

Article

The eco-city indicators from the local perspectives in the Northeast of Thailand

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Abstract: This research aims to delineate the ecocity indicators from the local perspectives in urban communities in the Northeast of Thailand. The research was quantitative survey research. Data was collected from a sample of 400 people who live in Khon Kaen Municipality and Udon Thani Municipality using a questionnaire. Data was analyzed by descriptive statistics and factor analysis. We found that the eco-city indicators from the perspective of people in the urban communities in the Northeast of Thailand were divided into three main criteria: a) economic perspectives; b) social perspectives; and c) environmental perspectives. When considering each aspect, it was found that the economic perspective had a total of 9 issues with an average of 3.06 out of 5.00, the social perspective had a total of 16 issues with an average of 3.76 out of 5.00, and the environmental perspective had a total of 14 issues with an average at 3.00 out of 5.00.

Keywords: eco-city; eco-city indicators; Northeast of Thailand

1. Background

Urbanization was initiated in the 20th and 21st centuries since the flock of immigrants to the city has continuously increased. This resulted in the people from rural areas evacuating from their hometowns to the city, which affected both the advantages and disadvantages of work employment and livelihood in the city (Zhang, 2016). The United Nations (UN) has estimated the global population from their latest studies and estimated that approximately 50 percent of the world's population is in urban areas, which is quite different from the study in the 1990s, which indicated that people in urban areas are approximately 30 percent. However, between the 2010s and the 2030s, the world's population in urban areas tended to increase to 60 and 70 percent, respectively (United Nations, 2015). This evacuation from rural areas to cities tends to grow immensely, especially in developing countries, which were affected by urbanization and turned into fast-growing cities. These not only significantly affect opportunities emerging and challenges for people in urban areas or city administrators but also damage the city's ecology (Chayanit Kritsutthajiva, 2013).

The advantages of an eco-city establishment would support environmental adjustment in the city to balance waste management and oxygen acceleration in the city to suit the residents. Furthermore, the eco-city would help network in the local community and reduce the side effects of impractical management (Global Environment Center Foundation, 2005). In developed countries, the eco-city was a prioritized issue for urban development to establish balance in the economic

dimension for society quality growth. Nonetheless, eco-city development is still under debate on the global stage, and there is yet to be a concrete consensus about the eco-city development model to be adopted at present. Thus, the eco-city concept would adapt theoretical knowledge from urban ecology and sustainable urban development as a prototype model with an actor aware of and involved in urban management (Kitikorn Chamondusit, 2015).

In Thailand, this eco-city concept was adopted in the capital and main cities, such as Bangkok and Chiang Mai. In Bangkok, the eco-city plan was launched since the greenhouse gases had reached a severe stage. This government had to improve urban management and the transportation system to alternative energy choices and reduce non-renewable energy consumption, including enacting regulations for the building's construction to be environmentally friendly and wastewater treatment management. In Chiang Mai, the eco-city concept was adapted to solve flooding problems, pollution problems, and housing problems. Yet, the urban development of the eco-city in Thailand still has numerous constraints and limitations in the aspect of modernity to construct a good economic basis for that city or even the political aspect, which has to set a systematics interconnection, including local city administrators since the technical limitations still were detected from administration, knowledge management for developing eco-cities to create sustainable cities due to the development in Thailand was majority based on central policy. Thus, this resulted in the eco-city concept barely seen in different urban areas in other provinces (Anambutr, 2017).

The aforementioned problems and gaps in the development of eco-cities in Thailand trigger both opportunities and challenges in sustainable eco-city development. Since its background is caused by the urban development for modernization model, but, in terms of practical ways, some countries are only able to adapt partially to prototype models with different economic, social, and environmental contexts. Furthermore, the development of eco-city indicators based on the needs of the people in the city tends to remain ambiguous. Therefore, this research project would be vital to constructing knowledge for an eco-city indicator model development from the local perspectives in the community with the key research questions about the question of 'how to construct the knowledge to develop eco-city indicators from the local perspectives' for practical implication in the present and the future contexts.

Research Objective: From the mentioned research questions, this study's research objective was to delineate the ecocity indicators from the locals' perspectives in urban communities in the Northeast of Thailand.

