Migration Letters

Volume: 21, No: S3 (2024), pp. 490-500

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Influencing Factors Of Green Cities' Potential In Northeastern Thailand

Rasita Dasri[1] & Thanapauge Chamaratana[2,*]

Abstract

The urban network represents the potential to build a green city from human and non-human elements. This research aimed to analyze factors affecting the potential for becoming a green city by integrating the concept of a green city with network theory as an analytical framework. The study employed a quantitative research method and collected data from 385 sampling households in Khon Kaen and Udon Thani municipalities, the big city of Northeastern Thailand. The data was analyzed using statistical methods in a multivariate analysis. The study revealed that the variables influencing the potential for a green city include the average monthly household income, government participation, community involvement, air quality, green spaces, and green city management technology. Driving the network through these variables in the municipalities of Udon Thani and Khon Kaen has made both cities have the highest potential to transform into green cities in the northeastern region of Thailand. This study can be a model for local government agencies and communities to strengthen their networks and work towards sustainable green city development.

Keywords: *Green City, Green Potential, Green Indicators, Northeastern Thailand.*

1. Introduction

The solution for global warming and environmental problems has been invented by several scientists who try to solve problems through Conceptual models with a common goal of sustainable development. With the aim to increase the city's development and growth, especially in the economy, under the limited resources for sustainability into the future or, in other words to develop the city's growth under the limits to growth. These solutions would help to decrease air pollution, which affects world climate change. At the same time, the advances in science and technology would accelerate the development process (Phromphakphing, 2017). With new inventions, such as Transit-oriented development (TOD), Sustainable city, Eco-city, Compact city, especially the Green City, Green Urbanism was invented to preserve the urban areas and surrounding areas with a conservation system in aspects of water resources, forestry, agriculture, food production, housing, and transportation (Lehmann, 2010) with the ultimate goals to reduce the energy consumption and adopt alternative energy. This adaptation could promote a quality of life for people in the city for pleasingly and sustainability. This green city solution would be the guidelines for the physical development to support mass transit systems with renewable energy and reduce air conditioner usage. Add[1]itionally, the green city concept would help the city to be concerned about the green space to absorb carbon dioxide and other gases, which can cause the greenhouse effect phenomenon.

[1]Ph.D., Development Science Program, Faculty of Humanities & Social Sciences, Khon Kaen University.
[2]Assoc. Prof., Development Science Program, Faculty of Humanities & Social Sciences, Khon Kaen University.
*Corresponding author email: thanacha@kku.ac.th

In Thailand, the government currently emphasizes economic growth development and also attempts to implement government policies to promote urban development to reduce global warming problems with the global standard. Particularly in the northeastern region—Udon Thani and Khon Kaen provinces, which were the first two provinces with the most green areas implementation in 2018. When analyzing the land cover data with the Geographic Information System (GIS) through the Quantum GIS program (Figure 1), it found that Udon Thani municipality has implemented a green area of 4.38 square kilometres or about 9.18 per cent of the total area and the green space per population was about 36.58 square meters per person in 2021. Meanwhile, Khon Kaen municipality has implemented a green area of 7.36 square kilometres or about 16 per cent of the total area. The green space per population was about 65.97 square meters per person in 2021. The main reason that Udon Thani contributed to green space was that the city has strengths in business, trade and investment since the city is connected as the gateway to the Mekong Sub-region or the ASEAN Economics Community (AEC). In addition, it receives support from local agencies. Collaborate with academics to push Udon Thani towards becoming a green city. For Khon Kaen, since the geographical area was at the centre of the northeastern region and was currently also being pushed to a regional city centre for the development with the social development policy as the community networks in waste management, which is one of the important factors a green city development.

Therefore, urban development was not solely dependent on a single government and might cooperate with private sector and public sector networks due to traditional development might not be applicable to the current situation. As such, the green city design in each area would be flexible and different based on each geographical area. Without conducting the study on identity and uniqueness, the budget for solution and development could be wasted. For instance, the creation of walkable pathways in the business zone of Udon Thani, known as the "Udon Thani Walkable City" in the year 2018, only attracted people in the beginning. Due to pedestrian behaviors and utilization patterns in the area lacking connectivity, including the declining use of Smart City Bus services in both Khon Kaen City (2017-2022) and Udon Thani City (2018-2020). The main reason is that city residents still rely on private vehicles as before. Hence, this research emphasized examining factors influencing the development of green cities in the northeastern region of Thailand. In this study, Khon Kaen and Udon Thani were the city representatives, which aimed to determine the disadvantaged impacts of the development of the green city concept. The results were intended to benefit all relevant sectors and would be a guideline for prevention and adaptation to a sustainable green city.

