analysis will be carried out at the end of this thesis dissertation by merging ideation to improve the environment quality towards the hybrid home and working spaces.

ABSTRAK

Bekerja dari rumah akan menjadi kebiasaan baru di masa hadapan. Penyesuaian kerja dari rumah telah menyebabkan perubahan yang ketara pada orang yang menghabiskan lebih banyak masa untuk pergi ke dan dari tempat kerja. Masa yang dijimatkan ini kini dimasukkan kembali ke rumah persendirian. Mereka yang bekerja dari rumah mempunyai lebih banyak masa bersama keluarga dan lebih banyak masa untuk bergaul dengan rakan di luar tempat kerja. Wabak COVID-19 secara tidak sengaja memaksa tenaga kerja di seluruh dunia untuk melakukan eksperimen jarak jauh yang besar, kerana perniagaan di seluruh dunia dengan serta-merta menubuhkan perjanjian kerja dari rumah ('WFH') untuk mengekalkan operasi. Akibat wabak Covid-19, sehingga 40% pekerja dan firma terpaksa bekerja dari rumah. Selain itu, ruang susun atur reka bentuk seni bina semasa tidak mempunyai reka bentuk yang betul dan kekurangan sokongan teknikal dan bahan yang menghalang kemampuan mereka untuk menghasilkan karya yang optimum. Konsep rancangan induk utama untuk projek laman web ini berkaitan dengan konsep kampung bandar yang dengan menyusun semula infrastruktur, lama dan baru, dengan cara yang menggabungkan semua fungsi utama setiap pengezonan dan memastikan pengurusan yang cekap di sekitar Technopark UTM. Tujuan kajian ini adalah untuk mencadangkan rumah dan ruang kerja hibrid di Taman Teknologi UTM yang memfokuskan pada implikasi elemen hijau dalam meningkatkan prestasi kualiti persekitaran terhadap keselesaan pengguna. Hasilnya, objektif penyelidikan ini adalah untuk melihat pelbagai jenis ruang kerja dan kemudahan yang boleh bermanfaat hanya untuk permulaan yang semakin meningkat semasa bekerja dari rumah, untuk menganalisis ciri-ciri persekitaran pejabat rumah yang memupuk keselesaan pengguna, dan merancang persekitaran rumah / kerja hibrid yang dapat mendorong keseimbangan kerja / kehidupan yang sihat. Struktur penyelidikan asas akan dibahagikan kepada empat peringkat: menentukan topik penyelidikan, pengumpulan maklumat, pemprosesan data, dan terakhir, ringkasan. Data primer akan diperoleh dari hasil analisis simulasi dalam faktor siang untuk meningkatkan kualiti persekitaran ruang dengan menggunakan perisian Velux dan data sekunder diperoleh dalam tinjauan literatur yang ada, artikel jurnal, buku atau bahan bacaan, artikel berasaskan internet lain dan kajian kes. Analisis akan dilakukan pada akhir disertasi tesis ini dengan menggabungkan idea untuk meningkatkan kualiti persekitaran ke arah rumah dan ruang kerja hibrid.

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LIST OF ABBREVIATIONS

SOP	-	Standard Operating Procedure
ILO	-	International Labour Organization
QWL	-	Quality of Work Life
QoL	-	Quality of Life
EQ	-	Environment Quality
WFH	-	Work From Home
MCO	-	Movement Control Order
UNDP	-	United Nations Development Programme
SOHO	-	Small Office Home Office
SOP	-	Standard Operating Procedure
ILO	-	International Labour Organization
UTM	-	University Technology Malaysia

LIST OF SYMBOLS

%	-	percentage
DF	-	Daylight factor

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CHAPTER 1

INTRODUCTION

1.1 Background Study

Work from Home (WFH) is a sort of job that individual's function to participate without having to travel. Telecommuting, virtual companies, teleworking, mobile work, and flexi-work are other terms for it (Woody, L.,1995: Subramaniam, G., Overton, J., & Maniam, B., 2015). The last two years have really encouraged a change in workplace environments where many employers and employees transitioned to a remoted working arrangement. This tendency will lead to an increase in revenue for hotels and Airbnb-like rental locations. The work-from-home adjustment has led to significant changes in the people spend more time travelling to and from work. This saved time has now been put back into private homes. Those who work from home have more time with their families and more time to mingle with friends outside of work.

The global breakout of the COVID-19 pandemic, which is estimated to begin around March 2020, have spurred the Malaysian government to establish laws and performance measure to control the pandemic in Malaysia. For first time, COVID-19 has emphasized the physical dimension of labour. The epidemic compelled businesses and consumers to implement new, commonly habits, altering the trajectory of three groupings of patterns. As more than just a result, there is a significant difference in their influence on labour markets prior to and during the epidemic. The much more visible effect of COVID-19 on the labour force is the enormous increase in people telecommuting.

