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Strategic Planning for the Smart-Green City through Urban Governance

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ABSTRACT

Green city is a city seeking for transition from a traditional city paradigm to a sustainable city based on the principles of nature as circulation, coexistence and balance in a response to climate change. Cheongju City has been trying to find its identity as a green capital of Korea, and attempts to develop the policy packages to build the green capital in response to climate change. This study intends to analyze a transition master plan for the green city and to set policy priorities through governance. This study employs participatory approaches including focus group interviews, experts' advisory meetings, and survey. This study also develops indicators to evaluate the importance of the values of green city through an expert Analytic Hierarchy Process (AHP) survey method. Then, set policy priorities of green city based on the evaluation results. The vision and strategies were derived through consecutive group discussions between various stakeholders consisted of professors, NGOs, and local government officials for several months. The vision was composed of ten strategies, for example, building circular networks of local material and establishing community-based economic system etc. This study has set policy priorities based on the evaluation of green city's values of each policy. It is found that the top five policies were building *Moosim-chon*, river of life and citizens forests, diagnosis and innovation of administration system, mapping biotope and climate, operating car-free streets and building 1000 pocket parks.

1. Introduction

Although they cover only 2.75 of the word's surface area, cities are responsible for 75% of the world's energy consumption and 80% of greenhouse gas emissions (Girardet, 1999; UNFPA, 207; Roy, 2009). Thus, cities are the main agents for solving problems of environmental and climate change. In this context, sustainable development was focused upon as a way to cope with environmental problems and climate change by balancing the needs of the environment and those of development.

Sustainable development, which was first publicly discussed in 1987, is best monitored in urban areas, as most of the world's population now lives in cities. Furthermore, sustainable urban development can only be achieved through sustainable urban plans (Yazar and Dede, 2012). The vision for sustainable cities is based on political, social, and economic equity, as well as sustainability related to the theory and objectives of sustainable development. The following are the principles on which sustainable cities are based: Achievement of long-term social and economic stability; recovery and protection of biological diversity and nature; recognition of a variety of characteristics, including the value of human beings, culture, history, and nature; expansion of cooperation networks to work for a sustainable future.

The paradigm of urban planning based on sustainable development has involved planning objectives such as the conservation of nature, leisure, biological diversity, green areas, ecological networks, new renewable energies, ecological housing, ecological industry, disaster prevention, and coping with climate change (Ku, 2009; Ban, 2011).

Studies on sustainable development are divided into two types: those that suggest planning methods for cities and case studies that aim to create a real sustainable city. Studies that suggest planning methods deal with various subjects in the urban planning paradigm, such as transportation, urban space structure, energy, buildings, green areas, and water management (Falloon and Betts, 2009, Wende et al., 2010, Clarke-Sather et al., 2011, Mahmoud and El-Sayed, 2011, Bebzerra et al., 2012). Case studies aiming to create a real sustainable city suggest conceptual planning directions or practical planning strategies and establish a vision. Among these case studies of sustainable city planning, Ziegler (2009) identified growth strategies offering residents affordable and sustainable housing and transportation as the main requirements for urban planning policies in the twenty-first century in United States. He also considered buildings and transportation to be key elements in the aspect of energy consumption in a sustainable urban development plan. To be more specific, he suggested implementing planning methods such as creating a compact city, a broad mix of housing, an efficient infrastructure, and public services by combining urban planning and green development. Xiao, Li, et al. (2011) suggested an approach integrating climate change adaptation and mitigation into sustainable city planning in Lijiang City, China. They suggested

strategies of mitigation, adaptation, and public participation in economic sectors that are vulnerable to climate change.

Since sustainable development can also be relatively complex and requires specialized skills, Hawkins and Wang (2012) identified the importance of planning and implementation of sustainability initiatives by local governments, including the importance of network organization. On the basis of a national survey of US cities, Hawkins and Wang (2012) presented evidence of the extent to which cities utilize elements of the conceptual governance model. Because previous studies have focused mainly on independent planning, they have been weighted toward a physical plan; the aspects of governance management and administration of the physical plan have not received significant consideration. Although previous studies have researched comprehensive planning, they have only proposed policies, which are not sufficient to address the totality and practicality of planning.