2. Theoretical framework development

This research employed the eco-city concept as the cornerstone for developing the research framework, which originated in 1975 when Register and his friends at Berkeley University discussed the slow street concept together with civil society organizations in urban ecology. With this idea, the management of the canal was enabled, and the water pipes system was re-launched again to improve the city's greenery view with trees and fruit plantations along the roadside. Apart from the scenery development, the concept also designed the city to conduct the solar energy used in household consumption and established bus routes, bicycle paths, and walking

trails to reduce major road construction in the city (Lijuan and Shanyong, 2011). According to the eco-city concept, this would allow the city to be managed systematically and provide an appropriate environment for practical living with garden city inspirations. The definition of an eco-city concept would construct a quality of life and society for better living quality and allow the people to participate in planning management in the city. This would be an opportunity to reinforce the economic system, society, and environment to harmoniously support each other and collectively cooperate for mutual benefits in eco-city planning (World Bank, 2010).

Therefore, the eco-city would play a vital role in inventing a green energy city to reduce energy consumption and create a friendly environment to preserve the green areas known as ‘Green areas or Green belt’ to be as green as possible along with encouraging people to be aware of morality and empathy for each other. This concept emphasizes triggering human awareness of natural and environmental values to live peacefully and harmoniously for sustainable development. The eco-city concept consists of three main guidelines, i.e., the 3R model—reduce, recycle, and reuse to increase the green space in the city and to save energy as much as possible. Additionally, the eco-city was designed to encourage and cooperate with people to alter the use of renewable energy and develop effective public transportation infrastructure in practical ways without deforestation (Wineet Deesuan, 2014).

Considering the eco-city indicators, it was found that the eco-city indicators construction aimed to develop abstract indicators from the eco-city concept to explicate and implicate in practice. Then, the eco-city criteria were synthesized into variables and indicators, e.g., Sustainable development, Sustainable urban development, Sustainable urban community development, Community economy construction, Technology implication, Natural urbanization, Green city promoting, and Good ecological space establishment in the city. These indicators were the basic criteria for synthesizing the eco-city concept and for the further implications for other cities around the world (Roseland, 1997).

In 2003, the development of eco-city indicators occurred in China, and the government announced the launch of the trial eco-city indicators in all three main areas: social progress, environmental protection, and economic development. After that, in 2007, the indicators were revised to make them more understandable, able to be measured comprehensively, and able to perform complete statistical analysis. Finally, sixteen (16) indicators were obtained. The details and the evaluation of these indicators were also adapted in this study through the synthesis process according to the eco-city framework, which consisted of three (3) main components: 1) social progress, the indicator is population density, text reading hours, students in school, and cost of living; 2) Environmental protection, the indicator is the wastewater discharged from the manufacturing industry, sulfur dioxide emissions, lampblack emissions, green space, wastewater treatment and waste management rate; 3) Economic development, the indicator is Gross Domestic Product (GDP), Gross Domestic Product per Capita, GDP Shares in tertiary industry and Real estate Investment (Lijuan and Shanyong, 2011).

Parallely, from 2011 to 2015, the eco-city concept was investigated using the sustainable natural resource development criteria to compare the principles with the two significant eco-cities in China and the United Arab Emirates. Resulted in the ten

(10) main principles and indicators: 1) Space compatibility (Multi-function space); 2) Mass Public transportation priority (bicycle lanes, sidewalks, public transportation); 3) Reduce natural resources destruction (Wetlands); 4) Safe housing establishment; 5) Social justice equality; 6) Rural agriculture support; 7) “Reuse” policy encouragement; 8) Environmental friendly economic activities support; 9) Reduce impracticable consumption; and 10) Upgrade education in city. These indicators show that eco-city development needs to pay attention to these indicators to create a balance between economic, social, and environmental aspects simultaneously (Peiris, 2015).