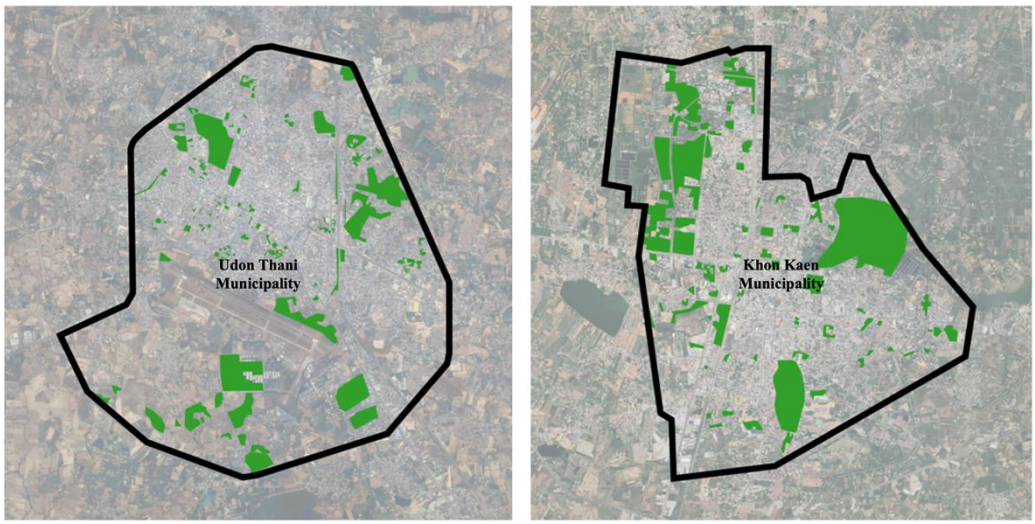

Figure 1 Green spaces in Udon Thani and Khon Kaen municipalities, Northeastern Thailand (Source: The result from Quantum GIS Program)

1.1 Research question

What influencing factors for the green city development in Udon Thani and Khon Kaen municipalities?

1.2 Research objective

1) To determine the potential scale of green city development in urban areas of the northeastern region of Thailand.

2) To examine influencing factors toward the potential scale of a green city in the northeastern region of Thailand.

2. Research Conceptual Framework

This research has developed a conceptual framework by using actor-network theory for connecting networks, which was important for green city development. The factors studied in a green city through network relationships were able to demonstrate the city's potential for green city development.

The green city is a concept which has been studied for urban planning and design towards sustainable development goals. Its meaning has consisted of many concepts with the same goal, such as a friendly environment city (Office of Strategy and Area Development Planning, 2011), Eco-city (Register, 1987; Charmondusit, 2015) and Low-carbon city (Akagi, 2018; Dhar et al., 2013; Tan et al., 2015), the mentioned concepts show the importance in the physical structure dimension. An important aspect of urban design would reflect community behaviour. For these reasons, urban development might not be able to be processed without the social dimension consideration. Such the example, the ideas that support the green city concept, e.g. the Happy city (Montgomery, 2019), New Urbanism (Kulchol, 2002; Piromruen, 2006) and Green Urbanism (Lehmann, 2010).

The green city development indicators have been developed and received attention from a number of academics. It was not specific only to the field of architecture and urban planning or environmental management that considers physical development only, but also includes the social sciences and economics that emphasize the importance of integrating education. As a result, the key parameters of being a green city were more diverse and comprehensive, such as the cooperation with the Economist Intelligence Unit (EIU) in Asia to specify the eight indicators: Energy and CO_2, Land use and Buildings, Transportation, Waste, Water, Sanitation, Air Quality, and Environmental Governance (Economist Intelligence Unit, 2011). As aforementioned, the green city development must need the planning and development taking into account of the environmental dimension with a participatory process and noble management according to the good governance principles (Benjamas Chotthong et al., 2015). Therefore, to determine the influencing factors toward a green city development, the research investigated the influencing factors from two key- dimensions, which were the geographical dimension and the social dimension.

The geographical dimension has played an important role in the perception of a green city through the perceptions: see, touch, and feeling, resulting in the green space and good water quality were mentioned in the recent research related to green city developments or even used as a tool to change the physical appearance in the future (Pinngarm et al., 2017; Manea, 2014). These included the indicators for energy consumption, waste management, and air quality (Brilhante and Klaas, 2018) to evaluate the city scale at that time. Furthermore, there were also infrastructure variables, especially transportation by the mass transit system, green roads, and natural architecture (Newman, 2010), which were counted as important variables for the urban development and livelihood of the people with a green city way.