Cheongju City in Korea was declared the Green Capital at the 2009 Green City National Forum (Table 1). Since then, it has been awarded the Building a Residentially Desired City Grand Prize (2009), the EcoRich City Prize (2009), and the Green City Prize (2010). Cheongju City has not only established its prospects as an ecological cultural city, but also has tried to establish a sustainable city. In particular, the administration's purpose and policies were established through a 10-day citizen contest in 2010. Since Cheongju City has a basis of resident participation, we consider it to have the will to improve urban sustainability. In this context, this study suggests practical strategies and constructs a planning vision based on the integrated sustainable development theory.

This study is intended to create a strategic planning of the green city through governance, focusing on Cheongju City, Korea. The master

Table 1 *Present condition of Cheongju City*

Aspect	Present Condition			
Physics	Area (km2)	153	Population	About 640,000
	Climate	Temperate continental climate	Average temperature	11.6℃
	Rain fall (mm/year)	1,400		
Regional Economy	Area of large supermarket (m2)	71,909	Area of shopping center (m2)	19,397
	Area of market place (m2)	4,528	Number of manufacturing company	475
	Area of agriculture (ha)	4,005	Electricity consumption (MWh/year)	8,299,311
Life and welfare	Population of standard living guarantee beneficial	16,345	Population of disable people	28,470
	Population of children	40,763	Population of old-aged people	53,552
	Social welfare facility (unit)	1,374		
Education and Culture	Education facility (unit)	233	Student per class	26
	Student per teacher	28	Cultural facility (unit)	20
	Cultural asset	179		
City and Transportation	Population of CBD	14,458	Number of registered vehicle	234,047
	Number of household	240,704	GHG emission from transportation (ton)	927,605
	Distribution ratio of transportation (%)	11%	Area of park per head (m2)	3.04
Ecological Environment	Area of stream (m2)	6,439,100	Area of park (m2)	1,760,462
	Area of urban park (m2)	29,615	Reduction ratio of air pollutant (%/5 year)	20.45
	Reduction ratio of water pollutant (%/5 year)	5.24	Reduction ratio of noise and vibration pollutant (%/5 year)	15.78
	Reduction ratio of environmental pollutant emitting facility (%/5 year)	32.31		
Green Foundation	Population of public official	1,760	Ratio of public official more than their 40s (%)	40
	Ratio of public official working on more than 20 years	908	Represented governance organization	The Cheongju Sustainable Development, The Council for Building a Residentially Desired Cheongju City

plan of this study involves three main planning fields: the economy, including the regional economy; society, including life welfare, education, culture, and a green foundation; and the environment, including the city itself, transportation, ecology, and the environment (Table 2).

2. Study area – Present Condition of Cheongju city

Cheongju is located in the center of South Korea. It is a capital of administration, politics, education, and culture in Chungcheongbuk-do. Cheongju has a population of approximately and an area of 153 km2. It has a temperate continental climate, with average rainfall of 1,400 mm and an average annual temperature of 11.6 ^{O}C. Cheongju contains major supermarkets, shopping centers, and marketplaces. Major supermarkets cover an area of 71,909 m2 (6 stores), shopping centers cover an area of 19,397 m2 (2 centers), and marketplaces cover an area of 4,528 m2 (1 market). In 2009, there were 475 manufacturing companies in Cheongju. Although this is an increase of 45 companies over 2001, there was a decrease in the number of workers. The Cheongju industrial complex houses 183 companies, many of them in the metal-assembly industry. The farm household population steadily decreased from 2001 to 2005, but it has increased since 2006. However, the area of agricultural land decreased from 4,431 ha in 2004 to 4,005 ha in 2009. Electric power consumption (8,299,311 MWh) and liquefied natural gas consumption (239,628,000 m2) steadily increased from 2004 to 2009.

