



Transportation Management Project for "GREEN PNRU"

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ABSTRACT

Phranakhon Rajabhat University (PNRU) has the awareness to the environmental problem caused by transportation and it is concerned to fulfil the criteria to become a green university, in accordance to the requirements set by University of UI Green Metric World University Ranking. The aforementioned ranking platform established a benchmark recognized globally as indicative metrics on university commitment to six criteria: 1) setting and infrastructure; 2) energy management and climate change; 3) waste management; 4) water resources management; 5) environmental friendly transportation; and 6) environment and sustainable development education. Transportation Management Project is based on the criteria of "Environmental friendly transportation" which is the 5th criterion for green campus. In addition, the research has proposed to improve the existing transportation system to make it even more effective, as well as offering the design of environment transportation to meet their full potential usefulness. It encourages people such as university staffs, students, lecturers, and visitors to cooperate in creating a healthy environment that has lasting benefits.

Keywords: *Transportation Management, Environmental Friendly Transportation, Green PNRU*

1. Introduction

Excessive energy consumption has contributed to environmental deterioration which has negative impacts to the environment. Hence, it has become an important issue in both Thai society and the world society. We are in sustainable development era, which is now popular and widely used in the civil society. The World Commission on Environment

Development Conference has announced that sustainable development has been recognized by all sectors for sustainable solutions. It is a development that meets the needs of modern humans and does not harm the future development of human beings in the future [6]. The principle of the sustainability concept has emphasized the importance of 3 dimensions – social dimension, economic dimension, and environmental dimension. The first dimension is the social dimension which focuses on improving the quality of life and the quality of education. It is aimed to help people achieve secured and healthy life. The second, the economic dimension, is a dimension that attaches importance to a stable economy. It is aimed to achieve quality and sustainable economic growth which has the ability to compete in world economics. It is also aimed to be a balanced economic development – a development that is not only concerned with the financial gains, but also with environmental concerns. For example, the economic growth that comes from the production process is the cost of products derived from the use of clean technology; hence, reducing waste and keeping the environment clean. The third dimension is the environmental dimension, which features the use of natural resources responsibly based on biodiversity that can minimize damage to the resources and may even preserve them in the same or near their original states.

Sustainable development focuses on creating a balance of three dimensions explained in the preceding paragraph. However, facilitating change in attitudes to resource use is challenging and costly. Nevertheless, educational institutions are one organization that can integrate these three dimensions of sustainable development under the green university concept. Based on the Green University concept study, a well-managed university participates in the utilization of green space or land to use. Additionally, a green university should commit to environmental preservation and conservation, and reliant on energy-saving resources. Renewable energy not only improves the quality of life, but also more efficient in terms of safety for both life and property, and can also enhance the economic condition of the surrounding community [1]. Hence, the setting up of a green university environment is one of the key strategies because it is a factor that can bring sustainable development following the standard criteria.

The internationally accepted criteria for qualifying as a green university is established by Green University of UI [5]. It set a benchmark recognized globally as indicative metrics for green university. The six criteria are 1) setting and infrastructure; 2) energy management and

climate change; 3) waste management; 4) water resources management; 5) environmental friendly transportation; and 6) environment and sustainable development education. Currently, Thailand has five universities that have been ranked by UI Green Metric World University in 2010-2014, namely Chulalongkorn University (CU), Kasetsart University (KU: Bangkhen Campus), Thammasat University (TU: Rangsit Campus), King Mongkut's University of Technology Thonburi (KMUTT), and Mahidol University (MU) [3,4]. Especially Mahidol University was ranked as Thailand's first green university in 2012. It ranked 36th in the world, 11th in Asia and the 1st in Thailand to date (2012-2014).

As Bangkok continues to develop, pollution has also worsened. Several parts of the city have been noted for its transportation-caused pollution including Chang-Wattana Road and Phaholyothin Road, nearby where Phranakhon Rajabhat University (PNRU) is located. Additionally, PNRU has also faced problems relating to traffic congestions as constructions of mass transportation infrastructures such as the sky-train pink-line (Chang-Wattana Road) and green-line (Phaholyothin Road) are on their peak. Hence, PNRU commits itself to become a green university to help mitigate transportation-related pollution inside the university premises and the surrounding areas. Transportation Management Project for "Green PNRU" is a research project aimed at bringing theory into practice by creating the "Green PNRU".

2. Research Objectives

2.1 To study the cooperation patterns

To study the cooperation patterns of related sectors and the role of the participating community. Community sector pertained to PNRU. Institute of Education sectors was accountable for the Green University in Thailand which were ranked by UI Green Metric World University in 2010-2014. External sectors (e.g., professional associations involved such as The Engineering Institute of Thailand or EIT and Thai Green Building Institute or TGBI) was responsible for managing the environment for Green PNRU.