In aspect of the social dimension, the social dimension have corresponded to the people's living conditions, density, income, employment, and life security in the city. (McKendry & Janos, 2015; Lehmann, 2010), including the government management, which should focus on community participation (Chotthong et al., 2015; Wayalun, 2014), which demonstrates of the working network existence in a urban development at all levels; from the central government, local government, and people in the area (Zain et al., 2022). With this network, in each areas would have the leaders who hold power and roles in driving the life quality, especially at the community level and in local government organizations (Sakunthong, 2023). The relationship between urban development networks was therefore considered an important variable in measuring success; it is not specific only to humans and humans, but it also includes the relationships between humans and non-human things within the city (Bruno Latour, 1996). Moreover, the relationships that occur can occur in many phases of the network processes, such as Problematization, from defining goals or shared problems, Interessement, coordinating or persuading actors to enter the network with mutual

benefit, Enrolment: joining the network, Mobilization: driving the network until it was widely accepted (Callon, 1986). These processes have been applied to measure the potential level in the Isaan urban area for gaining attention to the same issues, the influencing network, and the network expansion.

From the literature reviews and the survey of the study areas, the influencing factors toward the green city potential were related to the social dimensions and urban geographical dimensions. Thus, the researcher has developed a conceptual framework by synthesizing variables, which would affect the green city potential in the Isan urban areas. Based on synthesis, the variable consisted of six main variables: (1) Household characteristics: occupation, family members, and income; (2) Public sector component: green city development policies, Government participation, and Government vision, (3) People sector: population density, affordability, employment opportunity, life security, community involvement, and community leadership, (4) Urban environment: green energy, water quality, air quality, and waste management, (5) Urban structure: green architecture, green spaces, green logistics, and public transportation, (6)Technology: green city management technology and communication technology (Figure 2).