There are 223 education facilities in Cheongju City: 3 universities, 16 graduate schools, 95 kindergartens, 54 elementary schools, 28 middle schools, and 27 high schools. There are three public libraries, and each university has one library. The number of private education facilities increases every year, but the number of teachers decreases annually. Cheongju City has 20 cultural facilities, 20% of the total cultural facilities in Chungcheongbuk-do. There are 179 appointed cultural assets in Cheongju City. The total cultural budget is 31 million won, smaller than that of Chungju City (47 million won), Seongnam City (68 million won), Anyang City (43 million won), and Jeonju City (58 million won).

The population of Cheongju City has increased annually, from 626,614 persons in 2004 to 648,598 persons in 2009. However, the population of the central region of Cheongju City, Seongan-dong and Jungang-dong decreased from 17,414 persons in 2004 to 14,458 persons in 2009. In addition, land the value and the number of companies is decreasing every year. There are 234,047 registered cars and 240,704 households, thereby implying that there is approximately one car per household. Transportation is responsible for 19.7% of the total greenhouse gas emissions in Cheongju City. The population of bus passengers has decreased by 2.13% every year, and the distribution ratio of transportation by bus is just 11%. The greenfield area per person is 48.57 m2, which is higher than some other cities, including Seoul (10.64 m2), Deajeon (34.28 m2), Gwangju (12.59 m2), and Ulsan (38.46 m2). But the park area per person is just 3.04 m2, which is less than the legally required park area per person of 6.0 m2, and less than the area in some other cities, including Ulsan (16.3 m2), Deagu (5.6 m2), and Busan (4.7 m2).

The areas for streams, parks, and conservable green space increased by 0.31%, 26.25%, and 263.57%, respectively. However, productive green space and natural green space decreased by approximately 44.34% and 38.56%, respectively. The overall number of city parks increased, but the area of city parks decreased by up to 44.01%. Air pollution, water pollution, and noise and vibration pollution decreased by up to 20.45%, 5.24%, and 15.78%, respectively. There are two representative governance organizations: and The Council for Building a Residentially Desired Cheongju City. These organizations engage in businesses-related sustainable development and improve quality of life, redefine urban identity and symbolism, analyze directions for development, determine policy direction, and create strategies. Further, it must be mentioned that no large-scale disaster (flood, typhoon, etc.) has occurred in Cheongju City.

The distribution industry in Cheongju involves a central structure of large distribution companies; thus, conventional distributors and markets find it difficult to compete. The use of automatic manufacturing systems has led to job shortages in the manufacturing industry. Although the farm household population has increased, the agricultural industry is barely developing because of decreasing agriculture profits, free-trade agreements (FTA), and a decreasing output of agricultural products because of the decreasing amount of agricultural land. Electricity and gas are the main sources of power.

In Cheongju, there is a full lifestyle and welfare infrastructure, but the local government does not enforce an equal employment policy based on local characteristics. Therefore, the low-income class is barely employed. Moreover, there is no coordination between related welfare facilities for elderly people, and although the variety of services is increasing, omissions and overlaps of service occur between welfare facilities for children and those for the disabled.

Table 2 *Issues in Cheongju City*

Aspect	Issues
Regional Economy	A structure of distribution by large supermarkets
	Reducing job for local residents
	Agriculture decline by decreasing a agricultural population
	Consumption dependence on fossil fuels
Life and welfare	Lack of employment policy for a weak class
	Lack of co-operation between welfare organization
	Gaps and overlaps among service units
Education and Culture	Lack of education infrastructure
	Insufficient connectivity among cultural resources
City and Transportation	CBD decline
	1 vehicle per 1 household
	Reducing the ratio of public vehicle use
	Lack of park area per person
Ecology and Environment	Lack of program on ecological resources
	Fragmentation of green space and low ratio of stream resource use
	Lack of Citizen's practice
Green Foundation	Lack of cooperation among divisions
	Disaster preparedness

The educational infrastructure in Cheongju City does not serve the needs of every citizen. Classrooms are too small. Furthermore, there are few public libraries. Although the university libraries are open to the public, the rate of use is low. The cultural infrastructure is reasonably strong, but connectivity among cultural resources is weak. The low cultural budget compared to other cities is also.