Several businesses utilized technology and artificial intelligence (AI) in warehousing, supermarkets, contact centres, and manufacturing facilities to minimize worker intensity and cope with demanding spikes. COVID-19-accelerated trends may cause bigger shifts in the balance of occupations throughout countries than when anticipated before to the pandemic. Many tourism groups, both formally and informally, have reacted to the necessity for a Work from Home (WFH) policy to ensure that the government's Movement Restriction Order (MRO) is faithfully executed. It is thought that increasing the number of workers who would utilizeWFH as a new operational standard will help to reduce the number of epidemics at a lower cost than other strategies. Companies' workspace decisions now will have an impact not only on their business structures, but also on the shape of cities for coming years. The place of work has just become a lot more complicated.

The media is awash with stories about people returning to work after the pandemic. Not remarkably, there is opposition from co-workers who have become adept atusing techniques to accomplish their homework and wish to continue doing so. Employers, too, are concerned about how much workspaces they really require. A hybrid version that enables a workforce to merge some in days with others ended up spending working at home could be the solution. As a result, the purpose of this paper is to improve the condition WFH towards the environment focus on user comfort and to analyze their perspective of having required facilities of WFH.

1.2 Masterplan UTM Technovation Park: UTM Green Urban Village

The realization of the urban village concept had to have an impact on existing circulation traffic and facilities surrounding Technopark UTM. As a result, the master plans for the new proposed design the core concept master plan of urban villages is to reorganize the infrastructure, both old and new, in a manner that integrates all of the main functions of each zoning and ensures efficient management around Technopark UTM. The concept of urban villages will allow Technopark UTM to have several detailed development ideas in special areas, allowing it to be

developed into a specific scope while also facilitating supervisors, making preparations, and tracking.

The concept begins with sustaining an organic trend onthe sub road by following the slope pattern of the site. Then, the zoning is planned byreturning to the uniqueness of the urban expansion during the early years, using the Linear Cluster Mode Planning, where it is dispersed in the environment of the road for each district plus relieve primarily dominated born by road network system. The Environment Quality Act Law will also take into consideration what the best choice which could have been suggested towards to the originality of the site, which is densely forested.

1.3 Problem Statement

Below is the main focus on problem statement throughout the studies:

1.3.1 Current and future trends make work from home the new normal

Because of the COVID-19 situation, businesses and their workers were forced to initiate or enhance their work from home efforts. The COVID-19 epidemic inadvertently forced the worldwide workforce into a large working remotely experiment, as businesses throughout the world instantly established working from home ('WFH') agreements to sustain operations. On March 18, 2020, the Malaysian government issued the Movement Control Order (MCO) to combat the spread of Covid-19. The order called for the closure of both public and private buildings, thereby suspending most economic activity in the country except for a few critical services. As a result, many people were forced to work from home. Even though the MCO eventually succeeded with a recovery period in which people may start work, some workers may continue to work from home until vaccinations already developed.

1.3.2 The physical working environment of working culture

The current architectural design does not have proper design and lack of technical and material support which inhibits their ability to produce optimum work. The demand of need for modern, flexible office space with lots of services provides safe working environments after post-pandemic are very likely important. Intuitively, working from home depends on whether workers are appropriately equipped with the necessary hardware and internet connectivity at home. Nationally, 71.3% of households have computers, and 90.1% have an internet connection (DOS, 2020b). Expectedly, richer areas of the country are more connected, indicating that not all households are equipped with the infrastructure to enable working from home.

1.3.3 Role of UTM Technovation Park to offers conducive environment for incubation and start up.

UTM is a research university that measures to generate its own revenue for using university research and management. This statement is supported by Malaysia's Prime Minister, who announced UTM's designation as the country's fourth research university during the briefing of the Tenth Malaysia Plan (10MP) in the *Dewan Rakyat* (Arkib Negara, 2010). This accomplishment is the result of UTM's tireless reshaping into a research university focused on innovation and growth. Currently, the master plan itself does not provide a flexible place to facilitate the objective of collaboration and entrepreneurship in the UTM Technovation Park for future use but also for UTM Business School also.

1.4 Research Question

(a) How to enhance the productivity of work from home to take the advantage towards the growing start-up business?

(b) What is the parameter in achieving the environmental quality performance for work from home?

(c) How to promote a work/life balance architecturally?

1.5 Research Aim

This dissertation aims to propose a hybrid home and working space in UTM Technovation Park which focus on the implication of green element in improving the environmental quality performance towards user comfort.