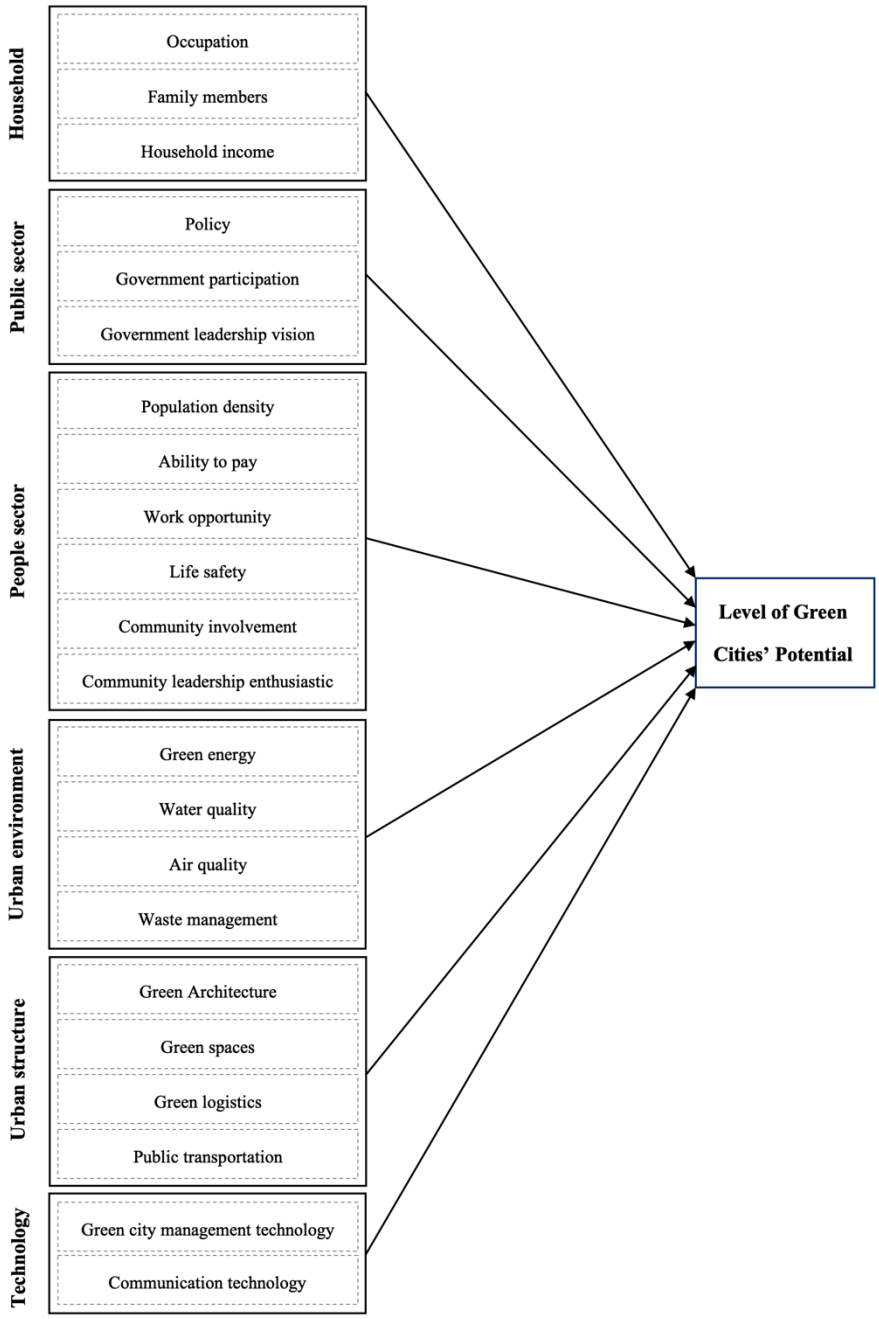

Figure 2 Research Conceptual Framework

3. Research methodology

This research is a quantitative research, which aimed to determine the potential scale of green city development in Udon Thani and Khon Kaen municipalities and influencing factors toward the green city potential. The study was conducted with households in the Udon Thani and Khon Kaen provinces, a total of 125,809 households, based on data from the Central Office of Civil Registration, Department of Provincial Administration, in December 2018. The sampling size was determined by calculating from W.G. Cochran's formular, and the confidence level was at 95 per cent (Israel, 1992). The samplings were consisted of 385 households with 185 households in Udon Thani and 200 households in Khon Kaen. The samplings were drawn by multi-stage sampling suitable for large-scale surveys (Fisher-Giorlando, 1992; Ungpansattawong and Khukoosamut, 2014). This study employed two-stage sampling for data collection, and the first step was purposive sampling to ensure the data was comprehensive and relevant to the research objectives (Babbie, 1990; Chamaratana, 2017). In addition, the characteristics of the communities studied must be urban communities with a community environment for a green city. The second step employed a simple random sampling for the household selection to provide an equal chance by drawing lots from random community leaders.

The structured interview was used as the research tool for the data survey, which was approved by the Human Research Ethics Committee and passed the content validity with three experts. The Index of Item-Objective Congruence (IOC) was at 0.88 before trying out with households in the cities which were not actual research sampling, totalling 30 households, and the reliability was at 0.97, which was considered as usage capacity in the study(Chamaratana, 2017; Jongsuksomsakul, 2018). For the data analysis, the study employed descriptive statistics and multiple regression analysis to determine the influencing independent variable and adopted enter regression to elicit the predictable and non-predictable variables (Butsaenkom, 2012) with SPSS program version 28.0.1.1 under Khon Kaen license.

4. Results

The results in this study indicated that the majority of interviewees were female, about 70.91 per cent female, and were male, about 29.09 per cent. The majority of the age range was between 60 to 69 years, about 23.64 per cent and the age range was 50 to 59 years, about 19.22%. The occupations of the people were varied. Thus, the researcher has pushed in 'other' categories, which means the community; some of them were unemployed, housewives, students, retired civil servants or volunteers, about 28.31 per cent. Next, the independent occupations were followed about 21.82 per cent, whereas the self-employed business owners or traders were about 21.56 per cent, the daily employment occupations about 2.99 per cent, the monthly employment occupations about 6.23 per cent, government service or state enterprise occupations about 4.68 per cent, employment as a contract about 1.56 per cent, private company employee about 1.56 per cent, and agricultural about1.30 per cent, respectively.

For the household level, the results indicate that the total number of members in households averaged about 3 to 4 people or 40.00 per cent, followed by 5 to 6 members or 31.17 per cent, and 1 to 2 members or 21.30 per cent, respectively. Apart from these, the average household income per month is less than or equal to 10,000 baht per month, or about 45.19 per cent, followed by more than 10,000 baht but not more than 20,000 baht or about 28.57 per cent, more than 20,000 baht but not more than 30,000 baht or about 10.91 per cent, more than 50,000 baht or more or about 6.23 per cent, more than 40,000 baht but not more than 50,000 baht or about 4.94 per cent, and more than 30,000 baht but not more than 40,000 baht or about 4.16 per cent, respectively.