The central business districts in Seongan-dong and Joongang-dong, the old downtown of Cheongju City, have begun to decline. The number of registered vehicles is increasing annually, so the use ratio of public transportation decreases every year. Moreover, the area of park per person is less than the legal requirement and less than some other cities.

The ecological environment in Cheongju City has improved. However, despite strong infrastructure, there is a lack of variety in . Most efforts to preserve the environment are handled by the local government, so local residents should participate and be interested in such efforts. Green space is plentiful, but green areas are fragmented. Although there is an abundant stream of water, it has not been put to effective use.

Most public officials are older, long-serving employees. This means that there are a number of veteran public officials working for Cheongju City, but there is another side to this. This structure leads to an inflexible business process based on long-term experience. Because two governance organizations conduct similar businesses, Cheongju City needs to establish an upper governance organization to them. Finally, Cheongju City is relatively safe from large-scale disasters, but unpredicted disasters based on climate change must be prepared for.

3. Methodology

3.1 Urban Governance

The international importance of participatory approaches was exemplified by Agenda 21, a document signed at the 1992 Earth Summit in Rio de Janeiro, stating that "broad public participation in decision making was a fundamental prerequisite for the achievement of sustainable development" (The Melbourne principles for sustainable cities included participation and governance (UNEP, 2002). Sustainable cities have to promote the participation of connected people and sustainable improvement based on good governance. Good governance is accomplished through broad participation of all groups in governance, incentives to encourage probity and performance, review mechanisms, building service delivery capacity, transparency, and efficient revenue generation and financial management (Rakodi, 2003). The discussion on participatory urban governance assumes that the government works together with other types of organizations —civil society organizations as well as the private sector— in different forms of multi-stakeholder arrangements in order to attain public policy goals (Baud and Dhanalakshmi, 2007) - Figure 1.

In order ensure the participation of various stakeholders and to develop policies, a participatory council called the "Policy Planning Corps for a Green City" was created comprising local government, professional, and civil society organizations. This mutual agreement between governance organizations can be considered a private-public collaboration. The council played an important role in the co-ownership and dissemination of the concept and value of a green city. During implementation and creation of green city policies, the corps consisted of public participants (public officers) -who were responsible for putting the policies into action– and other participants (from professional and civil society), who could come up with creative policies at a one-to-one ratio. Thus, the corps had 10 public officers, 3 professionals, and 8 civic group activists. Because of the structure of this organization, planning and implementation could happen simultaneously. The corps divided its activities into six groups: regional economy, life welfare, education and culture, city and transportation, ecology and environment, and green foundation. These classifications were founded on the following objectives: promotion of regional economy, social welfare creating happiness among citizens, development of education and culture in order to realize the dream of a creating a prestigious city and environment, and open administration working in cooperation with citizens. Emphasizing As shown in Table 3 these groups could cover all 25 posts in the municipal office.

The master plan included a concept and vision, value indicators, and policies. Based on the participatory structure of the organization, this study describes the process of creating a transition master plan for a green city. The value indicators and policies were derived from the concept and vision. The concept and vision were able to be easily understood through bottom-up and top-down methods. The former presented concept and vision, value and strategies, and policies, in that order. The latter presented strategies and policies, value and concept, and vision, in that order. Most importantly, the corps focused on communizing concept and value. Agreement within the corps was needed before seeking consensus from citizens. Thus, this study employed various participatory methodologies, such as workshops, brainstorming sessions, surveys, group discussion, meetings, and so on. These methods were used to create a consensus and develop strategies and policies. The basic process was that a particular member stated his or her personal opinions, followed by brainstorming and discussion; thereafter these opinions were collected and a group workshop/ discussion and corps' meeting/discussion was held in order to determine the group's stances. Reaching a broad consensus, we used a feedback system in the basic process. Additionally, a survey was employed, using analytic hierarchy process (AHP) and suitability for value indicators and policies, in order to determine the weights of value indicators and priorities for policies in the process of developing strategies and policies.

