รายงานการวิจัยฉบับสมบูรณ์

มหาวิทยาลัยสีเขียว: แนวคิดเกี่ยวกับความยั่งยืนเพื่อสถานศึกษาในระดับอุดมศึกษาในประเทศไทย - การศึกษาเปรียบเทียบระหว่างมหาวิทยาลัยที่ได้รับการจัดอันดับและยังไม่ได้รับการจัดอันดับเป็นมหาวิทยาลัยสีเขียว

Green Campus: a concept of sustainability for higher educational institutions in Thailand – A comparative case study on Green- and Non-Green-Campus universities in Thailand

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ชื่อโครงการ (ภาษาไทย)

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ABSTRACT

In 2010, Universitas Indonesia (UI) developed the UI GreenMetric World University Ranking for universities to share information about their sustainability practices. This ranking system was well aligned with the basis of Sustainability for Higher Education (SHE). The scoring system can also be used as a guideline for universities to achieve sustainability in their campuses. Since its first launch, more universities around the world have increasingly participated in the ranking system including many universities in Thailand. This study compared perception of stakeholders in Green Campus and Non-Green Campus universities in Thailand regarding stakeholders' satisfaction on sustainability practices and perceived quality of life at their campuses. The results showed that stakeholders at the studied Green Campus University were more satisfied and had significantly better perceived quality of life compared to stakeholders from the studied Non-Green Campus university. The results suggested that universities should adopt the criteria set in the UI GreenMetric World University Ranking to achieve better sustainability in their campuses and improve quality of life of their stakeholders.

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CHAPTER 1
INTRODUCTION

This chapter describes background of information about the study focusing on sustainability, quality of life, universities and green campus. It also explains the reasons for the needs for this study and its objectives to be accomplished.

1.1 Background

Over the past two decades, university rankings have become a global phenomenon and continue to be wide spread around the globe. They have emerged from professional, government, private and media-based sectors (UNESCO CEPES, 2004). They deal with various issues ranging from research and academic reputation, education, to environmental performance. Of these three perspectives, most of the university ranking designers often stress on the importance of research and academic reputation, followed by educational indicators, whereas environmental issues have received little or no attention (Alshuwaikhat and Abubakar, 2008).

However, the green campus revolution has gained momentum around the world since the declarations on Sustainability in Higher Education (SHE) have grown in number and significance over the last decade (Grindsted, 2012). There are several terms for green initiatives including, but not be limited to, green campus, eco-urbanism, green urbanism, green building, and high performance buildings. Though similar in nature, the key objectives and implementation of each of them are different. For example, a green building initiative such as LEED (Leadership in Energy & Environmental Design) initiated by the U.S. Green Building Council (USGBC) is meant to decrease production of waste and hazardous materials, reduce the level of energy consumption, and promote the design of energy efficient buildings (Mehta and Wiesehan,2013). Many universities and colleges have already adopted the green concept to promote campus sustainability (Grindsted, 2012).

In 2010, the Universitas Indonesia (UI) established the GreenMetric ranking for universities around the world to share information and determine how to compare the university's commitment to the environment and sustainable resource usage. With respect to this specific issue of sustainability and the green campus, UI GreenMetric

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Ranking has played a different role among other sustainability surveys, scorecards, and rating systems (Hazelkorn, 2011). The ranking was based on the premise that there is room for a global ranking that will enforce measuring tools, which can be used for both developed and developing countries (Sari, 2012) The UI GreenMetric ranking of world universities is the first attempt to make a global ranking of universities' sustainable behavior (Grindsted, 2012).

The UI GreenMetric is based on six (6) main categories including green statistics, energy and climate change, waste management, water usage, transportation, and education. To comply with UI GreenMetric indicators, the universities will have to demonstrate sustainable practices in many ways as detailed in the six (6) main categories. Universities entering this UI GreenMetric ranking are so-called 'green campus' universities (Guidelines of UI GreenMetric World University Ranking, 2013). The number of participating universities from Thailand is increasing constantly. In 2012, there were only five (5) universities from Thailand ranked in the UI GreenMetric. The number of Thai universities participating in the ranking dramatically increased to thirteen (13) universities in 2013. Some other universities are still considering participation. Overall, a university's environmental management measure will be reflected the quality of life at university" (UI GreenMetric, 2014)

Interesting research topic recently has looked at quality of life. Though difficult to define and even harder to measure, quality of life has been important to everyone. According to Griffith (1994) "higher education leaders should reshape their priorities to include the creation of attractive, engaging campuses that are conducive to both activity and tranquility" and a student's perception of how a campus looks and feels plays a critical role in the choice of a higher education institution". Furthermore, researchers have also found that the physical environment of the university particularly; affected students, and their academic experiences (Karmel, 1965).

In another study of university students, Ulrich (1979) found that students felt an increase in positive affect after exposure to nature scenes when compared to those exposed to urban scenes after experiencing a stressor in the form of a one-hour exam. Evidence has also suggested that the physical environment of the university was an important concern for students. Boyer (1987) found that the appearance of the campus was the most significant factor for students in deciding which university to attend.

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1.2 Problem Statement

As now green campus was an interested topic around Thailand as thirteen (13) universities from Thailand have adopted this UI GreenMetric and been ranked in the index. There is a need for study to investigate the benefits of the initiative in terms of quality of life as it is one the ultimate goals to be achieved by the initiative. Existing ranked universities might need to the information to justify the level of efforts to be spent to pursue or promote the initiative. For non-ranked universities, results of the study would be beneficial for them to decide to enter the ranking system.

1.3 Objective of the Study

The primary objective of the study is to compare the perception of stakeholders in universities, both green and non-green campus labeled, regarding their quality of life. The study also aims to compare the perceptions of the stakeholders in aspects related to the six criteria of the UI GreenMetric. It also analyze the differences in perceptions among different demographic of the stakeholders such as gender and mode of transportation.

1.4 Scope of the Study

The study aims to investigate and compare perceived quality of life of stakeholders in Green and Non-Green Campus universities. The study use Mahidol University International College (MUIC) as the representative for Green Campus universities and the International College, King Mongkut's Institute of Technology Ladkrabang (KMITL International College) as the representative for Non-Green Campus universities.

1.5 Definitions of Terms

Green space: "a plot of undeveloped land separating or surrounding areas of intensive residential or industrial use that is maintained for recreational enjoyment" (Dictionary.com, 2014).

Green education: "as the process of reducing the multitude of on- and off-site environmental impacts resulting from campus decisions and activities, as well as raising environmental awareness within the human communities of a college or university" (Creighton, 1999).

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Sustainable campus: "as a concept describes a strategy to improve the sustainable performance within the University, and increase awareness among employees and students about sustainability and related issues." It should be noted here that most of the efforts pertaining to a Sustainable Campus typically focus on managing environmental issues (Central European University Sustainable Campus, 2010).

Quality of life of university students: an indication of the subjective sense of well-being students experience in the specific social context of the university (Roberts and Clifton, 1991).

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CHAPTER 2
LITERATURE REVIEW

This chapter lists studies related to the profound knowledge used in the design of this study. The literatures are summarized in three (3) topics including quality of life, green campus and sustainability.

2.1 Quality of Life

There is no single, universally, accepted definition of quality of life (Lauer, 1999). The World Health Organization's definition of quality of life, for example, focuses on the subjective perspective (WHOQOL group, 1997), whereas other constructs are broader and include objective indicators of health, housing and other material circumstances. According to recent reviews (Lauer, 1999), quality of life, as a construct, has frequently been the topic of social science research, though it has been difficult to define. Researchers in the fields of economics, psychology, sociology, political science, and education have defined quality of life using both objective and subjective terms (Schuessler and Fisher, 1985).

Objectively, quality of life has been studied using factors such as economic well-being, educational level, and health care access, quality of housing, crime rates, environmental quality, divorce rates and recreational activity (Dillman and Tremblay, 1977). Subjective measures of quality of life have focused on terms such as "happiness, satisfaction, sense of well-being, [and] aspirations" and suggests that "society exists to meet the needs of people in it, and to find out whether those needs are being met we should simply go out and ask them" (Dillman and Tremblay, 1977).

Researchers have used objective measures in an attempt to easily quantify and define social indicators of quality of life (Diener and Suh, 1997). Though researchers have used a vast array of objective variables to study quality of life, one problem with them was the absence of a commonly accepted value system which was meaningful across nations, or even within a single culture (Liu, 1974). Dillman and Tremblay (1977) explained that objective measures of quality of life "fell short of describing exactly what those measures should be and whether specific changes in indicators reflect improvement or decline". Diener and Suh (1997) also pointed out that even

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with objective measures, they were inevitably defined and interpreted in subjective ways.

Some researchers have defined subjective quality of life using psychological factors. For instance, Campbell et al. (1976) defined quality of life as referring to "a sense of achievement in one's work, an appreciation of beauty in nature and the arts, a feeling of identification with one's community, a sense of fulfillment of one's potential" and a general sense of well-being. Allardt (1976), in contrast, defined quality of life as coming from feelings of self-realization from relationships.

While some researchers tried to account each aspect that contributed to quality of life, others suggested that Maslow's "hierarchy of needs" (1943) appropriately reflected quality of life issues. In this hierarchy, physiological needs were the lowest category, which is composed of basic needs such as food and shelter, with the highest level of need being self-actualization needs, or emotional balance and growth. Numerous studies used Maslow's hierarchy as a theoretical basis for quality of life (McCall, 1975; Schuessler and Fisher, 1985; Waliczek et al., 1996). In these studies, as higher level needs were met, the greater a person's perceived quality of life.

Lastly, some researchers supported using a combination of objective and subjective factors to study the most accurate description of quality of life. Milbrath (1979), for example, argued in support of an "ecological" approach that looked at an interaction among a number of factors. However, Schuessler and Fisher (1985) asserted that while objective factors may foster specific qualities of life, they did not comprise or produce them.

2.1.1 Component of Quality of Life

Quality of life composes of several factors that correlate to each other, UNESCO crates numerous factors associating with quality of life, for instance, food, healthy, nutrition, education, environment, resource, dwelling, settlement, job, value, religion, ethics, law, and psychological side. As far as WHOQOL Group (1997) is concerned, quality of life comprises of 5 sides thereinafter:

1. Physical domain is the perception of the body's influence in daily life such as health, happiness, physical pain, stress management skill, amount of sleep and amount of rest.

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2. Psychological domain is the perception of the mind, namely, positive feelings with oneself, identity of self, self-esteem, confidentiality, thinking process, memory, concentration, decision, learning skill, depression and concerned management skill, belief in general to influence daily life, for instance, belief in mind-spiritual, religion, meaning of life, trust in others that influence life-going positively and creating defend barriers, etc.

3. Level of Independence is the dependence on medicinal substances and medical aids and individual work capacity

4. The social relationship also includes the interaction among people in the society. This includes to help each other in social activities and to get assistance from other people, as well as to perceive sexual feeling or to have sexual intercourse.

5. Environment is all the surrounding factors that impact life, for sample, being independent, not detained under custody, safety and righteous style of life. Accordingly, environment includes perception of well being in good physical environment, deprived of pollution, having comfortable transportation and having monetary dexterity and service for health and social. In addition, it also refers to acquiring information, having enough recreation and leisure time and so forth. As aforementioned, it may be concluded that there are two components to quality of life, namely, physical and psychological aspects. Physical aspects and qualities goes hand in hand with psychological aspects; for instance, developing thoughts, ethics, faith in teaching of religion, progress towards the goal in one's life, and living happily in the society.

2.1.2 Quality of life and Environment

Environment quality has always been one of the most important components of the quality of life. Evaluation of values such as beauty, fresh air, noise, fumes, and congestion cannot be precisely determined because people themselves are not very specific about their likes and dislikes. As rightly emphasized by O'Riordan (1976), no device and no matter how carefully thought out, can overcome the inherently contradictory psychological and social processes which cause any assessment of environmental quality to be problematic. To measure the quality of life provides one way for individuals to express their degree of integration with organizations. Quality of life refers to the degree of satisfaction or sense of well-being people experience in specific environments (Schuessler and Fisher, 1985). In general, the quality of life

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which people experience in organizations increases when people believe their interests are aligned with the goals of the organization, and as they perceive that the organization is serving their needs and interests.