4.1 The potential scale of green city development

The results of the potential scale of green city development from the attitudes survey towards relationships within the network are considered from three aspects: similar interest, influencing network, and network expansion. The criteria scores were ranked from 1 to 5 by determining the attitude level from the average sum data from 1.00 to 1.50 is the least, 1.51 to 2.50 is fair, 2.51 to 3.50 is the medium, 3.51 to 4.50 is high, and 4.51 to 5.00 is the highest. After that, the researcher has determine the statistic and considered together with the critical value t to check for significance score (Srisaat and Nilkaew, 1992). The results demonstrated that the Isaan people in the Udon Thani and Khon Kaen have a high relationship potential within the network ($\bar{x}$ = 3.96, S.D. = 1.28), with the greatest perceived potential for network expansion ($\bar{x}$ = .21, S.D. = 1.11), followed by the influence potential of the network ($\bar{x}$ = 3.83, S.D. = 1.37) and have similar interest in the same topic ($\bar{x}$ = 3.66, S.D. = 1.39), respectively (as show in Table 1).

Table 1 Mean, Standard deviation, and Potential scale of the relationships within the network

Relation in Network	**$\bar{x}$**	**S.D.**	**Potential Scale**
Similar Interest	3.66	1.39	High
Influencing Network	3.83	1.37	High
Network Expansion	4.21	1.11	High
Total	3.96	1.28	High

4.2 Factors influencing the potential of urbanites to be a green city

To analyze factors that influence the potential for a green city in Udon Thani and Khon Kaen, the researcher has employed a multivariate regression model to analyze the relationship between the variables to check their independence with the Pearson Product Moment Correlation Coefficient. It was found that government policy variables were related to government participation variables at a high level, and the correlation coefficient was at 0.822 and reached at a statistical significance level of .01, but for multivariate regression analysis, the variables should not have a relationship higher than 0.75 for conducting the equation prediction (Suchat Prasitratsin, 2019). To reduce the variables' redundancy, this study must eliminate one variable. When considering the correlation coefficient between the two variables and the attitude score towards relationships within the green city actor-network, it was found that the variable of government participation was related to the green city actors network rather than government policy with a correlation coefficient at 0.286 and 0.196 at the statistical significance at 0.01, respectively. As a result, government policy needs to be excluded in this study for the potential determinations.

The results from the multivariate regression model of all 21 primary variables indicate the six characteristics variables have influenced the potential scale of relationships within the green city network, including average monthly household income (Beta=-.236), Government participation (Beta=.100), Community participation (Beta=.078), Air quality (Beta=-.074), Green space (Beta=-.059), Green city Management technology (Beta=-.049). These resulted in the coefficient of multiple determination, R^2, equal to 0.243, which means the variables can predict the potential of being a green city for Isaan people by 24.3 per cent (As shown in Table 2).

Table 2 Factors influencing the potential of urbanites to be a green city

Variables	**b**	**Beta**	**Sig.**
Constant	.661		<.001
Occupation	-.022	-.086	.067
Family members	-.041	-.065	.174
Household income	-.236	-.238	<.001
Government participation	.100	.191	.005
Government leadership vision	.036	.066	.293
Population density	-.021	-.038	.539
Ability to pay	.046	.090	.196
Work opportunity	.019	.037	.593
Life safety	-.006	-.013	.838
Community involvement	.078	.135	.050
Community leadership enthusiastic	-.008	-.016	.775
Green energy	.058	.140	.125
Water quality	.000	-.001	.992
Air quality	-.074	-.183	.008
Waste management	.041	.100	.095
Green Architecture	.042	.112	.108
Green spaces	-.059	-.162	.016
Green logistics	-.019	-.049	.527
Public transportation	-.038	-.081	.265
Green city management technology	-.049	-.135	.038
Communication technology	.015	.036	.556
$R^2 = 0.243$, F = 5.541, Sig. of F < 0.001			

5. Conclusion and Discussion

5.1 Conclusion

From the results, this can be concluded that a city with good relationships in the network at the initial stage, such as mutual agreement, participation, and interactions until network expansion, would accelerate the green city potential through the factors influencing the city, which consisted of six elements:

(1) Household characteristics with income as indicator, households with moderate to low incomes value the green city and have a positive attitude toward relationships within the green city network in a positive direction. Activities resulting from green city development enable people to generate income and access local food resources within the community, thereby reducing household expenses.

