

# Quality of Life at Green and Non-Green Campus Universities

## A Comparison of Stakeholders' Perception at Mahidol University and King Mongkut's Institute of Technology Ladkrabang

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**Abstract**— Green Campus is one of the key initiatives designed to promote sustainability concepts among universities. Recently, the initiative has increasingly gained more interest from many universities worldwide. Some of them have already entered the GreenMetric ranking established in 2010 by the Universitas Indonesia (UI). Its purpose is to compare the university's commitment to the environment and sustainable resource usage. This study investigates the perception of green campus initiatives among lecturers, students and staff and its impact on their quality of life. A survey was conducted at a UI GreenMetric ranked university (Mahidol University, MU) and a non-ranked university (King Mongkut's Institute of technology Lagkrabang, KMITL). MU first entered the UI GreenMetric ranking in 2012 and was ranked 36, which was the highest score received by a Thai university. KMITL has not yet submitted any data to UI to be ranked in the UI GreenMetric. The results of this study provide some guidance on the differences between MU and KMITL. The results show that stakeholders who study or work at MU rated their perception of the overall quality of life higher than the others who study or work at KMITL. The study reveals statistically significant correlations between the opinion of both groups of respondents regarding environmental management and the amount of green space in their campuses. Campus green space and perceptions of quality of life have been found to be related.

**Index Terms**— Green Campus, sustainability, sustainable development, environmental management, UI GreenMetric

### I. INTRODUCTION

Over the past two decades, university rankings have become a global phenomenon. Emerging from professional and government to private and media-based sectors, the ranking systems cover various issues ranging from research and academic reputation to environmental performance [1]. Most of the times university rankings often stress the importance of research and academic reputation, followed by educational

indicators, whereas environmental issues have received little or no attention [2]. However, green campus revolution has gained momentum around the world over the last decade since the declarations on Sustainability in Higher Education (SHE) [3]. The relationship between green features and urban design or campus development are terms for such green initiatives including, but not be limited to, green campus, eco-urbanism, green urbanism, green building, high performance buildings, etc. Though similar in nature, the key objectives and implementation of each of them are different. For example, the green building initiative such as the Leadership in Energy & Environmental Design (LEED) established by the U.S. Green Building Council (USGBC) is meant to decrease production of waste and hazardous materials, reduce level of energy consumption, and promote the design of energy efficient buildings [4]. Many universities and colleges have already adopted the green concept to promote campus sustainability [3]. 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 ranking has played a different role among other sustainability surveys, scorecards, and rating systems [5]. The ranking was based on the fundamental that there is room for a global ranking that will enforce measuring tools, which can be used for both developed and developing countries [6]. The UI GreenMetric is based on six (6) main categories including setting and infrastructure; energy and climate change; waste; water; transportation; and education. To comply with UI GreenMetric indicators, the universities will have to demonstrate sustainable practices in many ways as detailed in the categories. Universities entering this UI GreenMetric ranking are so called 'Green Campus' universities [7].

The number of participating universities from Thailand has gradually been increasing. In 2012, there were only five (5)

universities from Thailand ranked in the UI GreenMetric. The number of Thai universities participating in the ranking was increased to 13 universities in 2013. Some other universities are still considering participation in the ranking system. After all, a university's environmental management measure will be reflected in the quality of life at university [8].

Quality of life refers to the degree of satisfaction or sense of well-being people experience in specific environments [9]. An interesting research investigating the relationship between physical environment and various aspects of quality of life reported that individuals, who had access to good natural setting, were happier with their home, job, and life [10]. Furthermore, environmental quality has always been one of the most important components of the quality of life. Researchers have also found that the physical environment of the university particularly affect students and their academic experiences. Students feel more energetic after exposed to green scenes compared to those exposed to urban scenes. Evidence has also suggested that the physical environment of the university is an important concern for students [11]. Additionally, the appearance of the campus is one of the most important factors for students to decide which university to attend [12].

To investigate the benefits of being green among Thai universities, this study compares the perceptions of stakeholders in universities, both Green and Non-green Campus labelled, regarding their stakeholders' 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. analyses the differences in perceptions among different demographic of the stakeholders such as gender and mode of transport.