The relationship between the quality of life and the environment has become an important subject in the study in the last several decades. (Ruúen, 2012) Researcher found interesting results that investigated the relationship between physical environments and various aspects of quality of life. Kaplan and Kaplan (1989) reported, "People with access to nearby natural settings have been found to be healthier overall than other individuals. Similarly, Wolf (1996) revealed that urban forests provide a more satisfying quality of life for urban residents. Several researchers have found physiological differences in individuals who worked close to plants or natural views when compared to those working in areas without natural. For example, Kaplan (1992) found that employees reported fewer incidences of headaches and other illness when having a view of nature at work. Dravigne (2006) found that people life in plants decoration and window views of green spaces showed to positively influence employees' perceptions of their overall life quality, and employees' perceptions of their physical work environment. Furthermore, Gottleib (1994) found environmental quality to be the highest ranking quality of life factor.

2.1.3 Quality of Life and Environment in the University

Griffith (1994) found that "Higher education leaders should reshape their priorities to include the creation of attractive, engaging campuses that are conducive to both activity and tranquility". Furthermore, she defined "Attractively landscaped formal open spaces or habitats left in their natural form, as woods and gorges, help establish a venerable campus identity, stir alumni sentimentalism, create a strong sense of community, and curb escalating campus densities". She emphasized, "A well laid out campus with sufficient open space will assist in the recruitment of top notch students and faculty member". In addition to theoretical perspectives, researchers have also found that the physical environment of the university, particularly, affected students, and their academic experiences. One of the earliest studies on students and the environment found that high school students in rooms with windows were generally happier (Karmel, 1965). In another study of university students, Ulrich (1979) found that students felt an increase in positive affect of high quality of life after exposure to nature scenes when compared to those exposed to urban scenes after

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experiencing a stressor driven by a one-hour exam. Evidence has also suggested that the physical environment of the university was an important concern for students. Boyer (1987) found that the appearance of the campus was the most significant factor for students in deciding which university to attend. Im (1984) found that, vegetation coverage was one of three important predictors for visual preference of a familiar campus area for both undergraduates and graduate students. Furthermore, in a free-response question, the presence of vegetation was the most frequently cited reason for preference of an area.

2.2 Green Campus

Green campus initiative calls for the university environment management system to promote construction of green buildings and transportation facilities such as walkways, cycle-ways, greenways, etc. on the campus. Green buildings can reduce energy consumption and improve the well-being of the university community. The target of the energy-efficient green buildings is to have better lighting, temperature control, improved ventilation and indoor air quality which contribute to healthy environments by reducing the dangerous air-pollutants that cause respiratory disease in campus buildings. A building's energy use is a primary consideration in its long-term environmental impact because both the heating and cooling design and the equipment selected contribute to this impact. Energy efficiency improves as building spaces are used efficiently with intelligent control systems.

2.2.1 Green Campus Concept

The greening of higher educational institutions can be defined as the process of reducing the multitude of on- and off-site environmental impacts resulting from campus decisions and activities, as well as raising environmental awareness within the human communities of a college or university (Creighton, 1999).

Effective education are concerning to encourage individual persons to develop their potential. And educate the core values and attitudes that are necessary to daily life and prepare them to be outstanding persons from following factors curriculum, education background, teacher, student, atmosphere and good environment. Good environment is important factor that university management needs to pay attention because of good environment support a student life.

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The concept of campus ecology can be defined as the study of the campus as an ecological system made up of three components organisms or inhabitants (students, faculty, staff, visitors, others), settings environments both social (the curriculum, the co-curriculum, the extra-curriculum, and other social functions) and the physical (buildings, landscapes, walkways, and other natural and built features of the environment), and the activities behaviors (learning, research, personal development, and other outcomes specific to higher education). Most importantly, the concept of campus ecology focuses our attention on the myriad of mutually interdependent relationships among inhabitants, environments, and behaviors with a special emphasis of how the ecology of the campus can support or hinder the traditional goals of student growth and development. To be a campus ecologist means to have a "mind set" that behavior is not just a function of intra and inter psychological variables, but the social and physical environment is always in a transactional relationship with the these important person variables. This website is dedicated to providing a "virtual" opportunity for the exchange of information, ideas, and resources about students and their environment.

2.2.2 UI GreenMetric

Universitas Indonesia, as an emerging world-class university, in 2010 has developed an online "green" ranking for world universities, aimed to offer the portrait of the current conditions and policies related to Green Campus and sustainability in the universities all over the world. Instead of using research and educational indicators, it mostly embraced the environmental ones. (Suwartha and Sari, 2013) With respect to this specific issue in sustainability and green campus, UI GreenMetric ranking has played a different role among other sustainability surveys, scorecards, and rating systems (Hazelkorn, 2011). The ranking was based on the premise that there is room for a global ranking that will enforce measuring tools, which can be used for both developed and developing countries (Sari, 2012).

The UI GreenMetric ranking was developed to provide a profile for and way of comparing the commitment of universities towards going green and promoting sustainable operations, with regard to all three important dimensions: research, educational and environmental (Suwartha and Sari, 2013). The UI GreenMetric ranking selected criteria that are generally thought to be of importance by universities concerned with sustainability. In 2013 UI GreenMetric world university ranking

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consist of six (6) main criteria to determined based on information provided by respective universities that demonstrates commitment to going green and being sustainable, namely environmental settings and infrastructure, energy and climate change, waste, water, transportation and education (Guidelines of UI GreenMetric world university ranking 2013). (Figure. 2.1)

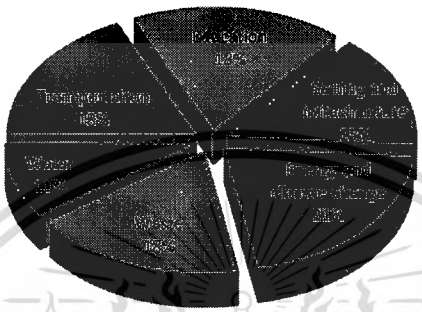

Figure 2.1 UI GreenMetric World University Ranking Criteria

2.3 Sustainability

Sustainable development is the biggest challenge to universities in twenty-first century. Many term of different definitions and interpretations of the concept exist, is not surprising that the strategies of the universities that are beginning to strive for sustainability show some differences. Various universities have already become engaged in the process of integrating sustainable development in their activities. (Hans, 2000)

The declaration which has a link to university environmental sustainability was completed at the UNESCO Conference on Environment and Society: Education and Public Awareness for Sustainability, hosted by the Government of Greece (UNESCO, 1997). The declaration also recognized that sustainability initiatives must take place at all levels of society and must be interdisciplinary in nature. The declaration argued that the concept of environmental sustainability must be clearly linked with poverty, population, food security, democracy, human rights, peace and health and a respect for traditional cultural and ecological knowledge (University Leaders for a sustainable future, 1997).

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Sustainable physical operation, the theme of sustainable physical operations is expressed generally, but is not of primary importance in the national and international declarations. The Kyoto Declaration, for example, encourages universities to review their physical operations to reflect best sustainable development practices. The Talloires Declaration also calls for more sustainable physical operations, and for higher education to set an example of environmental responsibility by "establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations" (University Leaders for a sustainable future, 1990). Regardless of how a university approaches its commitment to sustainability, there are foundational themes that exist in both macro and micro approaches to sustainability. These themes include sustainable physical operations, sustainable academic research, environmental literacy, ethical and moral responsibility, cooperation amongst universities and countries, the development of interdisciplinary cu9rriculum, and partnerships with government, non-governmental organizations and industry. (Wright, 2002)

2.4 University Background

2.4.1 Mahidol University

Mahidol University (MU) is one of Thailand's well-known public universities. MU has a long history beginning in 1888 as School of Medical Practitioners, Siriraj Hospital. Then, it was reorganized as University of Medical Sciences in 1943. Although MU emphasized on Health Sciences in the early age, it extended instruction in other branches over decades. Presently, MU offers bachelor's, master's and doctoral degree programs in a wide range of disciplines.

MU possesses several campuses in metropolitan and suburban areas. At Salaya, it is the large suburban campus in Nakhon Pathom province. In Bangkok, MU has metropolitan campuses in Bangkok Noi and Phayathai. The College of Management Mahidol University (CMMU) is located in Bangkok as well. In addition, other provinces including Kanchanaburi, Nakhon Sawan and Amnaj Charoen are where MU campuses are located. MU has a network of computers linking among campuses. With this electronic linkage, Mahidol's personnel and students at a wide range of departments can access to academic, research and administrative computing services. Mahidol Salaya Campus contains ten faculties, eight institutes, five colleges,

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and three centers. MU now offers 368 educational programs. Various fields of MU are medicine, science, public health, nursing, pharmacy, dentistry, engineering, environment and natural resources, veterinary science, sport science, information and communication technology, management, social sciences and humanities, innovative learning, music and arts. Besides, one of famous international colleges in Thailand is Mahidol University International College (MUIC) established in 1986. MUIC is the first international college funded by the government. MUIC offers educational programs instructed in English language to different nationalities of overseas students at undergraduate level. (Mahidol university fact and figures, 2013-2014)

Moreover, MU launched the Master Plan of 2008 whose an objective was to create a suitable environment for learning, with a physical structure that is in harmony with the society and our environment. This policy was established for three main reasons: to provide students and employees with a pleasant studying and working atmosphere in order to enhance creativity as well as inspiration for learning, research and innovation; to offer transformative education and to cultivate the love of nature along with preserving the environment; and to provide support for energy conservation. MU is determined to turning its Salaya campus into a "green campus." The physical campus, including landscape, traffic circulation and infrastructural services are now established. Nonetheless, the university realizes that the physical aspect is only one factor. Another factor to consider is the lifestyle of people on the campus. Therefore, some policies have been revised as follows:

1. Land use development
2. Landscape system development,
3. Traffic system development
4. Infrastructure service system development

5) Building and construction control

MU started the green project by converted its six-lane roads that was originally just for cars into a 3-lane car and 3-lane bicycle and walking road. MU thought this was not enough and wanted to encourage more energy-conservation practices. Going green is not just about having a green campus, but also minimizing carbon footprint through more efficient use of technologies. The university has allocated 900 million baht to growing trees and building canals and ponds for more water sources. All 50,000 or more light bulbs have been changed to energy-efficient ones, and 2,256 air-conditioners that are older than five years were removed. More

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than 400 bicycles are offered for free use around campus, and 15 shuttle buses are offered for people to get around campus without using cars. There is also an organic farm, as the university has 5 rais of land for villagers to grow cheap and toxin-free vegetables for the university staff. More notably, there is a wind turbine producing 2 kilowatts of electricity per hour. There is also a solar cell installed on the rooftop of the science and technology building; it is able to generate 19.65 megawatts of electricity. This is a good example of MU.

2.4.2 King Mongkut's Institute of Technology Ladkrabang

Founded in 1960, King Mongkut's Institute of Technology Ladkrabang (KMITL) aimed to be the center supporting research and development in science and technology for progressing Thai industrial and economic sectors. KMILT's students also are fostered an appreciation of social responsibility. KMITL was derived from the name of King Mongkut (King Rama IV) of the Chakri Dynasty. King Rama IV was named "Father of Thai Science" and royally permitted his name to be the name of KMITL. Located in Lat Krabang, KMITL is not far from Bangkok. It also initiated first remote campus in Chumphon Province, Southern part of Thailand. As a center of industrial development and promotion in south side, the remote campus contains 1,800 hectares of land. Now KMITL possess 9 Faculties as well as KMITL international College. Emphasized on various fields, the International College offers programs in science and technology and other fields including business and management.