(2) Public sector with government participation as indicator, when citizens are involved in the government's operations. This can positively impact network relationships and encourage cooperation in green city development.

(3) People sector with community involvement as indicator, when community members have a positive attitude toward the involvement of community members, it positively impacts network relationships and collaboration efforts to transform the community into a green community.

(4) Urban environment with air quality as indicator, low air quality can prompt community members to create a cohesive green city network to collectively the problem issue.

(5) Urban structure with green spaces as indicator, the situation of green spaces significantly influences the green city network, especially when it is inadequate and decreased. This can lead to the creation of stronger relationships aimed at achieving the goal of transforming into a green city.

(6) Technology with green city management technology as indicator, using technology in urban management processes can rapidly drive the transformation into a

green city. Simultaneously, if there is insufficient use of technology for environmental management within the city, fostering strong relationships within the green city network becomes crucial and should be prioritized.

The mentioned factors can be used to determine guidelines to enhance the potential of a green city and build collaboration between local authorities and communities. Government projects or community-based projects must be evenly spread across all households, aiming to expand networks and increase the success of transforming into a green city. Projects and activities conducted should benefit the urban environment and can add economic value to the residents, creating a win-win situation. Pursuing development in this direction will lead to continuous and sustainable in the long run. In the project and activity details, considerations should be made regarding environmental issues, focusing on managing air pollution and supporting the expansion of green spaces. Employing technology in operational processes is essential to decrease work duration and enhance the efficiency of transitioning into a green city. However, in operationalizing these mentioned guidelines into a strategic plan for becoming a green city, legal considerations are crucial specifically laws regarding land use within urban areas and laws about alternative energy. Because certain areas, such as public spaces, cannot be used for commercial purposes, or cannot place waste-to-energy gasification facilities within community areas.

5.2 Discussion

In a city that reflects the transformation towards an environmentally friendly city, the people would be concerned to drive the city through networks cooperation. This is consistented with Chamaratana et al. (2022), who revealed that community network operations would bring changes in the grassroots level and the social structure level of the city changes. If the network cooperation has a good direction, it would show strength and power for development. As can be seen, the people in Udon Thani and Khon Kaen have attitudes toward the potential scale of network relationships at a high level, especially network expansion due to the network will spread the success possibility. (Jazayeri et al., 2023).

This expansion is included in both social network expansion and geographical expansion, which consistent with the factors influencing a green city in government and public sector aspects. Resulted in the benefits of development would be in the same direction to promote the development process (Galati et al., 2023). Moreover, the community network serves as a key actor that enhances the city management capability within the government sector network, emphasizing knowledge exchange and community involvement is crucial. Through these efforts can behavioral changes occur, leading to an improvement in the quality of life for the people (Chamaratana et al., 2020). On the one hand, geographical networks can be connected through environmental factors such as air quality and urban infrastructure factors such as green space. If both factors can be made, there would be in a good situation and increase possibility. These would cause the expansion of the network of green cities comprehensively and effectively, especially green areas, which not only related to physical space but also is a social space (Haase, 2022) that can cause people awareness for creating a green city development.

Noticeably, when considering the potential of green cities through network relationships in the same areas of interest, although the potential was at a high level, the average score seems to be at the lowest. This reflects that the interests of city people or the factors that would lead to a green city still vary. Therefore, some processes may not be as successful as intended (Sangkhamanee, 2016). Partly, the urban people still prioritized to the family’s income for living and career opportunities, which seem to be important in the urban development network towards a green city. For instance, the collaboration among community members in establishing urban vegetable gardens in Thepharak 5, Khon Kaen municipality, and Khlong Charoen 2, Udon Thani municipality, has resulted in various benefits. Members involved in the urban vegetable cultivation network are granted rights to use public land for agricultural purposes. The agricultural yields provide aid to citizens' livelihoods and reduce household expenses. Furthermore, it contributes to greener physical

environments within communities, creating a visually green space. The presence of greenery also enhances the overall freshness and ambiance of the surrounding air, promoting a sense of well-being among people.

Ultimately, since the human resources for development may take too long to solve problems in a timely manner. For example, the utilization of water treatment technology in rehabilitating the public water sources in the Nong Tao Lek community, Udon Thani municipality. Typically, the community releases water from the source once a year for annual fishing activities. However, during the COVID-19 crisis, the government imposed restrictions on gatherings to prevent the spread of the virus. Consequently, this led to an accumulation of polluted water with a foul odor in the area. Moreover, both Udon Thani and Khon Kaen municipalities have employed technology for collecting databases on green spaces and information regarding trees within the city, aiming to facilitate the maintenance and development of green spaces, expanding coverage in urban areas. Technology and scientific knowledge might affect the potential to drive a green city (Safitra et al., 2023). When the urban environment and urban infrastructure can be managed with modern, more environmentally friendly technology, the more successful development towards green city would have more potential.