## II. RESEARCH METHODOLOGY

### A. Study Setting

Study populations of the study include institutional units of MU and KMITL representing Green-Campus and Non-Green Campus universities, respectively. The international units are Mahidol University International College (MUIC) and KMITL International College (KMITL-IC). In 2013, MU was ranked top among Thai universities in this ranking [8]. MUIC was one of the MU's pilot academic units to implement the Green Campus initiative. Therefore, it is used as the representative of Green Campus universities. KMITL is located in a suburban area of Bangkok, similar to the Salaya campus of MU, where MUIC is located. The university also has an international college, KMITL-IC, which has similar stakeholder demographic to MUIC.

The two international colleges were chosen as the study population based on an assumption that their stakeholders would reflect greater variety of nationalities among stakeholders (e.g., multi-nationality students) compared to traditional Thai academic units. This diversity would allow the comparison of perspectives of Thais and also those of foreign

stakeholders. Stakeholders, which include students, lectures, and staff at these institutions, were set as the study population.

### B. Sample Size

The sample sizes of MUIC and KMITL-IC were calculated using Taro Yamane's rule. Yamane provided a simplified formula to calculate sample sizes, where  $n$  is the sample size,  $N$  is population size, and  $e$  is level of precision as in (1) [13].

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

The sample size of this study is considered at 95% confidence level with a precision rate of  $\pm 5\%$ . 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.

### C. Questionnaire Design

The questionnaire consists of 2 parts. Part I was designed to learn about demographic data of the respondents. The questions were aimed to ask about the age, gender, status, lifestyle, living conditions, and means of transportation.

Part II was designed to learn about perceptions of the respondents regarding their quality of life. The questions are mainly based on the 6 categories of the UI GreenMetric ranking criteria. The responses were measured using a five-point Likert scale [14]. Prior to the data collection, the questionnaire was tested for its validity and reliability in order to make sure that the questions were well written and understandable.

### D. Data Collection

A total of 3 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 staff members.

By sending the link through the web-based survey through MUIC and KMITL IC webmail systems and the posting that link in closed-group Facebook accounts, the study received a total of 530 responses including 370 responses from MUIC and 160 responses from KMITL-IC. This sample size satisfies with the calculated sample size by Yamane'.

### E. Data Analysis

The survey results were analyzed by the Statistical Package for Social Sciences (SPSS). The following statistical tools were used:

- Percentage and frequency: to analyse background information of respondents.

- Arithmetic Mean: to calculate the average level of responses in the five point Likert scale.
- The Cronbach Alpha Method: to ascertain the reliability of the responses for the items based on the five-point Likert scale.
- A T-test method: to find the difference in the attitudes between stakeholders in Green-Campus and Non-Green Campus. (Determination of significance level was set to 0.05.)
- P-value: to determine the significant correlations.

### III. RESULTS AND DISCUSSIONS

As presented in table I to table VII, a total of 4,281 stakeholders were randomly selected to receive surveys. A total of 530 responses were received yielding a response rate of approximately 12.38%. As presented in, approximately 56.23% of the respondents are female, while approximately 43.77% of them are male. By comparing MUIC and KMITL-IC, the percentage of female respondents from KMITL-IC is slightly lower (45%) compared to MUIC (61.10%). The majority of respondents are younger than 20 years old (38.5%), 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.

As for respondents' nationalities, the majority of the respondents are Thai including 95.68% MUIC respondents and 96.88% of KMITL-IC respondents. Most respondents identified themselves as being students; 71.35% at MUIC and 95% from KMITL-IC.

More than half of the respondents (57.51%) from MUIC reported that they usually commute to the campus by private vehicles. KMITL-IC respondents answered the same question with a percentage of 41.06%. When asked about their time spent at the campus, more than half of the respondents (MUIC = 62.2%, KMITL-IC = 58.8%) indicated that they usually come to campus more than 4 days per week. About one-third of the respondents (30.4%) spend 3 - 4 days on the campus a week.

When asked whether it is known that "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 in 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 work and has been a topic in one of their classes. The study also showed that a similar percentage of stakeholders do participate in green campus campaigns at both MUIC and KMITL-IC campuses, with the responses of 71.1% and 76.3%, respectively.

Perceptions of quality of life among MUIC and KMITL-IC's stakeholders towards the environmental management of the university have also been compared. Table II illustrates the results of t-test to examine the difference of stakeholder's perception towards the quality of life and the university's environmental management.

The results show a significant difference between the mean scores between groups of the stakeholders at p-value = 0.0. This means that there is significant difference between Green Campus stakeholders' satisfaction on environmental management as compared to Non-green Campus stakeholders. The data show that green campus stakeholders deem environmental management more important and are more satisfied with environmental management in their campus.