The International College is the center to link students, staffs and researchers in different nations. With The International College, KMITL becomes one of outstanding universities that generate new successful graduates to domestic and international arena. Over times, research and development to multiple industries has been conducted through the cooperation between KMITL and industrial sector. In addition, KMITL has cooperated with over fifty countries worldwide to conduct international research projects.

KMITL has included "sustainable development" as part of its university mission. The strategy aims to develop the university into an educational institute that offers research alongside with its curricula. It aims to offer such activities while engaging students on a continual basis. There will also be many environmental management programs that help aid students in creating green innovation technology

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and environmentally friendly facilities, such as the faculty of engineering's "success in green technology" project. KMITL also has curricula that pertain to environmental development and making development last. For example, there is the Bachelor of Science Program in Environmental Resource Chemistry and Master of Urban and Regional Planning Program in Urban and Environmental Planning. There are also campaigns for the following: reducing the use of energy inside the KMITL campus, separating trash within faculties, and supporting the local community. All of these are open to participation by staff and students. In addition, the SEACUS has been established to promote education, research, professional training and expert to increase the quality of life in urban areas and support urban sustainability (King Mongkut's Institute of Technology Ladkrabang, 2009).

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CHAPTER 3
METHODOLOGY

This chapter presents the research methodology conducted to complete the study. It explains how the study area and study population were set. It also describes how data were collected and how results were interpreted.

3.1 Study Area

The study was conducted through questions with stakeholder in Mahidol University International College (MUIC) and King Mongkut's Institute of technology Ladkrabang International College (KMITL-IC). These two universities were selected for the study because of Mahidol University was first ranked UI GreenMetric ranked campus in Thailand. The college is used as the representative of Green Campus.

KMITL has not yet submitted any data to UI to be ranked in the UI GreenMetric. Geographically, both campuses are located in suburb areas of Thailand. International colleges of both universities were selected for the study based on an assumption that the study populations would reflect a greater variety concerning nationalities of stakeholders (e.g., multi-nationality students) compared to traditional Thai academic units. This diversity would allow the comparison of perspectives between those of Thai and foreign stakeholders. Stakeholders, which include students, lectures, and staff at these institutions, were set as the study population.

3.2 Study Population

The subjects participating in this study consist of stakeholders from the two international colleges. Each college consists of stakeholders with different demographic profiles such as status, level of education, gender, and age. The total numbers of the stakeholders at MUIC and KMITL-IC are 4,013 and 268, respectively Study population listed by their statuses is summarized in Table 3.1.

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Table 3.1 Study population

Campus / Population	MUIC	KMITL-IC
Number of students	3,632	244
Number of lecturer	272	16
Number of staff	109	6
Total of stakeholders	4,013	268

* Updates as of Jan 2014

3.3 Survey Design

The number of sample size was calculated by a simplified formula for proportions. The simplified formula to calculate sample sizes was provided by Yamane (Yamane, 1967). The sample size is determined by level of precision and population, confidence level and proportion are designated as specific number.

The researcher has used random sampling and to select the sample, the formula of Taro Yamane has been used with the following formula.

formula $$n = \frac{N}{1 + Ne^2}$$

When n = size of sample group

N = size of all population

e = the missing adjusting rate in random sampling at level 0.05

The sample size of this study was considered appropriate at 95% confidence level with a precision rate of ±5% and the degree of maximum variability is .5

The degree of maximum variability is 0.5, the minimum size of sample populations were set to be total 524 that included 364 from MUIC and 160 from KMITL-IC.

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3.4 Questionnaire Form Design

A questionnaire was used as the primary tool to collect data for the study. The questionnaire was developed in English. Thai translations were also incorporated in the questionnaire form to minimize the problems of ambiguity, misinterpretation, and opacity of the content since the some stakeholders have limited English proficiencies. The procedures of constructing the questionnaire were described as follows:

a) Literature, research and theory related to Green Campus, quality of life in university, sustainability (such as environment management program, etc.) and the participation in university's environment management were studied in detail in line with the scope of the study. An interview with university's management was also conducted to gather some perspectives that can be useful for the design of the questionnaire. The interview form is presented as Appendix A.

   A draft questionnaire was constructed for emphasizing the purposes of the study and the research questions. The questionnaire was then examined and revised under the supervision of the thesis advisors and experts in the field in order to ensure the validity of the questionnaire

b) After that, the questionnaires were tried out with 20 respondents in others universities. The major purpose of this trial was to indicate whether the rubric, phrases, expressions and language used in the instructions and the questionnaire items could be clear and understandable to the respondents. An additional page asking about the respondents' opinion toward the questionnaires was attached at the end of each set so that the respondents could write down their comments and/or suggestions which might be beneficial for improving the questionnaires.

c) After the questionnaire was tried out, it was revised according to suggestions of the experts and the results from the pilot. The researcher changed some ambiguous questions and the form of the questionnaire to be more understandable.

Using questionnaire consists of 2 parts:

Part 1 Demography data

Part 2 Perception of the respondents in quality of life.

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Part I consist of ten (10) questions, which were designed to collect general information and profiles of the respondents. The questions were aimed to ask about the age, gender, status, lifestyle, living conditions, and mean of transportation.

Part II of the questionnaire consists of 21 questions designed to ask about the aspects related to Green Campus and the perception of the respondents' quality of life. These questions were mainly based on the 6 categories of the UI GreenMetric criteria including:

1) setting and infrastructure;
2) energy and climate change;
3) waste;
4) water;
5) transportation;
6) education.

Scoring, The responses were measured using a five-point Likert rating scales ranging from 5="strongly agree" to 4= "agree", 3= "Neither Agree nor Disagree", 2= "Disagree"and 1= "Strong Disagree" for stakeholders to check in the column appropriate to their opinion. It is designed to demonstrate the respondents' perception of the university's environment al management and Green Campus.

Perception

5-refers to Strongly Agree
4-refers to Agree
3-refers to Neither Agree nor Disagree
2-refers to Disagree
1-refers to Strong Disagree

Opinion

5-refers to Very important
4-refers to Fairly important
3-refers to Neutral
2-refers to Not so important
1-refers to Not at all important

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Quality of life

5-refers to Very good

4-refers to Fairly good

3-refers to Neither good or bad

2-refers to Not very good

1-refers to Not good at all

(See Appendix B for the stakeholders questionnaire)

3.5 Collection of Data

Three channels were used for the distribution of questionnaires. A web-based survey tool (Survey Monkey®) was used as the first channel. The second one was by distributing hard-copy questionnaires manually at the two colleges. Finally the management of MUIC and KMITL-IC sent hard copies of the questionnaire to their staffs.

By sending the link to the web-based survey through MUIC and KMITL IC webmail systems and the posting that link in closed-group Facebook accounts the study received in total 530 respondents, which include 370 respondents from MUIC and 160 respondents from KMITL-IC. All participants remained anonymous with demographic information being collected for comparative analysis only. All questionnaires remained confidential.

3.6 Analysis of Data and Statistical Procedures

From the collection of research data, statistical analysis based on descriptive and inferential methods were used to analyze data by utilizing the Statistical Package for Social Science (SPSS), a computer software package for Microsoft Windows Version13.0. The statistical devices used for analyzing the data were described as follows:

1) Percentage and Frequency was used in the analysis of the answers concerning background information.

2) Arithmetic Mean was used to calculate the average level of needs for the fivepoint Likert scale and the modified Likert scale.

3) The Cronbach Alpha Method was employed to ascertain the reliability of the responses for the items based on the five-point Likert scale.

4) A t- test and one-way ANOVA (F-test) method was employed to find

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the difference in the attitudes between stakeholders in Green and Non-Green Campus. Throughout this study, the determination of significant level at .05 was used.

5) P -value, a measure of probability that a difference between groups during an experiment happened by chance. For example, a p-value of .01 (p = .01) means there is a 1 in 100 chance the result occurred by chance. The lower the p-value, the more likely it is that the difference between groups was caused by treatment.

3.7 Hypothesis

1. Stakeholders in Green Campus have perceptions of quality of life in university higher than stakeholders' in Non-Green Campus.

2. University's environmental management is correlated with quality of life of stakeholders in Green and Non-Green Campus.

3.8 Basic Assumptions

1. It was assumed that respondents answered the survey questionnaire honestly, and were not informed or biased based on the information provided in the survey or from any other outside source.
2. It was assumed that respondents responded to the survey only once.
3. It was assumed that the population sample was representative of the target population.

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CHAPTER 4
RESULTS AND DISCUSSIONS

This chapter presents the results of the research questions. Descriptive statistics and data analysis of the surveys completed by 530 respondent stakeholders are presented and reviewed.

4.1 Respondents' Profile and General Information

Approximately 56.2% of the respondents are female and 43.8% of them are male. As presented in Figure 3, the percentage of female respondents from MUIC (61.1%) is slightly higher than from KMITL-IC (45.0%). Male respondents from MUIC and KMITL-IC are 38.9% and 55.0%, respectively. The numbers of responses are labeled on the graphs.

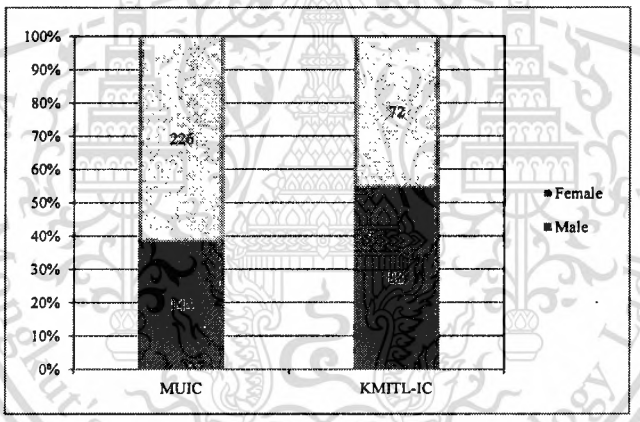

Figure 4.1 Gender of respondents

Figure 4.1 presents age distribution of the respondents. The majority of respondents are younger than 20 years old (39.5%), with a mean of age between 21-24 years old (SD=1.532) representing 34.7% of the respondents. Approximately 8.5% of the respondents are 25-29 years old, 7.0% of them are 30-34 years old, 6.8% of them are 35-39 years old and 4.5% are older than 40 years, which is the smallest group.

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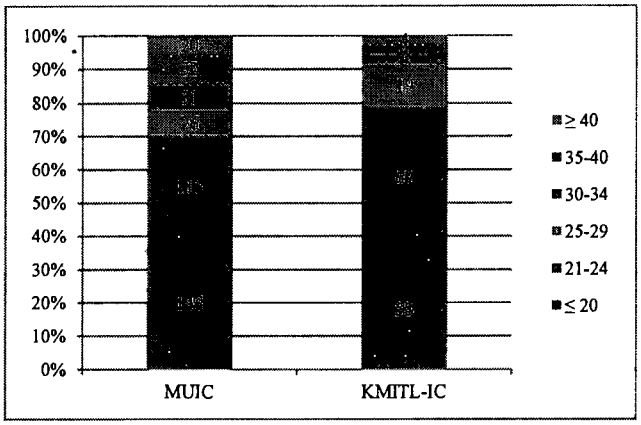

Figure 4.2 Age of respondents

Nationalities of the respondents from both groups show that the majority at MUIC (95.7%) are Thai. Other nations are underrepresented so they were grouped as others (4.3%). Approximately 96.9% of respondents from KMITL-IC are Thai with only 3.12% of other nationalities.

Most respondents identified themselves as being students; 71.4% at MUIC and 95.0% from KMITL-IC. Out of these students, approximately 98.1% and 1.9% of MUIC student respondents are undergraduate and graduate levels, respectively. At KMITL-IC, approximately 70.4% are undergraduate students and 29.6% are graduate students. Statuses and study level of respondents are presented as Figure 4.3 and 4.4, respectively.