6. Recommendation

This study examines the level of green city potential through the city's network of relationships. The study results thus show the influencing factors at a broad scale. However, the study of green cities elicited an in-depth dimension to the community level. It can lead to the physical design and determination of clear community guidelines consistent with the local context. The factors found in this study would lead to green city development in different aspect and depends on the geographic characteristics of the community and the social behaviour in that community.

7. Acknowledgment

This article is part of a doctoral research project on developing green city models through actor networks. The research was funded by the Graduate School, Khon Kaen University Research grants to accept talented and high-potential students to study in the curriculum and conduct research with the professor's expertise. In the academic year 2018 (Regular program).

Reference:

Akagi, J. (2018). Low-carbon City Profile – Climate Change Actions by Asian Cities in the City-to-City Collaboration Programme. Japan: Ministry of the Environment

Babbie, E. (1990). Survey research methods, Belmont, California.

Brilhante, O and Klaas, J. (2018). Green City Concept and a Method to Measure Green City Performance over Time Applied to Fifty Cities Globally: Influence of GDP, Population Size and Energy Efficiency. Sustainability. Retrieved January 12, 2020, from https://www.mdpi.com/2071-1050/10/6/2031

Butsaenkom, P. (2012). Selection of predictive variables into the multiple regression equation. Journal of Educational Measurement. Mahasarakham University, 17(1), 43-60[in Thai].

Callon, M. (1986). The Sociology of an Actor-Network: The Case of the Electric Vehicle. In: Callon, M., Law, J., Rip, A. (eds) Mapping the Dynamics of Science and Technology. Palgrave Macmillan, London

Chamaratana, T. (2017). Quantitative research for social development work. Khon Kaen: Faculty of Humanities and Social Sciences, Khon Kaen University. [in Thai]

Chamaratana, T., Knippenberg, L. W. J. and De Jong, E. B. P. (2020). Toward a Low Carbon City: Community Networks for Developing and Promoting Carbon Emission Reduction Behavior, Khon Kaen, Northeast Thailand. The International Journal of Sustainability Policy and Practice, 16(2), 1-13, https://doi.org/10.18848/2325-1166/CGP/v16i02/1-13

Chamaratana, T., Knippenberg, L. W. J. and De Jong, E. B. P. (2022). The Influenced Factors of Perception on Carbon Emission Reduction of Isan Urban People in Khon Kaen Municipality. Journal of Humanities and Social Sciences Nakhon Phanom University, 12(2), 86 - 99

Charmondusit, K. (2015). Eco-cities and the application of eco-efficiency for eco-city development.Eco. Journal of the Institute of Advanced Science and Technology, 1(1), 32-45.[in Thai]

Chotthong, B., Phothi, K., Noipa, W., Disayapanya, C., Singkarotai, R. and Khaokrathok, P. (2015). Decoding the code for livable cities. Bangkok: Saengsaeng Printing House[in Thai].

Dhar, S., Pathak, M. and Shukla, P. R. (2013). Low Carbon City: A Guidebook for City Planners and Practitioners. Retrieved January 17, 2020, from https://www.researchgate.net/publication/256120789_Low_Carbon_City_A_Guidebook_for_City_Planners_and_Practitioners

Economist Intelligence Unit. (2011). Asian Green City Index: Assessing the environmental performance of Asia's major cities. Germany: Siemens Franziska Consolati.

Fisher-Giorlando, M. (1992). Sampling in a suitcase: multistage cluster sampling made easy. Teaching Sociology, 20(4), 285-287

Galati, A., Coticchio, A. and Signes, A. P. (2023). Identify the factors affecting citizens' willingness to participate in urban forest governance: Evidence from the municipality of Palermo, Italy. Forest Policy and Economics, 155, 1-18, doi.org/10.1016/j.forpol.2023.103054.