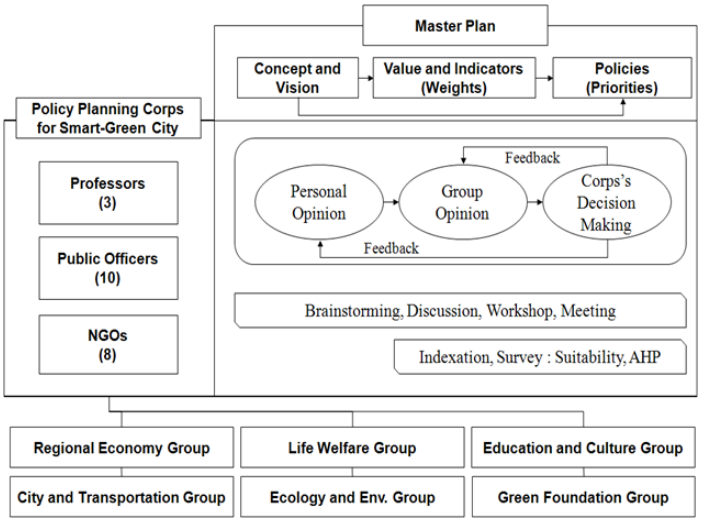

Figure 1 Structure and Process of Urban Governance for Green City's Transition Master Plan

Developing creative and original policies for Cheongju City was a very important issue in this plan because not only was there a public sector requirement to create drastic policies, but these policies were also required to be different from the policies implemented continuously in the local administration. Thus, the corps approached from two directions, developing creative policies for the organization and creating guidelines for the policies that were still being implemented in each department. The policies were based on the present condition and characteristics of Cheongju City.

3.2 *Green City Index*

In this study, the policy priorities were selected through policy evaluation. In order to achieve this, it is first necessary to index indicators; therefore, we applied an AHP method for this purpose. Indexing is an operation that expresses indicators evaluated by various resources as only one figure (Kangwon National University and Korea Forest Research Institute, 2006), and includes four steps (Chung and Lee, 2003): selection of variables, selection of indicators, normalization, and aggregation. Normalization means standardizing a sector index by measuring indicators and using a linear function, a nonlinear function, and so on (Ban et al., 2009). Aggregation is a process that deducts an index through addition, multiplication, and minimum and maximum functions using sector index and weight (Ban et al., 2009). AHP was used to set weights in the process of deduction of the green city index. After calculating every section index for the green city, all items were integrated into an index. "I," the index of all items, are approximated by the following formula (Chung et al., 2003).

Table 3 *Classification of Cheongju City Hall Administrative Department by the Sectors*

Sector	Cheongju City Hall Administrative Department
Regional Economy	Department of Economics Department of Enterprise Support Department of Taxes, Department of Accounting Department of Agricultural Policy Department of Cleaning Administration
Life Welfare	Department of Citizens' Welfare Department of Family and Women Department of Sanitation
Education and Culture	Department of Culture and Tourism Department of P/E and Youth Department of Information & Telecommunication
City and Transportation	Department of City Planning Department of City Development Department of Urban Regeneration Department of Architectural Design Department of Roads Department of Transportation and Administration Department of Natural Disaster Control
Ecology and Environment	Department of Environment Department of Park in Greens Department of Water Purity Control
Green Foundation	Department of the General Affairs Department of Planning and Budget Department of Self-governing Administration

$$I=g(I_1,I_2,\ \ldots,\ I_n)$$

The aggregated index is classified into additive, multiplication, and minimum and maximum functions (Kangwon National University et al., 2006). An additive function, the simplest, is applied in this study (Chung et al., 2003). In order to make up for the weak point that an all-items index is overestimated, an additive function may multiply by a weight so that the sum total is 1 (Chung et al., 2003).