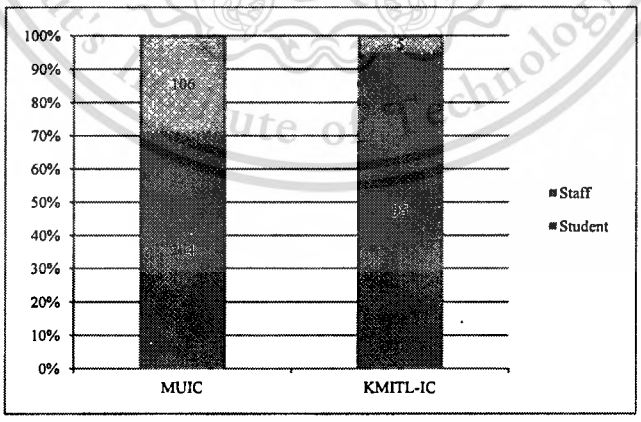

Figure 4.3 Statuses of respondents

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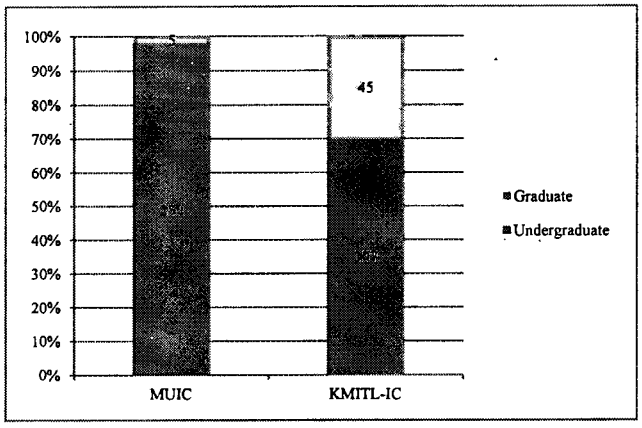

Figure 4.4 Study levels of student respondents

More than half of MUIC respondents (57.5%) commute to university by private vehicle followed by public transportation (28.9%) compared to 41.6% of KMITL respondents commuting by private vehicle and 35.0% by public transportation. Modes of transportation are presented as Figure 4.5.

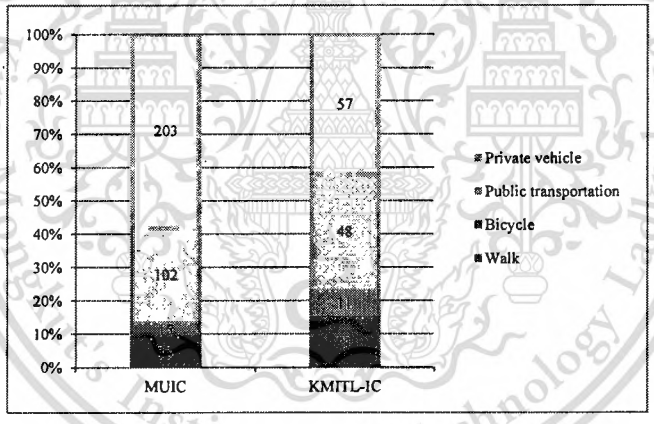

Figure 4.5 Modes of transportation

It is interesting that respondents from MUIC rely more on private vehicle than those from KMITL-IC even though they are in the institution where Green Campus campaign is stronger. This preferred mode of transportation may be resulted from many factors. First, UI GreenMetric primarily focuses on transportation management in campus area. Transportation outside of the campus is somewhat beyond the university's control. Even though MU offers Salaya Link, a shuttle bus system connecting Bangkok downtown and MU's Salaya Campus; commuting to KMITL campus is still more convenient. This is because KMITL campus is located near Ladkrabang Station of the Airport Rail Link (ARL) system, which is an electric train

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system connecting Suvarnabhumi Airport and Bangkok downtown area. KMITL campus is also located near Suvarnabhumi Airport.

Second, affordability of students at different colleges may be different. Students from higher-income families tend to be able to afford private vehicles more than students from lower-income families. Students may prefer to commute by private vehicles if they can afford even though public transportation systems are available. Income levels of students' families are not available in this study.

When asked whether respondents are aware of "sustainable development is a part of the university's mission statement", approximately 72.7% of MUIC stakeholders answered yes compared to 61.3% of the respondents from KMITL-IC. This might reflect the difference of Green Campus promotion between MUIC and KMITL-IC. Nevertheless, the majority of the respondents from both institutes (80.8% from MUIC and 78.1% from KMITL-IC) replied that sustainable development is part of their curriculum or has been a topic in one of their classes.

4.2 Green Campus and Perception about QOL

Figure 4.6 and Table I present the responses of MUIC and KMITL-IC stakeholders regarding sustainability aspects covered in the UI GreenMetric Ranking and their perceive quality of life. Overall, on five-point Likert scale, MUIC respondents seem more satisfied with environmental management and sustainability practices at their campus. The overall mean scores of the responses in this part are 4.05 and 3.90 for MUIC and KMITL-IC respondents, respectively.

Table 1 illustrates the results of t-test to examine whether there are significant differences between the mean scores of both groups of the respondents. Significant differences are recognized when the p-value is at or below 0.05. Mean scores of MUIC responses are significantly higher than KMITL-IC responses for the following statements:

Q1: Environmental management is very important for a university's campus

Q2: Satisfied with the university's environmental management

Q4: The university does provide enough green space to support high quality of life.

Q13: The overall quality of life on campus

Based on the results, some interesting findings are noted here. MUIC respondents rated their university providing enough green space higher than what KMITL-IC respondents rated. MUIC respondents also provided higher score on the

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statement that university's environmental management is important compared to what KMITL-IC provided.

The aforementioned findings are agreeable with what McFarland et al. concluded about undergraduate students' preference. They found that undergraduate students deem green space as a positive impact to their quality of life (McFarland et al., 2008). Therefore, it is important for campus planners to consider the relationship between the student experience and green spaces on campus.

Table 4.1 The Comparison of Mean Scores, T-test Values and P-Values between MUIC and KMITL-IC responses

Item	Quality of life and university's environmental management	MEAN		t-test value	p-value
		MUIC	KMITL-IC		
Q1	Environment management is important for a university's campus	4.50	4.22	3.965	.000*
Q2	Satisfied with environmental management of your university	3.95	3.52	5.203	.000*
Q3	Important of university green space available	4.25	4.19	.767	.443
Q4	The university does provide enough green space to support a high quality of life	3.99	3.61	4.104	.000*
Q5	Energy saving is very important practices for your university	4.11	3.99	1.579	.115
Q6	The Universities energy saving practices does support a high quality of life.	4.07	4.06	.195	.845

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Q7	The climate change mitigation programs (greenhouse gas emission reduction) are very important practices for your university.	3.84	3.86	-.173	.863
Q8	Waste management (example waste separation, waste reduction) is very important practices for your university.	4.18	4.05	1.655	.099
Q9	Universities waste management (example waste separation, waste reduction) does support a high quality of life.	4.10	3.99	1.424	.155
Q10	Universities water management (water saving) does support a high quality of life.	4.07	4.04	.314	.754
Q11	Universities transportation condition (amount of traffic, availability of public transportation, etc.) does support a high quality of life	3.84	3.84	-.035	.972
Q12	Universities education for green (academic courses and activities related to environmental) does support a high quality of life	4.16	4.08	1.032	.302

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Q13	Overall the quality of your life on campus	4.05	3.59	6.289	.000*
Q14	If you are an applicant university, would a Green Campus be a university's selection?	3.79	3.78	.062	.951
Q15	Universities Green campus does support a high quality of life on campus.	3.81	3.75	.723	.470

* Significant when p-value is at or below 0.05.

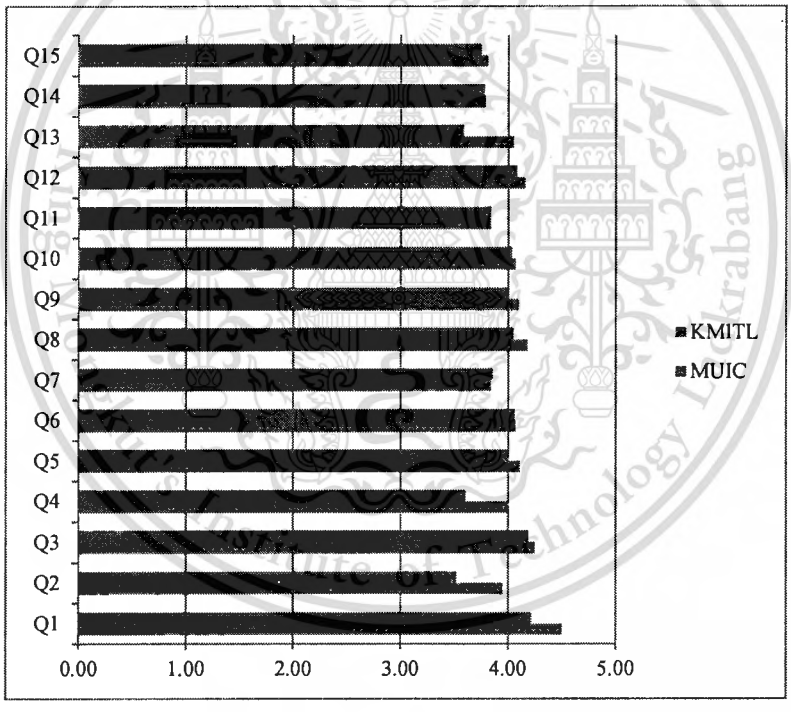

Figure 4.6 Responses regarding sustainability practices and perceived quality of life

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CHAPTER 5
CONCLUSION

The study was conducted to compare stakeholders' perception about quality of life between those in Green and Non-Green Campus universities. Study results clearly show that MUIC respondents, whose campus better comply with sustainability practices listed in the UI GreenMetric, are more satisfied with their campus and have better perceived quality of life. This is demonstrated through the mean score of the "overall quality of life" questions that were rated in five-point Likert scale by the stakeholders at both MUIC and KMITL-IC. The t-test also indicated that MUIC respondents seem significantly more satisfied with environmental management and quality of life at their campuses.

Therefore, it can be concluded that universities should promote and try to adopt the UI GreenMetric Ranking for their campuses as all groups of the stakeholders have positive views about the initiative. Being a Green Campus would increase good perception of stakeholders about their quality of life on campus. Green space, one of the Green Campus' criteria, is also important for the image of the university and as an essential component of the campus environment (Speake et al., 2013). The initiative would raise good awareness about sustainability for universities' stakeholders. The universities could also use the Green Campus initiative for marketing purpose to recruit students. Green Campus initiative seems to be one of the prominent channels to promote and support world sustainability.

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BIBLIOGRAPHY

Allardt, E. 1976. "Dimensions of welfare in the comparative Scandinavian study", **Acta Sociologica**. 9: 227-239.

Alshuwaikhat, M.H. and Abubakar, I. 2008. "An integrated approach to achieving campus sustainability assessment of the current campus environmental management practices", **Journal of Cleaner Production**. 16 : 1777-1785.

Boyer, E.L. 1987. **College: The undergraduate experience in America.** New York: Harper and Row Publishers.

Campbell, A. Converse, P. and Rodgers, W. 1976. **The quality of American life**. New York: Russell Sage Foundation.

Central European University Sustainable Campus.2010 "**What is Sustainability?**" [Online]. Available: http://actjust.ceu.hu/framework%20concept Accessed: May 22, 2014.

Creighton, S.H.1999, Greening the Ivory Tower: Improving the Environmental Track Record of Universities, Colleges, and Other Institutions. Cambridge Massachusetts MIT Press.

Dictionary.com, "**Green space**," in Dictionary.com's 21st Century Lexicon. [Online]. Available : http://dictionary.reference.com/browse/Greenspace Accessed: May 22, 2014.

Diener, E., and E. Suh. 1997. Measuring quality of life: Economic, social, and subjective indicators. **Social Indicators Research**, 40:189-216.