The eco-city Indicator is an effective evaluation of six indicators, namely, a) land usage; b) energy efficiency; c) water efficiency usage; d) machine adaptation; e) internal environment quality; and f) green space management. In addition, this study also focused on citizens’ livelihood in eco-city management, which considers the citizens as those who have the ability and choices to commute and work. Hence, to change their behavior in developing the eco-city, the citizens might need a new space and infrastructure with quality neighbors and surroundings for sustainable eco-city development (Flynn et al., 2016). In addition, there were also related studies on eco-city development at the international level, which was widely acknowledged for urban development from 2000 onwards. Since the eco-city has noticeably assisted in urban development in the Americas, Europe, and Asia, included by the world-renowned scholars as follows. Joss (2010) conducted his study to explore the eco-city in 2009 through extensive document analysis and related research synthesis to eco-city development in each city to comprehend the phenomenon of environmentally friendly urban management planning. The results reveal that in late 2000, the eco-city was the main concept in urban development in terms of urban planning, public transportation, building construction, and community participation, including social justice equality, but in situational practice, there was still a small practice and limited in both domestic and global stage. From the studies, it was found that there were 79 eco-city concepts that were planned or developed in eco-cities, mostly located in the Americas, Europe, and Asia. The eco-city was measured by population, public transportation, and industry for sustainable resources, carbon reduction, garbage and waste management, technology adaptation for house construction, clean energy, save energy policy, and green space on the building. These might be slightly different or similar because each city has its knowledge management to create an eco-city. In the future, the eco-city will move towards an innovative, creative, and sustainable city and finally create good governance in the city as the ultimate goal.

Another interesting study was conducted by Eryildiz and Xhexhi (2012), who studied the eco-city under construction to examine the creation of an eco-city to improve living conditions. The study indicated that eco-city development requires attention to the construction process, which, overall, requires all building construction to be friendly to the environment and based on the population living in the city, including the cost of investment for city development. In addition, the eco-city also highlighted the importance of the image development to be green and friendly to the environment as well as public transportation to reduce carbon emission and reduce energy consumption in the city for covering the entire city transport system to meet the citizens’ needs along with creating innovation in urban areas. All in all, of the eco-city, the major cities need water for consumption; therefore, water might be an

important criterion for building a city to meet the citizens' needs. Besides, waste management is also one of the important criteria for recycling to reduce non-renewable energy consumption.

Caprotti (2014) conducted a study and research on eco-city in China, with a critical study to examine the size eco-city in the future eco-cities, work efficiency evaluation framework, and follow-up results to create a friendly environment along with a social aspects evaluation that occurs in eco-city. The study indicated that the size of the eco-city must be scoped to support a friendly environment, risks, and area. Once the development was launched, the population rapidly increased for employment and low wages, but when the employment was terminated, those people had to continue to dwell in the city. Therefore, creating an eco-city creates a so-called new city of poor people and turns it into a city of workers.

Cugurullo (2015) investigated the modernity and policy context in developing new eco-city projects in a case study: *Why Mazda City Failed?* This study focuses on the phenomenon of eco-city development that occurs in various areas and impacts the environment, society, and economy. The eco-city development was one of the tools that local governments could use to push economic growth through the direction of urban expansion. Many factories have been established to use modern technology and develop existing construction in the city to create a friendly environment. Nonetheless, it can be seen that the development of an eco-city that focuses on the economy does not create fairness and justice in the cities. In the past, the eco-city seemed to be only a dream of a few people who took a role in their development. Therefore, the eco-city development should take the city's policy agenda into account to make the city economically and environmentally equitable to solve the problems in the community.

In the context of Asian countries, Wang et al. (2015) studied the aspect of ecological city evaluation through technological implications to analyze the area of Jiangsu Province in China. This study was a new form of eco-city evaluation with information science index analysis and score evaluation from experts. The results indicated that the study could evaluate the eco-city with efficient and appropriate processes for the city and different from past evaluations with interesting indicators, namely, economic development, consisting of growth percentage of gross product, city income percentage, citizen Income, investment value, extensive energy consumption per GDP, water consumption per unit, percentage of industrial output to gross product, percentage of investment in fixed assets to GDP. For the social process, the indicator consisted of the population, unemployment rate, public buses per city population, Number of beds per patient, and birth of the population. Regarding the environment, the indicators included urban planting areas, water resources, the rate of green areas in the city, wastewater discharge requirements, green areas, and carbon emission reduction.

Meanwhile et al. (2017) studied social sustainability and the experiences of residents of the Chinese eco-city to study the living conditions of new residents in the Sino-Singapore-Tianjin eco-city and focused on understanding life experiences. The results indicated that eco-construction in the areas of Sino-Singapore and Tianjin was necessary to create social justice by analyzing the access to housing and network of residents in the eco-city and whether there was a good lifestyle. In addition, to create

a city that was socially sustainable to establish a vision to plan and design technology to facilitate the residents along the organization's role in the city to develop the city.