2.2 To study Transportation Management

To study the transportation management process model using the International Green University standard.



2.3 To propose the practical guidelines on transportation management

To study the practice guidelines in order to set up a Green PNRU environment from the process of the environmental friendly transportation and suggestions for appropriate model.

3. Methodology

This research has applied the methods of survey, quantitative and qualitative study undertaking 8 steps. The process steps can be summarized and showed to the objectives listed in Table 1.

Table 1 Research Methodology consistent with research objectives

Research process 8 steps	Research operations	Research objectives
<p>1. Collaboration Network among community of PNRU, Institute of Education sectors, and external sectors</p>	<p>Introduction the research Transportation Management Project to become “Green University” in Exhibition on 24-26 February 2016 at The 2016 National Planning Conference Special Economic Zone: Planning and Design at PNRU</p>  	<p>To study the cooperation patterns of related sectors and the role of the participating community (PNRU) and Institute of Education (Green University in Thailand).</p> <p>External organizations (professional associations involved) in managing the environment for green university. The Focus group collaboration has direction idea to become Green University from CU & KU</p>  
<p>2. Survey Site & Collective Data</p>	<p>The research team explored and survey site in the PNRU area. The existing data onto transportation that will be used in conjunction with the design.</p>	<p>To study the transportation management process model using the International Green University standard. Green</p>

Research process 8 steps	Research operations	Research objectives
	  <p data-bbox="488 814 971 951">Collective data onto the case study of green university such as Mahidol University, Kasetsart University, King Mongkut's Institute of Technology Thonburi Chulalongkorn University and Thammasat University.</p>	<p data-bbox="1013 300 1328 363">University Rankings (UI - Green Metric World University)</p>  <p data-bbox="1013 531 1328 552">Phranakhon Rajabhat University (PNRU)</p>  <p data-bbox="1068 764 1268 785">Mahidol University (MU)</p>  <p data-bbox="1068 1003 1268 1024">Kasetsart University (KU)</p>
<p data-bbox="297 978 428 999">3. Data Analysis</p>	<p data-bbox="488 978 971 1182">The researcher was the data analyst. Consisting of information from 1,095 questionnaires. The results founded 97% transportation management in PNRU should be prepared and separate parking area (car, motorcycle, bicycle), 98% requested for walkway or pedestrian in PNRU.</p> <p data-bbox="488 1205 971 1268">Questionnaires from various aspect and in-depth interviews in research methods</p>  	 <p data-bbox="1013 1226 1328 1289">King Mongkut's Institute of Technology Thonburi (KMUTT)</p>  <p data-bbox="1045 1524 1292 1545">Chulalongkorn University (CU)</p>
<p data-bbox="269 1661 454 1822">4. Synthesis and Alternative Design, Synthesis and Alternative Environmental Design.</p>	<p data-bbox="488 1661 971 1864">The research team has prepared a draft selection of preliminary study areas to present the trilateral. Community sector area owner (PNRU) Institute Green University standardized education and outside organizations took part in the parody. Design critique by the research team.</p>	 <p data-bbox="1057 1740 1279 1761">Thammasat University (TU)</p>

Research process 8 steps	Research operations	Research objectives
		 <p>The Engineering Institute of Thailand (EIT)</p>  <p>Thai Green Building Institute (TGBI)</p>
<p>5. Present alternative design to the public hearing and critic</p>	<p>Commenting on comments from relevant people. The tripartite is divided into three sectors: the community sector, the area owner (PNRU). Sustainable University Network of Thailand and external professional organizations (EIT).</p>  	<p>To Study the environmental management process model using national and international green university standards.</p> <p>To Study the cooperation model of related sectors and the role of the participatory community.</p> <p>Public hearing and criticism for preliminary design of the research including with Staffs, Lecturers, Students of PNRU and collaborations of representatives from MU, KU, KMITT, CU, and EIT</p> 
<p>6. Develop a green design (Design development to Green PNRU)</p>	<p>The vice rector of PNRU participate the research with aspect of sustainable development as Social dimension, Economic dimension and Environmental dimension.</p>	<p>To study the practice guidelines. Setting up a Green University Environment from the process to the 3-Dimensional Equity of Sustainability, taking into account the benefits, obstacles, and suggestions for</p>

Research process 8 steps	Research operations	Research objectives
		adopting the model. 
7. Evaluation and Conclusion	Presenting the trilateral stakeholders is the community sector, area owners. (PNRU). And external organizations The advantages of each group will be adjusted according to the recommendations of the relevant representatives.	
8. Summary and Recommendations	Evaluating the results of the whole process in action. Environment project for stakeholders. That reflects the benefits, problems, obstacles, as well as suggestions for further development.	