Dillman, D. and K. Tremblay. 1977. The quality of life in rural America. **Annals of the American Academy of Political and Social Science**, 429:115-129.

Dravigne, A. 2006. The effect of life plants and window views of green spaces on employee perceptions of job satisfaction. Unpublished master's thesis, Texas State University-San Marcos, San Marcos, Texas.

Gottlieb, P. D., "Amenities as an Economic Development Tool: Is There Enough Evidence?" Economic Development Quarterly, Vol. 8, No. 3, August 1994, pp. 270–285.

Griffith, J.C. 1994. Open space preservation. **Journal of Higher Education**, 65(6): 645-669.

Grindsted, T. H. 2012. Thematic development of declarations on sustainability in higher education. **Journal of Environmental Economics**, 3(1): 32–40

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Hans, V. W. 2000 "Towards a vision of a sustainable university", **International Journal of Sustainability in Higher Education**, 1:20 – 34.

Hazelkorn, E., 2011. World-class Universities or World-class Systems? Rankings and Higher Education Policy Choices. **UNESCO Forum on Rankings and Accountability in Higher Education**, Paris, 16e17.

Im, S. 1984. Visual preferences in enclosed urban spaces: An exploration of a scientific approach to environmental design. **Environment and Behavior**, 16(2): 235-262.

Kaplan, R. and Kaplan, S. 1989. The experience of nature: A psychological perspective. Cambridge, New York , Cambridge University Press.

Kaplan, R. 1992. **The psychological benefits of nearby nature. In: D. Relf (ed.) The role of horticulture in human well-being and social development**, Oregon: Timber press.

Karmel, L.J. 1965. Effects of windowless classroom environment on high school students. **Perceptual and Motor Skills**, 20:277-278.

King Mongkut's Institute of Technology Ladkrabang, 2009. [Online]. Available: http://www.kmitl.ac.th/en/about.main.php?page=main Accessed: May 22, 2014.

Lauer, G. 1999. Concepts of quality of life in mental health care. **In Quality of Life and Mental Health Care** (eds S. Priebe, J. P. J. Oliver & W. Kaiser), Philadelphia: 19 -34.

Liu, B. 1974. Quality of life indicators: A preliminary investigation. **Social Indicators Research**, 1: 187-208.

Mahidol university Office of President, 2012 [Online]. Available:http://www.op.mahidol.ac.th/oppe/img/mu_eco/1mahidol%20Green%20campus.pdf Accessed: May 22, 2014.

Mahidol Sustainable University, 2013 [Online]. Available: http://mahidol.ac.th/green/ Accessed: May 22, 2014.

Mahidol University fact and figures. 2013-2014 [Online]. Available: http://www.mahidol.ac.th/en/facts-figures/Fact2013-2014.pdf

Maslow, A.H. 1943. A theory of human motivation. **Psychological Review**, 50: 370-396.

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Forbidden to modify the content, and cite the document when use.

McFarland, A.L. Waliczek, T.M. and Zajicek, J.M. 2008. The Relationship Between Student Use of Campus Green Spaces and Perceptions of Quality of Life, **HortTechnology**, 18(2):232-238.

McCall, S. 1975. Quality of life. Social Indicators Research, 2, 229-248.

Mehta, P. and Wiesehan, M. 2013. Sustainable Energy in Building Systems. **Procedia Computer Science** 19: 628–635.

Milbrath, L. 1979. Policy relevant quality of life research. **Annals of the American Academy of Political and Social Science**, 444: 32-45.

O'Riordan,T. 1976. **Environmentalism**, Pion Ltd., London

Roberts, L.W. and R.A. Clifton. 1991. Measuring the quality of university student life. Winnipeg: University of Manitoba, Centre for Higher Education Research and Development.

Ruúen, K. 2012. The Quality of Life and the Environment, **Procedia - Social and Behavioral Sciences**, 35: 23 – 32.

Sari, R.F. 2012. Methodology and evaluation of green and sustainable campus indicators for world university ranking. **Proceeding of the International Ranking Expert Group-6 (IREG-6)**, Taipei.

Schuessler, K.F. and Fisher, G.A. 1985. Quality of life research and sociology. **Annual Review of Sociology**, 11:129-149.

Suwartha, N. Sari, R. F. 2013 Evaluating UI GreenMetric as a tool to support green universities development: assessment of the year 2011 ranking. **Journal of Cleaner Production**, 61:46-53.

UI Greenmetric. 2014. GreenMetric Ranking. [Online]. Available: http://greenmetric.ui.ac.id/ranking. Accessed: May 22, 2014.

Ulrich, R.S. 1979. Visual landscapes and psychological well-being. Landscape Research, 4, 17-23.

UNESCO. 1997. **Thessaloniki Declaration**. Gland: UNESCO

UNESCO CEPES. 2004. Higher Education Ranking Systems and Methodologies **Centre for Higher Education**. How They Work, What They Do,

University Leaders for a sustainable future. 1990. **The Talloires Declaration**. [Online]. Available: http://www.ulsf.org/programs_talloires_history.html Accessed: May 22, 2014.

WHOQOL Group. 1997. Measuring Quality of Life: **The Development of the World Health Organization Quality of Life Instrument (WHOQOL)**. Geneva.

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Wolf, K. L. 1996. Psycho-Social Dynamics of the Urban Forest in Business Districts.

Wright, T. S. A. 2002. Definitions and frameworks for environmental sustainability in higher education. **Higher Education Policy** 15:105 – 120.

Yamane T. 1967. **Statistics, An Introductory Analysis**. New York: Harper and Row

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APPENDICES

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Appendix A:
University Management Interview Form

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Interview form for university's management concerning Green Campus

Interview with Sumalee Visetratana, Associate Dean for Administration, International College, Mahidol University, 24 March 2014

1. Is environmental sustainability part of university's mission statement, guiding principles, or similar document?
Answer As for the university's mission, Mahidol University also set the mission of the university which includes the environmental aspect. We consider the environmental friendly campus as a key part of its campus. The university's management has set a clear KPI to control and manage the campus, especially regarding the environment in the campus. For instance, the university will have the target to reduce the water consumption and the paper usage across the campus. Most important, the university's central office will set the core strategy, regarding the green campus management, and then share among each faculty/college with the clear proportion of the responsibility to be taken from each department. Each department across the university will take the responsibility to create the program to manage and improve the environment in their areas. Ultimately, the plan and the strategy of each department regarding the green campus will be an important part of each department's mission.

Vision: Mahidol University is determined to be A World Class University
Mission: To excel in health, sciences, arts and innovation with integrity for the betterment of Thai society and the benefit of mankind.
Strategy 7: Eco University
Vision : Healthy and Happy Workplace
Mission : A Learning University that lives with nature
Policies : - Green Campus in 2010 - Creative Sustainable University in 2015
Eco Index Corporate KPI: adjusted consumption rate of

1. Electrical Power
2. Water usage
3. Gasoline Usage
4. Paper usage

2. Does your university dedicate a committee to overseeing the campus environmental initiatives?
Answer Yes, the university has the dedicated team to take the responsibility on the environmental initiatives.

3. How is your college involved in the university's green campus initiatives?
Answer The college has appointed the committee the Energy Saving Promotion and Evaluation Committee to carry out the overall green campus program and execution. Each committee will be in charge for a period of 2 years. Then a new committee will

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be appointed. Each month, the committee takes responsibility for collecting and reporting the utility usage reduction (water, electricity, paper) following the plan to the university's central office. The committee also has to create initiatives and activities to support the Green Campus program. The past programs included the recycling of beverage cartons to support a green roof donation campaign.

4. Has your university made an official commitment to reducing its impacts by setting goals of emission reduction according to UI Green Metric requirements?
Answer The official commitment is made and announced by the university's central office.

5. What kind and amount of resources has your university invested on green campus initiatives?
Answer If green campus does not exist at your university, what is the level of investment has been put on improving environmental quality of your university?
The MUIC invests, using MUIC's budget, on the Green Campus initiatives and environmental improvement. In the last fiscal year, MUIC invested in the program approximately 90,000 THB.

6. What are the environmental- and/or sustainability-related majors, such as environmental studies, ecology, or sustainable agriculture, if any, offered at your university?
Answer MUIC offers 57 different sustainability-related majors.

7. Why has your university adopted the green campus initiatives?
Answer Initially, the management team of MUIC saw the importance of the global warming crisis and energy saving. Then, the college adopted the energy reduction program, to reduce the impact of the global warming, which later became the Green Campus program. The university also sees such importance and provides the additional supports to the college regarding the Green Campus program.

8. What are your university's management expectations on implementing green campus initiatives? Have they been accomplished?
Answer Considering the goal and expectation of the program, the college and the team has achieved the target of the utility usage reduction. For example, the program delivered the expected the water and electricity usage reduction as planned. Though, it is noticed that the result of the program is from the investment in infrastructure. The return on this investment requires a period of 3-4 years. Such investments include replacing the old air conditioner with new models which are more environmental friendly and require less energy consumption, and replacing over 4,000 old light bulbs with the T5 model for better performance.

9. Does the UI Green Metric ranking have any influence on the amount of student applications?
Answer It is impossible to have a clear response to this as, currently; there is no study or survey conducted specifically for this concern. Though, it might be claimed that the improved environment after the Green Campus implementation, such as the provision

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of bicycle lane and the dedicated walking path, and the increase green spaces on campus, has a big impact to the visitors which provide the positive feedback to the university.

10. Does the UI green ranking have any influence on the employment rate of your university graduates?
Answer There is no study or survey conducted regarding the specific impact of UI Green ranking on the university. Though, after the Green Campus implementation, it is observed a greater amount of visitors coming to the campus to get to know the university's Green Campus programs.

11. Has the UI green ranking improved the university's image?
Answer The university's Green Campus program is well known in the country and has become the lead-model for other universities.

12. In what areas of green campus would you say university is strongest?
Answer In 2012, the Mahidol University was ranked at number 36 of the world while the ranking was improved in 2013 as the university was ranked at number 31. This ranking improvement shows the positive progress of the university which also will be evaluated and improved consistently. Specifically for the MUIC, the strength of the college is the college's building and infrastructure for example we create a relax area for student and staff and provide them with a lot of trees. Furthermore, central unit also improve pathways on the campus to be more suitable for walking, cycling and public transport.

13. In what areas of green campus would you say the university is weakest?
Answer The weakest point is the collaboration among the stakeholders of MUIC which still have low motivation to support the Green Campus program. Thus, the college creates the activity to improve the program and the collaboration, for example the energy saving awards provided for the best college's office and departments which deliver the best energy reduction. In addition, the college also has the committee to do the audit and to evaluate randomly every 3 months on the program.

14. Does your university/college have a green campus management plan?
Answer The management plan is created by the university's committee each year. This will be conducted prior the end of fiscal year. The committee will provide the clear tasks and timeline for the program by considering 3 key areas - water, electricity and paper usage reduction.

15. Please describe the key success factors of the green campus initiatives at your university/college?
Answer 1. The management team provides full support to the program

2. The strong collaboration among the team member

3. Regular monthly meetings.

4. The communication both to the staff and students across platforms – both online (e-mail) and offline (information board)

5. The program and information about the Green Campus are added into the student orientation day.

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Interview form for university's management concerning Green Campus

Interview with Prof. Dr. Monai Krairiksh, Acting President, King Mongkut's Institute of Technology Ladkrabang, 12 June 2014

1. Is environmental sustainability part of university's mission statement, guiding principles, or similar document?
Answer As for the university's mission, King Mongkut's Institute of Technology Ladkrabang has set the mission of the university which includes the sustainable development. The institute's management has included the sustainability in one of four categories mission This is shown in the statement of "Advancement of knowledge and research in science, engineering, and technology to support the sustainable development of the nation and toward international excellence".

2. Does your university dedicate a committee to overseeing the campus environmental initiatives?
Answer Yes, the institute has a land and building division to take responsibility on the environmental initiatives.

