Journal of Sustainability Perspectives

journal homepage: https://ejournal2.undip.ac.id/index.php/jsp/

Implementation of Sustainable Transportation at Mahidol University, Salaya Campus, Thailand

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Article Info

Received:
14 March 2022
Accepted:
25 May 2022
Published:
1 August 2022

DOI:
10.14710/jsp.2022.15526

Presented *in the 7th International (Visual) Workshop on UI Greenmetric World University Rankings (IWGM 2021)*

Abstract. Mahidol University is one of the leading sustainable universities in Thailand, which recognizes the importance of combining actions to achieve the 17 Sustainable Development Goals of the United Nations (17 Sustainable Development Goals: 17 SDGs) and the concept of Sufficiency Economy Philosophy. The eco-university and sustainability policy was launched and implemented in 2021 in order to reach the 17 SDGs. Transportation is one of the important issues of campus development. In order to reduce the greenhouse gas emission from private fossil based fuel transportation, the public transportation both inside and outside the campus area is provided including electric tram, shuttle bus and public bicycle. An Electric cart with solar energy was initiated and used on campus. Walking and cycling as primary means for commuting on campus have been promoted by reduction of vehicle traffic. Cycling lanes are improved and bicycle racks are provided around the campus. Around more than 10,000 bicycles including more than 500 public bicycles were used on campus. The parking areas were constructed and adjusted into green open spaces. Many outdoor spaces are created to support various kinds of activities and gatherings enhancing liveliness and variety to campus life

Keyword:
Mahidol University, Mobility, Transportation, Green area, Sustainability campus

1. Introduction

Since the term of “sustainable development” was formally introduced in the report of Brundtland Commission “Our common future”, the issue concerning the transformation of socio-economic systems to sustainable modes of operation within environmental limits has been focused to be of primary importance [1, 2].

In the recent decade, sustainability and green concepts have been initiated and implemented in Thai university campuses, where is small communities with a large number of facilities and building functions such as electricity and water supply systems, residence area, recreation area, sport complex area, cafeteria, library, laboratory, and transportation [3, 4]. Mahidol University (MU) is one of the leading sustainable universities in Thailand. MU has the main campus located in Nakorn Pathom province, which is around 15 kilometers west from Bangkok. MU is organized into 17 faculties (responsible for both research and teaching), 7 institutes (mainly focusing on research), 6 colleges (mainly focusing on teaching) and 9 centers (mainly providing academic services). MU has approximately 24,000 students, of whom some 15,500 are undergraduate students and some 8,300 are postgraduate students. It also has a total of 3,000 academic staff responsible for teaching and research, as well as some 6,500 academic assistants, 5,900 administrative staff, and 8,700 other employees (including hospital employees).

Mobility both inside and outside campus is relevant in environments of MU campus. MU recognizes that the awareness of environmental conservation and sustainable mobility are important. Therefore, a master plan was initiated in 2008 with the aim to develop MU to be “a promising place to live and learn with nature” providing a favorable environment for learning and having physical structure and facilities, which are in harmony with society and environment. Recently, MU has developed the Eco-University Policy and Sustainability, by integrating the principle of Sufficiency Economy Philosophy together with the vision of becoming a leading university in promoting sustainable development in order to reach the 17 sustainable development goals of the United Nation (17SDGs). To achieve the goal of becoming Eco University and to exercise relevant sustainability policies, it required 3 strategies as follows: 1) sustainable growth, 2) sustainable resource, and 3) sustainable society. This paper presents the best practice of transportation and landscape management at MU salaya campus, which can demonstrate the sustainable mobility model for higher education.

2. Mobility System Management of MU

Mobility system of campus was defined as a system that served society to move and access different places freely, trade and be connected to people, who have different lifestyles, backgrounds, beliefs and age cohabit and share the same spaces to study and work together [5]. The mobility system management of MU is classified into 4 parts, which are public transportation, public space and recreation areas, public walking and cycling pathways, and public parking areas as shown in Figure 1.