Last but not least, Gray (2019) studied the city of Mazda in the United Arab Emirates as a role model of an eco-city to highlight urban development. Although the development has not finished, Mazda City has become an environmentally friendly city. The study results found that the development of Mazda City facilitates citizen consumption and modern technology to make the city environmentally friendly and correspond with economic, social, and educational growth. However, eco-city development also causes economic problems, such as carbon emissions and policy terms, which is an interesting issue. Although people living in the city understood that the city was under construction to develop into an eco-city, some people were still not informed because it was new information. Therefore, it may take time to build an understanding and cultivate a new way of living in the city. Therefore, Mazda City would find ways to develop a friendly environment city with unique characteristics and renewable energy. From sunlight to attract more people to live and invest in this urban area.

From the eco-city concept and review of related studies, the researcher summarized the issues that were created as variables in the research by grouping data on eco-city to be balanced in terms of economic, social and environmental aspects to facilitate the living quality for sustainable development.

3. Research methodology

This study was survey research, which employed a unit of analysis of this research—the locals living in municipalities in the Northeast of Thailand.

3.1. Population and sampling

The population in this study were the citizens who dwelled in municipalities in the northeast of Thailand. According to data from the 20 municipalities in the northeast, the total population was 954,848 people (Department of Provincial Administration, 2022). In terms of determining the sample size, this study was an analysis of the components of the eco-city indicators from the perspective of the urban community with the exploratory factor analysis method. According to the conditions of this analysis, the appropriate size of the sample depends on the number of variables studied. However, according to Comrey's rule (1973), the appropriate and acceptable sample group was approximately 300–500 sampling, which is considered “good” for factor analysis, especially when dealing with exploratory research. Therefore, the study determined that 400 samplings were appropriate. Given the complexity of the eco-city indicators and the need to ensure robust and reliable results, a sample size of 400 was deemed appropriate. This sample size provides a balance between sufficient statistical power and practical feasibility. In addition, the study project was divided into two provinces, with a quota of 200 samplings per province according to the specified proportions. In the sampling process, the study employed cluster random sampling to obtain diverse and best-representative representatives (Thanapauge Chamaratana, 2016) by dividing the sample into provinces in the northeast.

The sample for this study was selected using a cluster random sampling method. The population consisted of citizens residing in municipalities within the Northeast of Thailand, with a total sample size of 400 participants, split evenly between Khon Kaen and Udon Thani provinces. The cluster random sampling approach ensured that the sample was representative of the diverse population in these municipalities. Randomly selected provinces in the northeastern region were used to study the components of eco-city indicators from the perspective of people in urban communities.

Two provinces were drawn, Khon Kaen and Udon Thani, to conduct the study: Khon Kaen Municipality in Khon Kaen province and Udon Thani Municipality in Udon Thani province, as the best representatives for investigation.

3.2. Research area

For the study area, the researchers have selected a specific area to conduct research in Khon Kaen province, a large city in the region because Khon Kaen city has developed economically from large government factories and the business sector, which invests in Khon Kaen urban development. Furthermore, Khon Kaen Municipality was recognized for continuous development in the city. Udon Thani is a rapidly growing city in the region in various dimensions, such as investment from Thai-Chinese businessmen with high investment power to drive the city economically (Phuttharak and Dhiravisit, 2017). Including a goal to develop the Udon Thani province into a city of sports and MICE city with a modern city management system and waste management, as well as develop the education system to create equal quality. This resulted in the city becoming a city center of prosperity in every aspect. (Udon Thani Municipality, 2022), which Udon Thani Municipality was considered the center of the network in creating cooperation in urban development.

Khon Kaen and Udon Thani are two of the most rapidly developing urban centers in the Northeast of Thailand. Both provinces have experienced significant urban growth and modernization, making them ideal representatives for studying urban eco-city indicators. Their development patterns reflect the broader trends occurring in other regional urban areas, providing a valuable context for generalizing the findings.

3.3. Research instruments

The research instrument in this study employed a questionnaire developed from a literature review and expert suggestion. Once the design was completed, the researchers examined the survey's validity using the three experts' item objective congruence (IOC) index and got a score of 0.877. After that, a questionnaire was prepared to collect data from the samples. To confirm statistical validity, the pre-test was conducted before collecting actual data and then measured reliability to check the accuracy of the data to ensure consistency with a score value of at least 0.75 or higher.

The questionnaire utilized a 5-point Likert scale to measure respondents' attitudes and perceptions towards various eco-city indicators. The scale ranged from 1 to 5, where: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. This scale was chosen for its effectiveness in capturing the intensity of respondents' opinions, allowing for a nuanced understanding of their views.