3. How is your university involved in the university's green campus initiatives?
Answer The university is not involved in any green campus initiatives yet.

4. Has your university made an official commitment to reducing its impacts by setting goals of emission reduction according to UI Green Metric requirements?
Answer There is no official commitment according to UI green Metric announced by the university's office.

5. What kind and amount of resources has your university invested on green campus initiatives?
Answer N/A

6. What are the environmental- and/or sustainability-related majors, such as environmental studies, ecology, or sustainable agriculture, if any, offered at your university?
Answer KMITL offers around 26 different sustainability-related majors.

7. Why has your university adopted the green campus initiatives?
Answer The university is not involved in any green campus initiatives yet. But in the future, if university implements the Green Campus, from my point of view, I think green environment initiatives will be important for KMITL and I would support the researcher team to study the green campus initiatives and create a pilot plan to make the university become a Green campus.

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8. What are your university's management expectations on implementing green campus initiatives? Have they been accomplished?
Answer The most important expectation of the program is good environment that support excellent learning experience.

9. Does the UI Green Metric ranking have any influence on the amount of student applications?
Answer As now KMITL does not apply the UI Green ranking yet, I can tell only that academic qualifications and reputations affected to the number of applications.

10. Does the UI green ranking have any influence on the employment rate of your university graduates?
Answer N/A

11. Has the UI Green ranking improved the university's image?
Answer As now KMITL does not apply the UI Green ranking yet, from my point of view UI Green Campus program itself, which is well known in the country and the ranking, will demonstrates that university commits to enhancing environmental and socially responsible practices. For KMITL now we are focusing on a high quality academic program.

12. In what areas of green campus would you say university is strongest?
Answer KMITL emphasizes on research in science and technology we are no specific plan concerned on green campus.

13. In what areas of green campus would you say the university is weakest?
Answer Initially, KMITL focuses on academic reputation in science and technology. We do not have an environmental management program or Green Campus in KMITL that is the weakest point from my opinion. But to develop and set up it in the university master plan, we need to get approve from KMITL's board directors, so we can start a small unit to be a pilot plan. After we get a concrete results, we could easily present the advantages of Green Campus initiatives to others member, showing that Green Campus can support a high quality of life among stakeholder in KMITL

14. Does your university/college have a green campus management plan?
Answer We KMITL have 4 missions that environmental management can apply to. We have to start improve from the inside of KMITL then expand to outside and nationwide.

15. Please describe the key success factors of the green campus initiatives at your university/college?
Answer Key factors to achieve the Green Campus initiative in KMITL are following

1. The management directions.

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2. The strong collaboration among faculty.
3. The advisory team that includes professional in Green Campus to support information and guidelines that KMITL-IC can be a leader.
4. Set up committee that has specific responsibility on Green Campus activity.

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Interview form for university's management concerning Green Campus

Interview with Assoc. Prof. Dr. Supat Kittiratsatcha, Dean, International College, King Mongkut´s Institute of Technology Ladkrabang, 12 June 2014

1. Is environmental sustainability part of university's mission statement, guiding principles, or similar document?
Answer KMITL-IC is mainly focusing on an academic unit providing internationally recognized study programs and research. KMITL-IC does not yet set an environmental sustainability in the college mission, due to the limit of college's area.

2. Does your university dedicate a committee to overseeing the campus environmental initiatives?
Answer In current situation KMITL-IC does not have a team to take care of the environmental initiatives but in the near future, after KMTL-IC has our own areas, the environment committee should establish to control and take responsibility in, environment initiatives. This committee will provide a good environment management that supports high quality of life to students and staffs.

3. How is your college involved in the university's green campus initiatives?
Answer KMITL's mission does not include Green Campus initiatives in the master plan. KMTL-IC ourselves has only small projects that concern to environment management program. We promote the waste separation activity, which is a pilot plan in our college, to increase environmental awareness to student and staff.

4. Has your university made an official commitment to reducing its impacts by setting goals of emission reduction according to UI Green Metric requirements?
Answer There is no official commitment according to UI green Metric announced by the university's office.

5. What kind and amount of resources has your university invested on green campus initiatives? If green campus does not exist at your university, what is the level of investment has been put on improving environmental quality of your university?
Answer The KMITL-C invests, using college's budget, on the environmental initiatives promotion. In the last fiscal year, KMITL-IC invested in the recycling program approximately 50,000 THB.

6. What are the environmental- and/or sustainability-related majors, such as environmental studies, ecology, or sustainable agriculture, if any, offered at your university?

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Answer KMITL-IC offers M.Sc. in Logistics and Supply Chain Management that is a major related to sustainability and in 2015 the program of International Management of Resources and Environment will be opened for new applicants. Moreover, KMITL-IC established Southeast Asian Center for Urban Sustainability (SEA-CUS) to provide academic education, research, professional training and consultancy to increase the quality of life in urban areas and meet the needs of urban sustainability.

7. Why has your university adopted the green campus initiatives?
Answer To implement green campus at KMITL, KMITL-IC can be a leader to promote environmental activities across the campus as we have a professional staffs, core subjects and organization like SEA-CUS to support the activity with strong and useful information.

8. What are your university's management expectations on implementing green campus initiatives? Have they been accomplished?
Answer Green Campus effort to enhance the university's image as an environmentally conscious institution.

9. Does the UI Green Metric ranking have any influence on the amount of student applications?
Answer Currently, KMITL does not apply the UI Green ranking yet; the good environment atmosphere in the college will support high quality of life and make a good impression to visitors.

10. Does the UI green ranking have any influence on the employment rate of your university graduates?
Answer There is no study or survey conducted regarding the specific impact of UI Green ranking on the university. From my opinion the employment factors are mainly student qualifications and academic courses.

11. Has the UI green ranking improved the university's image?
Answer The university's Green Campus program, with its well known in ranking, will be a material to promote university's environmental friendly image to outside.

12. In what areas of green campus would you say college is strongest?
Answer KMITL-IC is an academic unit providing internationally recognized study programs, research, and academic services.

13. In what areas of green campus would you say the college is weakest?
Answer KMITL-IC needs a support form KMITL's council as we can develop a lot from our valuable human resources.

14. Does your university/college have a green campus management plan?

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Answer No, we do not have a green campus master plan. For starting firstly, we need to establish committees to run the activities by establishing policy and clear direction from university. Moreover, the management team has to understand and support Green Campus initiative. Then we need corporate engagements from all sections to set up a green campus management plan.

15. Please describe the key success factors of the green campus initiatives at your university/college?

Answer For KMITL to achieve Green Campus initiatives consists of three main categories as

1. Financial resources.
2. The collaboration in university between faculties.
3. Finally, KMITL-IC's readiness. KMITL-IC is ready to be a role model because we have a professional team and research documents to promote KMITL to be a Green Campus.

King Mongkut's Institute of Technology Ladkrabang

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Appendix B: Questionnaire Form

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Questionnaire: Comparison Perception of Quality of Life among Stakeholder in Green and Non-Green Campus Universities.

(แบบสอบถาม: การเปรียบเทียบคุณภาพชีวิตของผู้มีส่วนได้ส่วนเสียในมหาวิทยาลัยที่มีการดำเนินกิจกรรมสถาบันสีเขียวและสถาบันที่ไม่ได้มีการดำเนินกิจกรรมสถาบันสีเขียว)

This questionnaire is part of a research by Ms. Nisanat Jirasit to fulfill her thesis requirements of Master Program in International Management of Resources and Environment (International Program), KMITL International College, entitled as "Comparison perception of Quality of Life among Stakeholder in Green and Non-Green Campus Universities."

(แบบสัมภาษณ์นี้เป็นส่วนหนึ่งของงานวิจัยโดยน.ส.นิศานาถ จิรสิทธิ์ เพื่อเป็นส่วนหนึ่งของการศึกษาตามหลักสูตรการจัดการทรัพยากรและสิ่งแวดล้อมระหว่างประเทศมหาบัณฑิต (หลักสูตรนานาชาติ) สถาบันเทคโนโลยีพระจอมเกล้า เจ้าคุณทหารลาดกระบัง ในหัวข้อ "การเปรียบเทียบคุณภาพชีวิตของผู้มีส่วนได้ส่วนเสียในมหาวิทยาลัยที่มีการดำเนินกิจกรรมสถาบันสีเขียวและสถาบันที่ไม่ได้มีการดำเนินกิจกรรม)

Notes (หมายเหตุ):

This questionnaire is designed to investigate perception and concerns of stakeholders in green and non-green campus universities. A green campus is a higher education community that is improving energy efficiency, conserving resources and enhancing environmental quality by educating for sustainability and creating healthy living and learning environment. This survey is anonymous and your response will be treated completely confidential.

(การศึกษาครั้งนี้มีกลุ่มเป้าหมายทางการสำรวจเป็นของกลุ่มตัวอย่างในสถาบันการศึกษา ที่มีการดำเนินกิจกรรมสถาบันสีเขียวและสถาบันที่ไม่ได้มีการดำเนินกิจกรรมเป็นตัวแทนที่จะได้รับการสำรวจ มหาวิทยาลัยสีเขียวหมายถึง มหาวิทยาลัยที่มีการบูรณาการอนุรักษ์ด้านพลังงาน และสิ่งแวดล้อมเข้าไปในการเรียนการสอน การวิจัย และในทุกกิจกรรมของมหาวิทยาลัย ทั้งนี้เพื่อให้เกิดการทำงานใน

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บรรยากาศที่มีความปลอดภัย เป็นมิตรกับสิ่งแวดล้อมและประหยัดพลังงาน อันก่อให้เกิดผลดีต่อสิ่งแวดล้อมและชุมชนของชาติ โดยข้อมูลที่ได้จากการตอบแบบสอบถาม ข้อมูลทั้งหมดจะถือเป็นความลับ)

Instruction (คำแนะนำ):

The questionnaire is divided into two parts; (แบบสอบถามแบ่งออกเป็น 2 ส่วน)

Part One - General information (ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม)

Part Two - Quality of life and university's environmental management (ส่วนที่ 2 คุณภาพ ชีวิตและการจัดการสิ่งแวดล้อมของมหาวิทยาลัย)

Should you have any questions or comments, please contact

Ms. Nisanat Jirasit at: Phone: 081-421-1050Email: nisanat.jir@gmail.com

Or her principal, Dr. Ronnachai Tiyarattanachai, lecturer of KMITL International College at: Phone: 081-659-8619 Email: rtiyarattanachai@gmail.com

(ผู้ที่มีความประสงค์จะสอบถามหรือให้คำแนะนำสามารถติดต่อน.ส.นิศานาถ จิรสิทธิ์

โทรศัพท์: 081-421-1050 อีเมล์: nisanat.jir@gmail.com

หรือติดต่ออาจารย์ที่ปรึกษาวิทยานิพนธ์ ดร.รณชัย ติยะรัตนาชัย

โทรศัพท์: 081-659-8619 อีเมล์: rtiyarattanachai@gmail.com)

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Part One: General Information (ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม)

Please select your answer by check ✓ in the ☐ according to your information and fill in your answer———on for the open-ended questions.