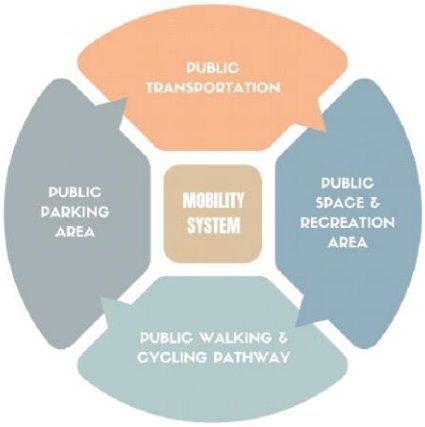

Figure 1. Mobility system management of MU

2.1. Public Transportation

MU has 2 campuses in the Bangkok metropolitan area and the large suburban campus at Salaya in Nakhon Pathom province, where it is the main campus. There are also provincial campuses in Kanchanaburi (west of Thailand), Nakhon Sawan (north of Thailand) and Amnaj Charoen (north-eastern of Thailand) provinces. Shuttle bus is provided for students and staff. The service runs between main campus and campuses in Bangkok and Kanchanaburi; operates five days a week from 5.30 am to 6 pm. MU Salaya campus is the location of more than 30 Offices/Centers/Faculties/Colleges. Thus, it hosts diverse student activities. Since commuting on campus is very high, the university has developed and improved the road system as well as public transportation system inside the campus for the students and personnel, which should be effective, unique, and appropriate for the surroundings. With this reason, MU provides an on-campus electrical tram that serves students, staff, and personnel for free. A total of 16 electrical trams operate seven days a week from 7 am to 9 pm. The shuttle bus terminal station is located near the electrical tram station in order to provide the unique connection of public transportation. Moreover, encouraging non-motorized modes of transportation, a total of 500 public bicycles are also provided for free.


2.2. Public Space and Recreation Areas

To promote MU as a place to live and learn with nature, the university has focused on conserving the original green space and increasing the size of green and recreation areas. Recently, the total green area of MU Salaya campus is 957,690 square meter (51.27% compared to total area) including forestation, horizontal and vertical plantations and the wetland area is 221,080 square meter (11.84% compared to the total area). The complex of MU salaya eco-system has potentially provided a wider range of available microhabitats, food and nutrients which offers rise to a greater variety of species to access.


There is a big natural park area in MU salaya campus. In 2015, Sireeruckhachati Nature Learning Park (SNLP) was upgraded from Sireeruckhachati medicinal plant garden in order to serve as ecotourism park, which covers a variety of medical plantations about 55 acres. The SNLP received Botanic Garden Conservation International (BCGI) certification in July 2021. Moreover, at MU Salaya campus, accessible recreation and sports facilities are provided in order to promote healthy lifestyles and wellbeing for our students and staff as well as local people nearby. Affordable housing is widely available both off and on campus, including shared housing, private flats or condos, and boarding houses.


2.3. Public Walking and Cycling Pathways

Walking or cycling is the obvious way for low carbon transportation [6]. More public space for walking and cycling safely on campus needs to be promoted [7]. MU salaya campus has intended to promote walking and cycling as primary means for commuting on campus. Vehicle lanes are reduced from 6 lanes to 3 lanes while sidewalks are expanded to encourage people to walk and use a bicycle instead of motorized vehicles. To reduce the use of energy from fossil fuel by using motorized vehicles, we encourage our students and staff, and then expand to the local community, by improving the campus environment to become more convenient for cyclists. Cycling lanes are improved and bicycle racks are provided around the campus. Around more than 10,000 bicycles were used in Salaya campus. The cycling lanes and pedestrian walkway system were comprehensively developed. The outdoor covered walkway connectivity between buildings with shared lanes between bicycle and pedestrian was constructed Along the sidewalks on campus, lots of big trees are grown to provide shade for pedestrians and cyclists making them feel more refreshed and comfortable.


2.4. Public Parking Area

There are five public parking locations inside the MU salaya campus, which are located at north, south, and east directions of the campus. Totally 16,11 car spaces at public parking areas are provided for a population of more than 29,000 people (around 4,000 staff and academic members and 15,000 students). Smart parking with real-time parking information

and management of the supply parking space according to the users was introduced. The public parking areas were constructed and adjusted into green open spaces. Many outdoor spaces are created to support various kinds of activities and gatherings enhancing liveliness and variety to campus life.

3. Conclusions

This paper intended to highlight an implementation that can support the recent mobility system insight MU toward more sustainability. The key aspects to the development of the mobility system at MU salaya campus are transportation, public space and recreation areas, cycling and pedestrian pathways, and smart parking areas. The strategy used by MU to reach more sustainable transportation is to increase walkability and use of bicycles on campus parallel with low carbon emission of public transportation by using renewable energy. Our wish is that the university administration can use this case study as a model for mobility development on campus.

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