1.6 Research Objective

The goal for the research will address in three objectives:

(a) To analyse the type of spaces and facilities of co-working space which can also be an advantage to a growing start up business during work from home.

(b) To study the home office environment quality which leads towards user comfort.

(c) To design of a hybrid home and working place which can promote a healthy work/life balance.

1.7 Scope of thesis

This study is concentrated on the design performance of the proposed solution to increase user comfort in the SoHo and office areas. The design element ofthe façade devices that are determined based on the simulation experiment and secondary data from the case studies chosen throughout the thesis. The design elements of a façade

device are classified into three types of systems: light weight green construction, brise soleil system, and flex brick construction. The lightweight green construction is a wall system in which climbing plants or sliding plantings are directed to cover specifically built structural components.

Climbing species are characterized as either self-supporting (such as root climbers or sticky suckers) or structurally dependent (such as twining, leaf-stem climbers, leaf climbers, or scrambling plants). It is made up of a modular trellis system designed for part and large-scale greenings, particularly on concrete blocks. A horizontally bar connects vertical wires and provides greater sturdiness and ease of maintenance. Transmission lines can be designed to meet the demands of a project or a specific unit. A safety system prevents its wires and the central core from overloading caused by massive plant weight, wind, rain, or other factors.

A brise soleil system is a sort of solar shading system to control the quantity of sunlight plus heat gain that enters a structure through a series of horizontal or vertical blades. Finally, flex brick façades are being used to bring a new technical concept of ceramic textile as a façade garden,ceiling, or other applications. The research also includes knowledge of the significance of sustainability in urban areas. Daylight factor (%) is the metrics to measure the day lighting efficacy of various types of façade designs depending on the building's orientation. The link between the façade's appearance as well as its functionality in respect towards the needed area will be examined with Velux software simulation.

1.8 Research Methodology

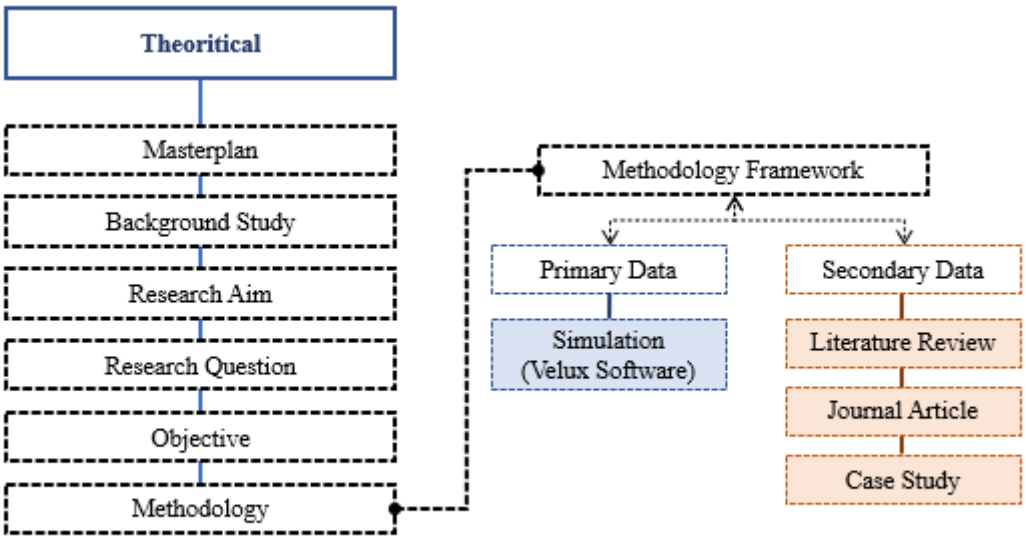

Figure 1 shows the flow of research methodology

Generally, practice, the fundamental research structure will be divided into four stages: determining the research topic, information gathering, data processing, and lastly, summary. Primary data will indeed be derived from the simulation analysis result in Daylight factor to improve the environmental quality of the space required by using Velux software and existing literature reviews, journal articles, books or reading materials, other internet-based articles and case studies will be used to gather secondary data.

Velux Daylight Visualizer2 is intended to aid professionals by predicting and documenting daylight levels and appearance of a space prior to realization of the building design. The softwarepermits generation of 3D models in which roof and facade windows are freely inserted. Other settings include the location and orientation of the models, the date and time of the simulation, as well as the sky type (from clear to overcast).

The Velux Daylight Visualizer willbe used to assist professionals by estimating and analyzing day lighting and the look of space prior to the space design's fulfilment. Additional options that may be changed include the position and orientation of the site models, the date and time according to what sort of visualizer display were required for subsequentexperiments, such as realistic rendering, simulation output such as luminance, illuminance, and daylight variable mapped.

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