(โปรดทำเครื่องหมาย ✓ ลงในช่อง☐ ☐ ที่ตรงกับความจริงของท่านมากที่สุด และกรอกข้อมูลลงใน____ สำหรับคำถามแบบอัตนัย กรุณาเติมคำตอบจนครบทุกข้อ)

1. What university are you affiliated with? (คุณสังกัดอยู่มหาวิทยาลัยใด)

   ☐ Mahidol University (มหาวิทยาลัยมหิดล)
   ☐ King Mongkut's Institute of Technology Ladkrabang (สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง)

2. Gender (เพศ)

   ☐ Male (ชาย) ☐ Female (หญิง)

3. Which category below includes your age? (อายุ)

   ☐ ≤20 (น้อยกว่าหรือเท่ากับ 20 ปี) ☐ Between 21 and 24 (21-24 ปี)
   ☐ Between 25 and 29 (25-29 ปี) ☐ Between 30 and 34 (30-34 ปี)
   ☐ Between 35 and 40 (35-40 ปี) ☐ ≥40 (มากกว่าหรือเท่ากับ 40 ปี)

4. What is your nationality? (เชื้อชาติ)

   ☐ Thai (ไทย) ☐ other, please specify (อื่นๆโปรดระบุ) _____

5. How many members are there in your family? (จำนวนสมาชิกในครอบครัว)

   ☐ 1-2 ☐ 3-4 ☐ ≥5

6. What is your status? (สถานภาพ)

   ☐ Freshman (นักศึกษาชั้นปีที่ 1) ☐ Sophomore (นักศึกษาชั้นปีที่ 2)
   ☐ Junior (นักศึกษาชั้นปีที่ 3) ☐ Senior (นักศึกษาชั้นปีที่ 4)

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☐ Grad student (นักศึกษามหาบัณฑิต)

☐ Lecturer Note: please skip to Question #8 (อาจารย์ กรุณาข้ามไปตอบข้อ 8)

☐ Administrators Note: please skip to Question #8
(เจ้าหน้าที่กรุณาข้ามไปตอบข้อ 8)

7. If you are student please identify, what is your major?
(นักศึกษาโปรดระบุสาขาที่กำลังศึกษาอยู่)

_____

8. Where do you currently live? (คุณอาศัยอยู่ที่ใด)

☐ On-campus Note: please skip to Question # 10
(ภายในมหาวิทยาลัย กรุณาข้ามไปตอบข้อ10)

☐ Off-campus; ≤5 km.
(ภายนอกมหาวิทยาลัยระยะทางน้อยกว่าหรือเท่ากับ 5 กิโลเมตร)

☐ Off-campus; 6-10 km.
(ภายนอกมหาวิทยาลัยระยะทางระหว่าง6-10 กิโลเมตร)

☐ Off-campus; (11-15 km.
(ภายนอกมหาวิทยาลัยระยะทางระหว่าง 11-15 กิโลเมตร)

☐ Off-campus; 16-20 km.
(ภายนอกมหาวิทยาลัยระยะทางระหว่าง 16-20 กิโลเมตร)

☐ Off-campus; more than 20km.
(ภายนอกมหาวิทยาลัยระยะทางมากกว่า 20 กิโลเมตร)

9. If you live off-campus, what is your most frequently used mode of transportation for commuting from home to university? (หากคุณอาศัยอยู่ภายนอกมหาวิทยาลัยคุณเดินทางจากบ้านมามหาวิทยาลัยโดยใช้วิธีทางการเดินทางวิธีใดบ่อยที่สุด)

☐ Walk (เดิน)

☐ Bicycle (จักรยาน)

☐ Personal Motorcycle (จักรยานยนต์ส่วนบุคคล)

☐ Personal car (รถยนต์ส่วนบุคคล)

☐ Public transit (ขนส่งสาธารณะ)

☐ University's shuttle bus (รถรับส่งของมหาวิทยาลัย)

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☐ Combined mode please specify (หลายช่องทางโปรดระบุ) _____

10. On average how often you are on-campus a week?
(โดยเฉลี่ยคุณมามหาวิทยาลัยกี่วันต่อสัปดาห์)

☐ ≥ 5 days/week (มากกว่าหรือเท่ากับ 5 วันต่อสัปดาห์)
☐ 3-4 days/week (3-4 วันต่อสัปดาห์)
☐ 1-2 days/week (1-2 วันต่อสัปดาห์)
☐ ≤ 1 day/week (น้อยกว่าหรือเท่ากับ 1 วันต่อสัปดาห์)

Part Two - Quality of life and university's environmental management
(ส่วนที่ 2 คุณภาพชีวิตและการจัดการสิ่งแวดล้อมของมหาวิทยาลัย)

Definition ความหมาย

Sustainable Development: "Sustainable Development is development that meets to needs of the present without compromising the ability of the future generations to meet their own needs" (WCED. 1987) (การพัฒนาอย่างยั่งยืน หมายถึง รูปแบบของการพัฒนาที่สนองความต้องการของคนในรุ่นปัจจุบัน โดยไม่ทำให้คนรุ่นต่อไปในอนาคตต้องประนีประนอมยอมลดทอนความสามารถในการที่จะตอบสนองความต้องการของตนเอง)

Quality of life : Quality of life refers to the level of well-being of the society and the degree of satisfaction of a number of human needs. (UNESCO 1993) (คุณภาพชีวิตหมายถึง ระดับความเป็นอยู่ที่ดีของสังคม และระดับความพึงพอใจในความต้องการส่วนหนึ่งของมนุษย์)

Please select your answer by check ✓ in the ☐ according to your information and fill in your answer on ____ for the open-ended questions.

(โปรดทำเครื่องหมาย✓ ลงในช่อง☐ที่ตรงกับความจริงของท่านมากที่สุด และกรอกข้อมูลลงใน ____สำหรับคำถามแบบอัตนัย กรุณาเติมคำตอบจนครบทุกข้อ)

5-refers to Strongly Agree (ระดับคะแนน 5 หมายถึง เห็นด้วยอย่างยิ่ง)
4-refers to Agree (ระดับคะแนน 4 หมายถึง เห็นด้วย)
3-refers to Neither Agree nor Disagree (ระดับคะแนน 3 หมายถึง ไม่แน่ใจ)
2-refers to Disagree (ระดับคะแนน 2 หมายถึง ไม่เห็นด้วย)

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1-refers to Strong Disagree **(ระดับคะแนน 1 หมายถึง ไม่เห็นด้วยอย่างยิ่ง)**

11. Environment management is very important of a university's campus.
(การจัดการสิ่งแวดล้อมเป็นสิ่งจำเป็นมากในมหาวิทยาลัย)

Strongly Agree ☐5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

12. You are satisfied with environmental management of your university.
(คุณพึงพอใจต่อการจัดการสิ่งแวดล้อมในมหาวิทยาลัยของคุณ)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

13. Do you know sustainable development is a part of university's mission statement? (คุณทราบหรือไม่ว่าการพัฒนาอย่างยั่งยืนเป็นส่วนหนึ่งของพันธกิจของมหาวิทยาลัย)

☐ Yes (ทราบ) ☐ No (ไม่ทราบ)

14. Sustainable development is a part of my curriculum/work or has been a topic in one of my classes? (การพัฒนาอย่างยั่งยืนเป็นส่วนหนึ่งของหลักสูตร/การทำงานหรือเป็นหัวข้อหนึ่งการเรียนในชั้นเรียน)

☐ Yes (ใช่) ☐ No (ไม่ใช่) ☐ N/A (ไม่เกี่ยวข้อง)

15. You regularly participate in green campus campaign (energy saving, water saving, etc.) (คุณมีส่วนร่วมในกิจกรรม การรณรงค์มหาวิทยาลัยสีเขียวเป็นประจำ ยกตัวอย่างเช่น การประหยัดพลังงาน, การประหยัดน้ำฯลฯ)

☐ Yes (ใช่) ☐☐ No (ไม่ใช่)

16. How important university green space available for you? (พื้นที่สีเขียวในมหาวิทยาลัยมีความจำเป็นต่อคุณในระดับใด)

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☐ 5-refers to Very important (สำคัญมาก)

☐ 4-refers to Fairly important (ค่อนข้างสำคัญ)

☐ 3-refers to Neutral (ปานกลาง)

☐ 2-refers to Not so important (ค่อนข้างไม่สำคัญ)

☐ 1-refers to Not at all important (ไม่สำคัญ)

17. For which purpose do you use green spaces on the campus? (คุณใช้พื้นที่สีเขียวในมหาวิทยาลัยสำหรับกิจกรรมใด)

☐ To relax (การพักผ่อน)

☐ To study (การศึกษา)

☐ To picnic (การพักทานอาหารร่วมกัน)

☐ Recreation activity (กิจกรรมนันทนาการ)

18. The university does provide enough green space to support a high quality of life. (มหาวิทยาลัยมีพื้นที่สีเขียวเพียงพอสำหรับการสนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree (เห็นด้วยอย่างยิ่ง) ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree (ไม่เห็นด้วยอย่างยิ่ง) ☐ N/A (ไม่มีความคิดเห็น)

19. Energy saving is very important practices for your university. (การประหยัดพลังงานของมหาวิทยาลัยเป็นกิจกรรมสำคัญสำหรับมหาวิทยาลัยของคุณ)

Strongly Agree (เห็นด้วยอย่างยิ่ง) ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree (ไม่เห็นด้วยอย่างยิ่ง) ☐ N/A (ไม่มีความคิดเห็น)

20. The Universities energy saving practices does support a high quality of life. (กิจกรรมการประหยัดพลังงานของมหาวิทยาลัยสนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree (เห็นด้วยอย่างยิ่ง) ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree (ไม่เห็นด้วยอย่างยิ่ง) ☐ N/A (ไม่มีความคิดเห็น)

21. The climate change mitigation programs (greenhouse gas emission reduction) are very important practices for your university. (นโยบายการบรรเทาผลกระทบจากการเปลี่ยนแปลงสภาพภูมิอากาศของมหาวิทยาลัย (โครงการลดการปล่อยก๊าซเรือนกระจก) เป็นกิจกรรมสำคัญสำหรับมหาวิทยาลัยของคุณ)

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Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐ N/A
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

22. Waste management (example waste separation, waste reduction) is very important practices for your university. (การจัดการของเสีย เช่นการคัดแยกขยะ, การลดขยะ เป็นกิจกรรมสำคัญสำหรับมหาวิทยาลัยของคุณ)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐ N/A
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

23. Universities waste management(example waste separation, waste reduction) does support a high quality of life. (การจัดการของเสียของมหาวิทยาลัย เช่นการคัดแยกขยะ, การลดขยะ สนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐ N/A
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

24. Universities water management (water saving) does support a high quality of life. (การจัดการน้ำของมหาวิทยาลัย เช่นการ ประหยัดน้ำ สนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐ N/A
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

25. Universities transportation condition (amount of traffic, availability of public transportation, etc.) does support a high quality of life. (ระบบขนส่งของมหาวิทยาลัย เช่นการจราจรและจำนวนระบบขนส่งสาธารณะของมหาวิทยาลัยสนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐ N/A
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

26. Universities education for green (academic courses and activities related to environmental) does support a high quality of life. (ระบบการเรียนการสอนเพื่อสิ่งแวดล้อมของมหาวิทยาลัยเช่น หลักสูตรที่เกี่ยวข้องกับสิ่งแวดล้อมช่วยสนับสนุนคุณภาพชีวิตที่ดี)

Strongly Agree ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Strongly Disagree ☐
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง) (ไม่มีความคิดเห็น)

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27. Are you interested in learning more about green campus? (คุณมีความสนใจที่จะศึกษาเพิ่มเติมเกี่ยวกับมหาวิทยาลัยสีเขียว)

☐ Yes (ใช่) ☐ No (ไม่ใช่) ☐ Not Sure (ไม่แน่ใจ)

28. Overall how would you rank the quality of your life on campus? (โดยภาพรวมแล้วคุณคิดว่าคุณภาพชีวิตในมหาวิทยาลัยของคุณอยู่ในระดับใด)

☐ 5-refers to Very good (ดีมาก)
☐ 4-refers to Fairly good (ค่อนข้างดี)
☐ 3-refers to Neither good or bad (ปานกลาง)
☐ 2-refers to Not very good (ค่อนข้างไม่ดี)
☐ 1-refers to Not good at all (ไม่ดีเลย)

29. Do you want university to continue or start implements Green Campus activities? (คุณต้องการให้มหาวิทยาลัย ดำเนินการต่อ/เริ่มดำเนินการ กิจกรรมมหาวิทยาลัยสีเขียวหรือไม่)

☐ Yes (ต้องการ) ☐ No (ไม่ต้องการ)