As mentioned earlier, we used the AHP method to deduct the weights of indicators. the father of the AHP method, defined AHP as a multiple-criteria decision model to express the problem of decision making and develop preference for an alternative. Although the AHP procedure is simple, its various techniques used in the selection of criteria, calculation of weight, and sensitivity analysis exploit methods adopted by empirical research and a strict verification process. For this reason, it is judged to be a method in theory (Cho et al., 2003). The following formula is the general form of an additive function with a weight, where SGC is sector index of green city.

$$SGC=W_i\times I_i$$

Assessment for measuring the indicators needs to use a survey-type evaluation for conformity assessment. The reasonable valuation basis will be applied in order to secure the objectivity and reliability of assessment, as well as the convenience needed to evaluate rationally.

In order to secure the convenience and simplicity of assessment, we considered the approach in stages.

- First stage: We evaluated 50 indicators (total 150 evaluations) using superordinate value and indicator by priority (suitability, effectiveness, and futurity). Then, indicators were sorted into three types: core (top 20), weighted (ranking 21–40), and backup (ranking 41–50) projects.
- Second stage: We evaluated core projects accurately using the bottom nine indicators (180 evaluations in total). They were

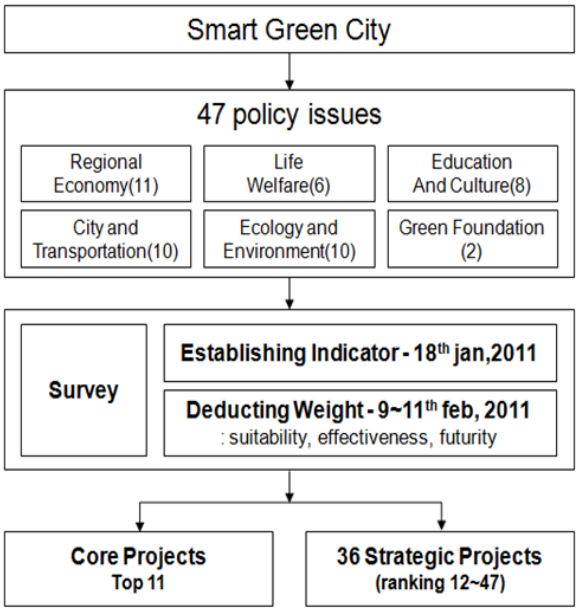

Figure 2 *The Process of Establishing Indicator and Deducting Weight*

classified into core symbolic (top 10) and core strategic (ranking 11–21) projects.

In order to deduct the weight of the value and indicator for policy evaluation of the green city, the AHP survey was conducted over two phrases: an indicator survey was conducted on January 18, 2011, and a survey on deducting weight was conducted from February 9 to 11, 2011, targeting (3 professionals, 10 public officers, 8 NGO staff) of the Policy Planning Corps for Green City.

Figure 2 presents the details of the survey. First, the indicator survey was conducted using 6 groups (and 47 policy issues): regional economy (11), life welfare (6), education and culture (8), city and transportation (10), ecology and environment (10), and green foundation (2). The survey on deducting weight addressed suitability, effectiveness and futurity.

We selected policy issue priorities through these surveys. As a result, we suggested 11 core projects based on the top 2 issues in each group (green foundation top 1 issue), and 36 strategic projects 36 with rankings in the range 12–47.

4. Results and Discussions

4.1 Basic Purpose of the Green City

The basic purpose of the green city is to create a transition to a sustainable green society. This requires a sustainable green transition of the economy, society, and environment through the principles of the ecosystem (circulation, symbiosis, balance). In part, it seeks transition to a community-circulation economy (economy), communal lifestyle (society), and green space (environment); altogether, it aims to improve quality of space and life in response to climate change.