3.4. Data analysis

For data processing and analysis, the researchers checked the accuracy and completeness of the data and coded the data according to the coding manual. After that, the information is saved in the prepared database. The analysis is an overall analysis rather than separating them by province. The objective of this study is to identify generalizable eco-city indicators from the local perspectives in the urban communities of the Northeast of Thailand. By analyzing the data collectively, we ensure that the findings reflect the broader regional trends rather than being limited to specific local contexts, which may introduce variability that could obscure the overall patterns. Khon Kaen and Udon Thani have unique characteristics, and they share socio-economic and environmental conditions as part of the Northeast region. The eco-city indicators identified in this study are intended to be applicable across similar urban settings within the region, and the combined analysis better supports this goal.

Once the data was analyzed with a ready-made program, the data was divided into two parts: a) analysis at the single variable level with descriptive statistics and b) composition analysis, which uses the exploratory factor analysis method—initially, the study input data to test initial agreement in the analysis to examine the completeness. The data processing conditions were set as follows: 1) Selected variables for factor analysis have to be continuous variables or values in the interval scale and ratio scale due to component analysis. The selected variables for factor analysis should have relationships between the variables; 2) Selected variables for factor analysis should have a high level of relationship between the variables ($r = 0.3–0.70$) and a correlation coefficient (r) between 0.3 and 0.7, often considered moderate to strong. And have a relationship between the components and variables in a linear form only; 3) The number of selected variables in the component analysis should be more than 30 variables; 4) the Sample group should be large and contain more than a variable number. Some ideas suggest at least 5–10 times more data than the number of variables, or at least. The proportion of the sample number was three cases per one variable; and 5) In the case of principal component analysis, each variable or data did not need a normal distribution. However, if some variables had imbalanced distribution and contained the lowest value and abnormal maximum values (outlier), the results tend to be inaccurate.

3.5. Ethical standards for human research

This study was approved by the Human Research Ethics Committee, Khon Kaen University, which has been certified as a human research project subjected to exemption consideration according to Khon Kaen University Announcement No. 2178/2020, according to IRB No. HE653274, according to the records of the Office of the President Office, Center for Human Research Ethics, Khon Kaen University with KKU Ref. No. 660201.2.3/4643, Dated on 21 October 2022.

4. Results

4.1. General information

From collected data in Khon Kaen Municipality and Udon Thani Municipality, the study indicated that the majority of the sample was female, 71.3%, and male 28.7%. The average age of the sample was 53 years old, whereas the youngest was 13 years old, and the oldest was 96 years. The majority careers of the sample were unemployed, students, housewives, and the elderly, at 31.5%, followed by self-employed, business merchant/trading business, and contract employment at 21.0%, 20.3%, and 18.5%, respectively. Considering the number of household members in the sample, the average is 4.06 people, with the lowest household having only one member and the most crowded members being 11 people in the family. In terms of monthly income, it was found that the sample group had an average income of 21,780.00 baht, with the lowest income being 600 baht and the highest income being 800,000 baht. Demographic differences can affect the perceptions and responses of participants. The broad range of demographics in our sample was intentional, as it reflects the diversity of the urban population in the Northeast of Thailand. This diversity is essential for ensuring that the eco-city indicators developed are inclusive and applicable to a broad cross-section of the community.

4.2. Eco-city indicators from the local’s perspective in the communities

In the development of eco-city indicators, it is necessary to study baseline data from the perspective of people in urban communities in northeast Thailand to consider each aspect. Based on this study, 400 cases were divided into three main aspects, namely, economic, social, and environmental perspectives. When considering each aspect, it was found that the economic perspective had nine issues, the social perspective 16 issues, and the environmental perspective had 14 issues, with details as follows.

4.2.1. The economic perspectives

Table 1. The average economic perspectives of the sample group ($n = 400$).

Economic perspectives	Mean	SD
1. Economic stability	3.03	1.150
2. Income of people in the city	2.82	1.163
3. Expenses of people in the city	2.68	1.123
4. Employment	2.95	1.200
5. Gross product per capita (GDP)	2.93	1.211
6. Gross city product (GPP)	3.27	1.166
7. Real estate investment	3.05	1.209
8. Investment in urban areas	3.34	1.156
9. Building safe and secure housing.	3.46	1.166
The average economic perspective	3.06	1.171

The overall economic perspective had an average of 3.06. When considering each aspect, safe and secure housing had the highest average at 3.46, followed by investment in urban areas, gross product (GPP), and real estate investment, with average values of 3.34, 3.27, and 3.05, respectively. Noticeably, the expenses of people in the city had the lowest average values at 2.68 (**Table 1**).