30. If you are an applicant university, would a Green Campus be a university's selection? หากคุณเป็นผู้สมัครเข้าศึกษาต่อมหาวิทยาลัย คุณจะใช้การได้รับ การรับรองสถาบันสีเขียวเป็นปัจจัยในการเลือกสถานศึกษาหรือไม่

☐ 5-refers to Very good (ดีมาก)
☐ 4-refers to Fairly good (ค่อนข้างดี)
☐ 3-refers to Neither good or bad (ปานกลาง)
☐ 2-refers to Not very good (ค่อนข้างไม่ดี)
☐ 1-refers to Not good at all (ไม่ดีเลย)

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31. Universities Green campus does support a high quality of life on campus. Please specify your answer (คุณคิดว่าโครงการมหาวิทยาลัยสีเขียวมีส่วนช่วยให้คุณภาพชีวิตในมหาวิทยาลัยของคุณดีขึ้น กรุณาระบุเหตุผล)

☐ 5-refers to Strongly Agree (ระดับคะแนน 5 หมายถึง เห็นด้วยอย่างยิ่ง)

Please specify (โปรดระบุเหตุผล) _____

☐ 4-refers to Agree (ระดับคะแนน 4 หมายถึง เห็นด้วย)

Please specify (โปรดระบุเหตุผล _____

☐ 3-refers to Neither Agree nor Disagree (ระดับคะแนน 3 หมายถึงไม่แน่ใจ)

Please specify (โปรดระบุเหตุผล) _____

☐ 2-refers to Disagree (ระดับคะแนน 2 หมายถึง ไม่เห็นด้วย)

Please specify (โปรดระบุเหตุผล) _____

☐ 1-refers to Strong Disagree (ระดับคะแนน 1 หมายถึง ไม่เห็นด้วยอย่างยิ่ง)

Please specify (โปรดระบุเหตุผล) _____

☐N/A

Thank you very much for your cooperation in filling questionnaire perfectly.

(ขอขอบคุณทุกท่านสำหรับความร่วมมือในการตอบคำถาม)

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ข้อมูลประวัติคณะผู้วิจัย

ประวัติส่วนตัว

ชื่อ-สกุล รณชัย ดิยะรัตนาชัย

เพศ ■ชาย ▫ หญิง วันเดือนปีเกิด **10** มีนาคม **2522** อายุ **36** ปี

สถานภาพ ■ โสด ▫ สมรส

ตำแหน่งปัจจุบัน อาจารย์

ประวัติการศึกษา

ชื่อย่อปริญญา	สาขา	สถาบันที่จบ	ปีที่จบ
Ph.D.	Environmental Sciences	New Jersey Institute of Technology	2010
M.Sc.	Environmental Management	จุฬาลงกรณ์มหาวิทยาลัย	2003
B.E.	วิศวกรรมสิ่งแวดล้อม	จุฬาลงกรณ์มหาวิทยาลัย	2001

สาขาวิจัยที่มีความชำนาญพิเศษ (แตกต่างจากวุฒิการศึกษา)

Environmental sustainability, green logistics, site remediation, and environmental policy

รางวัลด้านวิชาการ/ด้านวิจัย/งานสร้างสรรค์ (ด้านศิลปะ หรืออื่นๆ) ที่ได้รับ

Congressional Certificate honoring work on sustainable energy practices as part of a research grant through the U.S. Environmental Protection Agency's P3 (People, Prosperity, and the Planet) student design competition. Washington, DC. May 2006.

ทุนการศึกษาและทุนวิจัยที่เคยได้รับ ปี พ.ศ. ทุนการศึกษาและทุนวิจัยสถาบันที่ให้

KMITL International College research grant of academic year 2011

ผลงานวิจัย/งานสร้างสรรค์ที่ตีพิมพ์เผยแพร่ (ระดับชาติและนานาชาติ)

Publications

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Tiyarattanachai, R., Kongsawatvoragul, I., and Anantavrasilp, I. (2015) Reverse Vending Machine and Its Impacts on Quantity and Quality of Recycled PET Bottles in Thailand. KMITL Science and Technology Journal, 15(1), pp. 24-33.

Jackson, N. L., Smith, D. R., Tiyarattanachai, R. and Nordstrom, K. F. (2007). Use of a small beach nourishment project to enhance habitat suitability for horseshoe crabs. *Geomorphology.* (89), pp. 172-185.

Tiyarattanachai, R., Kanatharana, P., and Hsieh, H. (2004). Treatment of trichloroethylene contaminated wastewater using Fenton's reagent. *Malaysian Journal of Science.* (23), pp.169-177.

Conference Proceedings

Tiyarattanachai, R., Han, T., and Anantavrasilp, I. Quality management of municipal solid waste at material recovery facilities. Proc. of the 2nd AUN/SEED-Net Regional Conference on Energy Engineering (RCEneE), Bangkok, Thailand, November 13-14, 2014, p. 31.

Jirasit, N., Tiyarattanachai, R., and Hollmann, N. Comparison of quality of life among stakeholders in green and non-green campus universities. Proc. of the 2nd AUN/SEED-Net Regional Conference on Energy Engineering (RCEneE), Bangkok, Thailand, November 13-14, 2014, p. 30.

Bhu-anantanondh, T., Tiyarattanachai, R., and Hollmann, N. Environmental Performance Benchmarking of Refineries in Asean Economic Community. *Proc. Of The 6th ASEAN Environmental Engineering Conference (AEEC),* Bangkok, Thailand, November 21-22, 2013,p. E-8.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls in the views of state regulators and licensed site professionals. *Proc. Of The 4th ASEAN Environmental Engineering Conference,* Yogyakarta, Indonesia, November 22-23, 2011.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls and brownfield redevelopment. *Proc. Of The 3rd AUN/SEED-Net Regional Conference on Global Environment,* Kuala Lumpur, Malaysia, February 21-22, 2011, p.22.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls and sustainable remediation. *Proc. Of The 10th EEAT National Environmental Conference*, March 23-25, 2011, pp. 151-152.

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Tiyarattanachai, R., Kanatharana, P., and Hsieh, H. (2003). Treatment of trichloroethylene contaminated wastewater using Fenton's reagent. *Proc. of International Conf. on Environmental Management and Technology, Malaysian University Consortium for Environment and Development – Industry and Urban Areas (MUCED – I&UA),* Putrajaya, Malaysia, August 4-6, 2003, p. 20.

การเสนอผลงานวิชาการ

Tiyarattanachai, R., Han, T., and Anantavrasilp, I. Quality management of municipal solid waste at material recovery facilities. Proc. of the 2nd AUN/SEED-Net Regional Conference on Energy Engineering (RCEneE), Bangkok, Thailand, November 13-14, 2014, p. 31.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls in the views of state regulators and licensed site professionals. *Proc. Of The 4th ASEAN Environmental Engineering Conference,* Yogyakarta, Indonesia, November 22-23, 2011.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls and sustainable remediation. *The 10th EEAT National Environmental Conference*, March 23-25, 2011.

Tiyarattanachai, R. and Watts, D. J. (2011). Institutional controls and brownfield redevelopment. *The 3rd AUN/SEED-Net Regional Conference on Global Environment,* Kuala Lumpur, Malaysia, February 21-22, 2011.

Tiyarattanachai, R., Song, S., Utku, M., Rock, S., Sinha, R., and Lewis, T. (2007). Innovative geostatistical technique to identify historical contaminant inventory in navigable rivers/water bodies. *The 2007 Innovative Environmental Technology Conference.* The Environmental Business Council of Commerce and Industry Association of New Jersey. Newark, NJ. October 10, 2007.

Tiyarattanachai, R., Kanatharana, P., and Hsieh, H. (2003). Treatment of trichloroethylene contaminated wastewater using Fenton's reagent. *International Conf. on Environmental Management and Technology*, Putrajaya, Malaysia, August 4-6, 2003.

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อื่นๆ

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ประวัติส่วนตัว

ชื่อ-สกุล อิสระ อนันตวราศิลป์

เพศ ■ชาย ▫ หญิง วันเดือนปีเกิด 22 มิถุนายน 2522 อายุ 34 ปี

สถานภาพ ■ โสด ▫ สมรส

ตำแหน่งปัจจุบัน อาจารย์

ประวัติการศึกษา

ชื่อย่อปริญญา	สาขา	สถาบันที่จบ	ปีที่จบ
Doctor rer. nat.	Computer Science	Technische Universität München	2553
Master of Computer Science	Computational Logic	Technische Universität Dresden	2547
Bachelor of Science	Information Technology	Sirindhorn International Institute of Technology	2544

สาขาวิจัยที่มีความชำนาญพิเศษ (แตกต่างจากวุฒิการศึกษา)

- Software Engineering
- Machine Learning
- Computer Networks

รางวัลด้านวิชาการ/ด้านวิจัย/งานสร้างสรรค์ (ด้านศิลปะ หรืออื่นๆ) ที่ได้รับ

2553 Selected Paper Award at the 8th International Network Conference

2550 Outstanding Paper Award at IADIS International Conference on Telecommunications, Networks and Systems

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ทุนการศึกษาและทุนวิจัยที่เคยได้รับ

2550 Ernst-von-Siemens Doctorate Scholarship Siemens AG

ผลงานวิจัย/งานสร้างสรรค์ที่ตีพิมพ์เผยแพร่ (ระดับชาติและนานาชาติ)

2555 Willnecker, F., Anantavraslip, I., Brügge, B.: Machine Learning Assisted Position Detection of UHF RFID Tags. In: *European Conference on Smart Objects, Systems and Technologies*, Munich, 2012.

2554 Anantavrasilp, I.: Approximating IP Traffic Characteristics Using Partial Flows. In: *The 4th Regional Conference on Information and Communication Technology*, Ho Chi Minh City, 2011.

2553 Anantavrasilp, I.: Intelligent IP traffic / flow classification system. In: *Proceedings of the 8th International Network Conference*, Heidelberg, 2010.

2552 Anantavrasilp, I.: A unified framework for flow classification. In: *Proceedings of International Conference on Computer Design and Applications*, Singapore, 2009.

2550 Anantavrasilp, I. and Schöler, T.: Automatic flow classification using machine learning. In: *Proceedings of the 15th International Conference on Software, Telecommunications and Computer Networks*, Dubrovnik, 2007.

2550 Anantavrasilp, I. and Schöler, T.: Providing quality-of-service support to legacy applications using machine learning. In: *Proceedings of IADIS International Conference on Telecommunications, Networks and Systems*, Lisbon, 2007.

การเสนอผลงานวิชาการ

2555 Willnecker, F., Anantavraslip, I., Brügge, B.: Machine Learning Assisted Position Detection of UHF RFID Tags. In: *European Conference on Smart Objects, Systems and Technologies*, Munich, 2012.

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2554 Anantavrasilp, I.: Approximating IP Traffic Characteristics Using Partial Flows. In: *The 4th Regional Conference on Information and Communication Technology*, Ho Chi Minh City, 2011.

2553 Anantavrasilp, I.: Intelligent IP traffic / flow classification system. In: *Proceedings of the 8th International Network Conference*, Heidelberg, 2010.

2552 Anantavrasilp, I.: A unified framework for flow classification. In: *Proceedings of International Conference on Computer Design and Applications*, Singapore, 2009.

2550 Anantavrasilp, I. and Schöler, T.: Automatic flow classification using machine learning. In: *Proceedings of the 15th International Conference on Software, Telecommunications and Computer Networks*, Dubrovnik, 2007.

2550 Anantavrasilp, I. and Schöler, T.: Providing quality-of-service support to legacy applications using machine learning. In: *Proceedings of IADIS International Conference on Telecommunications, Networks and Systems*, Lisbon, 2007.

ผลงานสิทธิบัตร/สิ่งประดิษฐ์/งานสร้างสรรค์ (ศิลปะ หรือ อื่นๆ)

2550 DE102007042588 - Method for Monitoring Data Flows

2549 EP2039079 - System and Method for Data Communication

อื่นๆ

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