The significant differences have been found between the mean scores of both groups of the respondents, with the p-value < 0.05, in 4 categories:

a) *Regarding the statement "Environment management is very important for a university's campus", the mean score of respondents from MUIC is significantly higher than from respondents from KMITL-IC (sig. = 0.0)*

b) *The mean score from respondents from MUIC concerning the statement "Satisfied with the university's environmental management" is also significantly higher than from respondents from KMITL-IC (sig. = 0.0).*

c) *The same result can be seen regarding the statement "The university does provide enough green space to support a high quality of life" the mean score of MUIC's respondents are higher than from those from KMITL-IC (sig. = 0.0).*

d) *Last but not least, "The overall quality of life on campus" is rated significantly higher by respondents from MUIC than from respondents from KMITL-IC (sig. = 0.0).*

The results also show that the stakeholders who reported that the availability of university green space are important on campus also tended to rate their overall quality of life as higher than those who rated it as less important. More stakeholders on the Green Campus rated that their university provides enough green space than stakeholders in Non-Green Campus. More Green Campus stakeholders also stated that university's environmental management is important compared to Non-Green Campus stakeholders.

In terms of available green spaces, the results show that stakeholders on the Green Campus who reported that green spaces are important tended to be satisfied with availability of green spaces in their campus and rated their overall quality of life higher than stakeholders in a Non-green Campus. The aforementioned findings are agreeable with what McFarland et al concluded about undergraduate students' preference [15]. They found that undergraduate students deem green space as a positive impact on their quality of life. Therefore, it is important for campus planners to consider the relationship between the student experience and green spaces on campus. The results also show that stakeholders in both Green and Non-Green Campuses mostly use green spaces to relax themselves, followed by for studying, conducting recreational activities, and picnicking, respectively.

Additional findings are as follows. There is no significant difference between mean scores of Green and Non Green Campus on the "Energy saving is very important practices for your university". There is no significant difference between the mean score of the idea that environmentally related academic programs for green supports a high quality of life. However, the mean score level of MUIC are higher than that of KMITL-IC's satisfaction with academic program support a high quality of life in university.

From the survey, most respondents of both MUIC (68.9%) and KMITL-IC (72.5%) are interested in learning more about Green Campus, on both campuses, almost 99% of the stakeholders want the university to continue or start implementing Green Campus activities as they think that it would support a high quality of life.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

The study has been conducted to compare stakeholders' perception about quality of life between those in Green and Non-Green Campuses. Overall, the results showed that stakeholders in MUIC representing Green Campus deem their overall quality of life higher than stakeholders in KMITL-IC,

TABLE I. DEMOGRAPHIC ANALYSIS- OVERALL STUDENT SAMPLE BY GENDER

(N = 530)	MUIC		KMITL-IC	
<i>Male</i>	144	38.90%	88	55%
<i>Female</i>	226	61.10%	72	45%

TABLE II. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY AGE (YEARS)

	MUIC		KMITL-IC	
$\leq 20$	146	39.5%	58	36.3%
21 - 24	115	31.1%	69	43.1%
25 - 29	26	7.0%	19	11.9%
30 - 34	31	8.4%	6	3.8%
35 - 40	32	8.6%	4	2.5%
$\geq 40$	20	5.4%	4	2.5%

which represents Non-Green Campus. This is demonstrated through the mean score of the "overall quality of life" questions at both MUIC and KMITL-IC. The mean score from MUIC responders is more than 4.0 while the mean score rated by KMITL-IC stakeholders is only 3.59. The study also found that there were statistically significant correlations between opinions of both groups of respondents regarding environmental management and the amount of green space on their campuses (significant difference at  $P = 0.0$ ). They all

TABLE III. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY NATIONALITY

	MUIC		KMITL-IC	
<i>Thai</i>	354	95.68%	155	96.88%
<i>South Korean</i>	5	1.35%	0	0%
<i>American</i>	2	0.54%	0	0%
<i>Bhutanese</i>	2	0.54%	0	0%
<i>Chinese</i>	2	0.54%	1	0.63%
<i>Laotian</i>	0	0%	2	1.25%
<i>Belorussian</i>	1	0.27%	0	0%
<i>Filipino</i>	1	0.27%	0	0%
<i>German</i>	1	0.27%	1	0.63%
<i>Indian</i>	1	0.27%	0	0%
<i>Taiwanese</i>	1	0.27%	0	0%
<i>Vietnamese</i>	0	0%	1	0.63%