4.2.2. The social perspectives

The overall social perspectives had an average of 3.76. When considering the average of each issue, it was found that the aspect of access to the health system had the highest average at 4.07, followed by the aspect of maintaining cultural traditions and the aspect of people’s participation and a good community, which the average values were at 3.95, 3.92, and 3.88, respectively. Therefore, it was noted that the population density had the lowest average of 3.21 (**Table 2**).

Table 2. The average social perspectives of the sample group (*n* = 400).

Social perspectives	Mean	SD
1. Population density	3.29	1.122
2. Literacy	3.61	1.086
3. Access to education for students	3.80	1.063
4. Improving the quality of education	3.57	1.175
5. Access to the health system	4.07	0.986
6. Good community	3.88	1.102
7. Fairness in society	3.79	1.095
8. People's participation	3.92	1.033
9. Activities to promote friendly environment	3.80	1.103
10. Good neighbor	3.76	1.078
11. People have access to welfare.	3.63	1.180
12. Continuing cultural traditions	3.95	1.094
13. Knowledge and abilities.	3.85	0.937
14. Good governance	3.79	0.955
15 Clear development plan and policy.	3.81	0.983
16. Urban development mechanisms	3.65	1.071
The average social perspective	3.76	1.067

4.2.3. The environmental perspectives

The overall environmental perspective had an average of 3.00. When considering the average of each issue, garbage and waste management had the highest average, with an average of 3.77, followed by city size, green space, and the pedestrian side, with averages of 3.58, 3.28, and 3.16, respectively. It was noted that the low carbon emissions aspect had the lowest average values, with an average of 2.49 only (**Table 3**).

Table 3. The average environmental perspective of the sample group ($n = 400$).

Environmental perspectives	Mean	SD
1. Low carbon emissions	2.49	1.340
2. Garbage and waste management	3.77	1.209
3. Wastewater discharge	2.94	1.382
4. Wastewater treatment	2.85	1.375
5. Reduce greenhouse gas emissions	2.49	1.333
6. Green space	3.28	1.336
7. Wetlands	2.90	1.396
8. Cycling area	2.91	1.416
9. Pedestrian walkway	3.16	1.349
10. Universal public transportation	2.83	1.274
11. Sufficient amount of water	3.11	1.424
12. Renewable energy consumption (water, wind, solar)	2.75	1.377
13. Green building	2.99	1.314
14. City size	3.58	1.155
The average environmental perspective	3.00	1.334

5. Conclusion

The eco-city indicators from the perspective of people in the urban communities in the Northeast of Thailand were divided into three main criteria: a) economic perspectives; b) social perspectives; and c) environmental perspectives. When considering each aspect, it was found that the economic perspective had a total of 9 issues with an average of 3.06 out of 5.00, the social perspective had a total of 16 issues with an average of 3.76 out of 5.00, and the environmental perspective had a total of 14 issues with an average at 3.00 out of 5.00.

6. Recommendations

From the results, the study indicated that the eco-city indicators from the local perspective in the Northeast of Thailand. The key findings consisted of three main criteria: a) economic perspectives; b) social perspectives; and c) environmental perspectives. From a social perspective, it has the highest average at 3.76, which reflected that people in urban areas in the northeast were concerned about the development of eco-city with various social mechanisms, whether in personnel development, urban development policy, educational access, participation, and equality, access to health services, friendly environment, Literacy, access to the welfare system, promote good culture, the safety of life and property, and appropriate population proportions. All of these were the missions of local government, especially municipalities and sub-district municipalities. Therefore, the organization should develop public services and delivery systems to be highly efficient and achieve sustainable eco-city development.

When considering the eco-city indicators from the local perspective in the Northeast of Thailand, there were 14 issues in total, and the lowest averages were in three areas, with an average of 3.00 out of 5.00. Therefore, the local government,

especially the municipality and sub-district municipality in the northeastern region, should expedite the process of providing information about environmental issues and encourage people in urban areas to participate highly in the development of the eco-city.

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