Haase, A. (2022). Green Spaces and Their Social Functions: Specific Challenger in Urban Spaces of Arrival. In: I. Misiune et al. (eds.) Human-Nature Interactions, 273-284 https://doi.org/10.1007/978-3-031-01980-7

Israel, G. D. (1992, November). Determining Sample Size (Fact sheet PEOD-6). Retrieved May 6, 2020, from http://sociology.soc.uoc.gr/socmedia/papageo/metaptyxiakoi/sample_size/samplesize1.pdf

Jazayeri, S. H., Poursaeed, A. & Najafabadi, M. O. (2023). Social network analysis of green space management actors in Tehran. International Journal of Geoheritage and Parks, 11, 276-285

Jongsuksomsakul, P. (2018, 6 June). Creation and quality checking of research tools. Handout Training "Creating a new generation of researchers" (chicks), Naresuan University, Class 6, Information and Communication Technology Service Center Naresuan University[in Thai].

Kulchol, K. (2002). What is urban design?: Searching for answers in the past 40 years. Nakhon Pathom: Printing House. Silpakorn University, Sanam Chandra Palace Campus.[in Thai]

Latour, B. (1996). On actor-network theory. A few clarifications plus more than a few complications. Soziale Welt, 47, 369-381

Lehmann, S. (2010). Green Urbanism: Formulating a series of holistic principles. Surveys and Perspectives. Integrating Environment and Society, 3(2), 1-16

Manea, G. (2014). Green cities – Urban planning models of the future. Retrieved January 12, 2020, from https://www.researchgate.net/publication/271587798_GREEN_CITIES_-_URBAN_PLANNING_MODELS_OF_THE_FUTURE

McKendry, C. and Janos, N. (2015). Greening the industrial city: equity, environment, and economic growth in Seattle and Chicago. International Environ Agreements, 15, 45 – 60

Montgomery, C. (2019). Happy City. (Pinda Phisitbutra, translator). Bangkok: Bloccoli. [in Thai]

Newman, P. (2010). Green Urbanism and its Application to Singapore. Environment and Urbanization ASIA, 1(2), 149 – 170

Office of Strategy and Area Development Planning. (2011). Environmentally friendly cities. Journal of Economics and Society, 48(3), 28 – 34[in Thai].

Phromphakphing, B. (2017). Concepts and theories of development from material wealth to well-being and happiness for the nation. 2nd Eds. Khon Kaen: Khon Kaen University Press[in Thai].

Pinngarm, P., Ninsonti, H., Pavasant, P., Jesdapipat, S. and Setthapun, W. (2017). Scenario analysis for Green City model: Case study of Chiang Mai World Green City Model, Thailand. Renewable Energy, 12(1), 23 - 36

Piromruen, S. (2006). Designing livable and sustainable urban communities: theory and experience. isosceles: Academic journal Faculty of Architecture Silpakorn University Academic year, 2006 - 2007,111 – 142[in Thai].

Register, R. (1987). Ecocity Berkeley: Building cities for a healthy future. Berkeley, CA: North Atlantic Books.

Sakunthong, S. (2023). The Role of Local Community Leadership and Enhancing the Good Quality of Life for Local People Based on the Philosophy of Sufficiency Economy in Phrao District, Chiang Mai Province. Journal of Peace Periscope, 4(1), 91 – 102

Sangkhamanee, J. (2016). The Non-modernity of Science: Non-science, Non-objectivity, Non-humanism and Bruno Latour's networks-actors. In: Chantanee Charoensri, editor. Science, Non-science, come in outside, go out in. Nonthaburi: Paragraph; Pages 142-178. [in Thai]

Safitra, M. F., Lubis, M., Kurniawan, M. T. and Alhari, M. I. (2023). Green Networking: Challenges, Opportunities, and Future Trends for Sustainable Development. Proceedings of the 2023 11th International Conference on Computer and Communications Management at Nagoya, Japan, 168 – 173. DOI:10.1145/3617733.3617760

Srisaat, B. and B. Nilkaew. (1992). Population references when using the estimation scale tool with Sample group. Journal of Educational Measurement, SWU Maha Sarakham, 3(1), 22-25.

Tan, S., Yang, J. and Yan, J. (2015). Development of the Low-carbon City Indicator (LCCI) Framework. Enery Procedia, 75, 2526-2522

Ungpansattawong, S. and Khukoosamut, C. (2014). Survey plan with sample. Khon Kaen : Printing House, Khon Kaen University[in Thai]

Wayalun, W. (2014). Urban greenness index for urban environmental management in the lower northern region of the country. Thai. Master's Degree Thesis in Urban and Environmental Planning. Graduate School Silpakorn University [in Thai]

Zain, A. F. M., Pribadi, D. O., and Indraprahasta, G. S. (2022). Revisiting the Green City Concept in the Tropical and Global South Cities Context: The Case of Indonesia. Front. Environ. Sci., 10:787204, doi:10.3389/fenvs.2022.787204