4. Transportation Management

The paper present transportation management which is one of the 6 adopted criteria for being a green university as established by the green university of UI [5]. It is one benchmark Recognized globally as a criterion with indicative metrics for university commitment to environmentally friendly management. Overall, there are six criteria: 1) setting and infrastructure; 2) energy management and climate change; 3) waste management; 4) water resources management; 5) environmental friendly transportation; and 6) environment and sustainable development education.

4.1 Environmental friendly transportation

Phranakhon Rajabhat University (PNRU) has a total land area of 162 rai (259,200 m²), and the total number of the population is 17,776, comprising students, faculty members and staffs [2]. The survey found that the university has 1,231 parking units (14,925 m²) accounting for 5.75% of the total area. The number of vehicles coming into PNRU per day is 679 cars, 500 motorcycles, and 52 bicycles, totaling 1,231 units per day. The problems assessed are: 1) lack of enough motorcycle parking area; 2) use of the bicycles outside the designated

lanes; and 3) parking area is not enough based on increasing number of vehicles. Figure 1 exhibits the problem of limited parking area.



Figure 1 Problem of limited existing parking area

4.2 Transportation Management

The transportation management has proposed plan for pedestrian and bicycle commuters (see Figure 2). The main aim is to make it more conducive for walking and cycling by providing a pedestrian thoroughfare alongside cars without crossing the street. Along the pedestrian walkways and bicycle lanes, trees will be planted to provide shades and reduce the sunlight that hits the road surface, which reduces heat. Most of the sidewalks are 6.00 meters wide, but some are narrow depending on the location. Some sections are covered walkways and are 2.00 meters wide. The plan is designed to encourage students, faculty members, staffs, and even visitors to walk or bike, instead of driving. Biking is safe from cars, and the biking trails connect the buildings within the university. Also, the plan includes a bicycle parking area in front of the buildings to encourage greater use (see Figure 3).

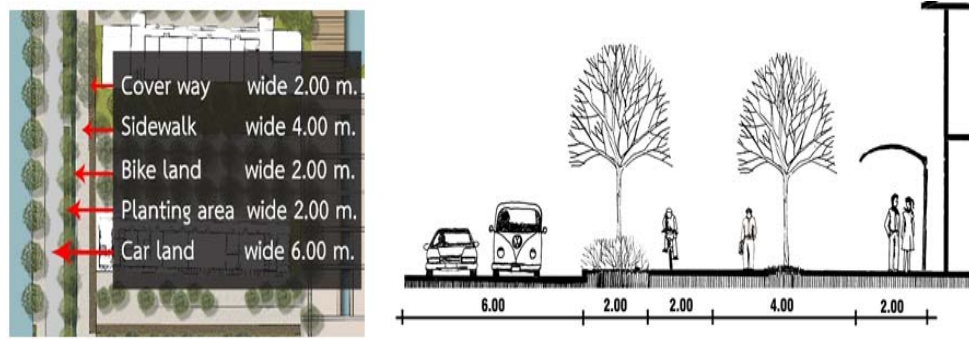


Figure 2. Section of cover way-side and walk-bike lane



Figure 3. Scenario design of transportation management to become environmental friendly transportation “Green PNRU”

5. Discussion and Conclusion

The operation of the transportation plan and budget allocation from the university are of significant concerns. It is important that the plan be supported through budget allocation. In order to achieve transportation management for Green PNRU, the cooperation among sectors and agencies as well as public users are needed. It has been found that transportation management of passage through Green PNRU is a necessity due to two main reasons: 1) there has been an increased use of personal vehicles such as cars and motorcycles by students, faculty members, and university staffs; and 2) there has been an increase in the use of personal vehicles such as cars, motorcycles of members of the general public who have access to campus roads for shortcut during rush hours. This adds to the carbon footprint of the campus. Therefore, the transportation management system proposes walkways and bicycle lanes. The policy “walkable-bicycle” promotes walking and using bikes for the benefit of everyone. PNRU should add the policy of transportation management into short-term management and long-term management. For the short-term management, PNRU should be concerned and be clear about the main budget of the university in adapting pedestrian walkways and bike lanes proposed in the plan. For the long-term management, PNRU should be concerned in educating all stakeholders of PNRU to adapt a green university as proposed.

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