TABLE IV. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY STATUS CLASSIFICATION

	MUIC		KMITL-IC	
<i>Student</i>	261	71.35%	152	95%
<i>Staff</i>	106	28.65%	8	5%

TABLE V. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY STUDENT MAJOR

	MUIC		KMITL-IC	
<i>Student major</i>	N = 264		N = 152	
<i>Under Graduate</i>	259	98.1%	107	70.41%
<i>Graduate student</i>	5	1.9%	45	29.59%

TABLE VI. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY MODE OF TRANSPORT

	MUIC		KMITL-IC	
	N = 353		N = 137	
<i>Walk</i>	33	9.35%	21	15.33%
<i>Bicycle</i>	15	4.25%	11	8.03%
<i>Private vehicle</i>	203	57.51%	57	41.61%
<i>Public transportation</i>	102	28.9%	48	35.04%

TABLE I. TABLE VII. DEMOGRAPHIC ANALYSIS - OVERALL STUDENT SAMPLE BY TIME SPEND ON-CAMPUS

	MUIC		KMITL-IC	
$\geq 5$ days/week	230	62.2%	94	58.8%
3 - 4 days/week	130	35.1%	47	29.4%
$\leq 1$ day/week	4	1.1%	3	1.9%

TABLE VIII. COMPARISON OF MEAN SCORES, T-TEST VALUES AND P-VALUES OF CONCERNING QUALITY OF LIFE AND UNIVERSITY'S ENVIRONMENTAL MANAGEMENT.

Quality of life and university's environmental management	MEAN		t-test value	p-value
	MUIC	KMITL-IC		
1. Environment management is important for a university's campus	4.50	4.22	3.965	0.0*
2. Satisfied with environmental management of your university	3.95	3.52	5.203	0.0*
3. Important of university green space available	4.25	4.19	0.767	.443
4. The university does provide enough green space to support a high quality of life	3.99	3.61	4.104	0.0*
5. Energy saving is very important practices for your university	4.11	3.99	1.579	0.115
6. The Universities energy saving practices does support a high quality of life.	4.07	4.06	0.195	0.845
7. The climate change mitigation programs (greenhouse gas emission reduction) are very important practices for your university.	3.84	3.86	-0.173	0.863
8. Waste management (example waste separation, waste reduction) is very important practices for your university.	4.18	4.05	1.655	0.099
9. Universities waste management (example waste separation, waste reduction) does support a high quality of life.	4.10	3.99	1.424	0.155
10. Universities water management (water saving) does support a high quality of life.	4.07	4.04	0.314	0.754
11. Universities transportation condition (amount of traffic, availability of public transportation, etc.) does support a high quality of life	3.84	3.84	-0.035	0.972
12. Universities education for green (academic courses and activities related to environmental) does support a high quality of life	4.16	4.08	1.032	0.302
13. Overall the quality of your life on campus	4.05	3.59	6.289	0.0*
14. If you are an applicant university, would a Green Campus be a university's selection?	3.79	3.78	0.062	0.951
15. Universities Green campus does support a high quality of life on campus.	3.81	3.75	0.723	0.470

\* Significant at or below the 0.05 level

agreed that good environmental management and enough green space would enhance their quality of life ( $P = 0.0$ ).

Based on the results of the study, 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 promote a good perception of stakeholders about their quality of life on campus. The initiative could also drive up good awareness about sustainability for universities' stakeholders. The universities could also use the Green Campus initiative for marketing purposes to recruit students. Last but not least, the Green Campus initiative, if widely adopted globally, could be one of the prominent channels to promote and support world sustainability.

#### V. RECOMMENDATIONS FOR FUTURE WORK

It is recommended that additional similar studies be conducted with some other universities to expand the groups of study population. It would also be interesting to study in other universities to expand the groups of the study population and to increase the sample size with greater demographically diversity, of the population. It is also recommended that there should be a study to illustrate the relationship between indicated levels of perception of quality of life and scientific data (e.g., air quality and health conditions in campuses). This recommended study will help ensure that the Green Campus initiative improve the quality of life besides what is perceived by stakeholders. In addition, the scientific data would assist university management to clearly set environmental management standards and to

maintain and evaluate the implementation of green campus activities.

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