4.2 Green City Concept

Table 4 presents the key for each of the determinants of the concept of the green city. The key phrase for regional economy is "a sustainable and balanced city." The key phrase for life and welfare is "a society providing humanity with a fair chance." The key phrase for education and culture is "reinstating community culture and improving quality of life." The key phrase for city and transportation is "harmony between a clean environment and high-tech." The key phrase for ecology and the environment is "a leading role in sustainable development."

The expert-identified research concepts for the green city are primarily improving quality of life and space, recovering community, leading the response to climate change, the coexistence of nature and humans, and harmony between the economy and the environment. Overall, the final research concept statement is: "The green city is a city seeking transition from a traditional city paradigm to a sustainable city paradigm based on such principles of nature as circulation, coexistence, and balance to respond to the exploitation and degeneration of nature and the local community by human beings and due to climate change, helping both present and future citizens live together in comfort and harmony (Table 5).

The expert-identified concepts for popularizing the idea of the green city were primarily "pleasant" and "harmony". Taken them altogether, the final concept is "Pleasant Environment, Rich Life, Harmonious Community".

4.3 Green City Strategies

Table 4 *Key words for Green City Concept*

Sector	Key words				
Regional Economy	Sustainability	Cultural Diversity	Understanding Society	Environmental Justice	Balanced Society
	Low-carbon City	Pedestrian City	Economic Dynamism	Bicycle City	
Life Welfare	Crisis and Opportunity	Maximization of Effectiveness	Fast Food/Slow Food (inconvenience)	Drum and Wood Fire	SF Movie
	Growing Gap	Vicious Circle/Posteriori/ Welfare	Restriction / Cultural Movement	Humanity	Earth
Education and Culture	Sustainability	Future Expansion	Climate Change	Smart	Quality of Life
	Governance	Environmental Preservation	Community	Software	Quality of Space
City and Transport	Happiness	Ecology, Nature	Clean	Public Transportation	Environment
	Sustainability	Storytelling	Well-being	Citizen Participation	Smart
Clean and Green Environment	Climate Change	Future	Sustainable Development	Ecological Culture	Win-win Life / Community
	Leading City	Green / Clean	Pleasant / Rich	Leading Response	

Table 5 *Concept of Green City for Research*

Creating the greatest livable city by improving quality of life (economy, education, culture, leisure, customized welfare) and space (life environment, urban environment).
Sustainable millennium clean city and green city seeking transition from a traditional city paradigm to a sustainable city paradigm based on principles of nature such as circulation, coexistence, and balance to respond to the exploitation and degeneration of nature and local community by human beings and due to climate change, enabling both present and future citizens live together in comfort and harmony.
Image of the future of the green city realizing a win-win scenario combining environment and culture in response to climate change and engaging in sustainable local development.
Cleanest and richest city in the country where nature and humans coexist in harmony with the economy and the environment.
Green City (for research)
A city seeking transition from a traditional city paradigm to a sustainable city paradigm based on principles of nature such as circulation, coexistence, and balance in order to respond to the exploitation and degeneration of nature and local community by human beings and due to climate change, enabling both present and future citizens to live together in comfort and harmony.

The purpose of Green City strategies are 'Climate Change' and 'Restoration of Nature and Community'. 10 strategies are selected by the field of sustainability – 'Economy', 'Society', and 'Environment', and the principle of natural ecosystem –'Circulation', 'Coexistence', and 'Balance'. Main contents of 10 strategies are building circular networks, balanced development, community system, low energy and environmental justice (Figure 3).

The process of creating strategies and policies for the green city involved the following four stages. In the first stage, 18 problems were drawn from 6 aspects: regional economy, life welfare, education and culture, city and transportation, ecology and environment, and green foundation. In the second stage, we established 10 strategies for a green city. In the third stage, we drawn 18 detailed strategies from the earlier steps. In the fourth stage, policies for the green city were deduced using problems and strategies (Figure 4).

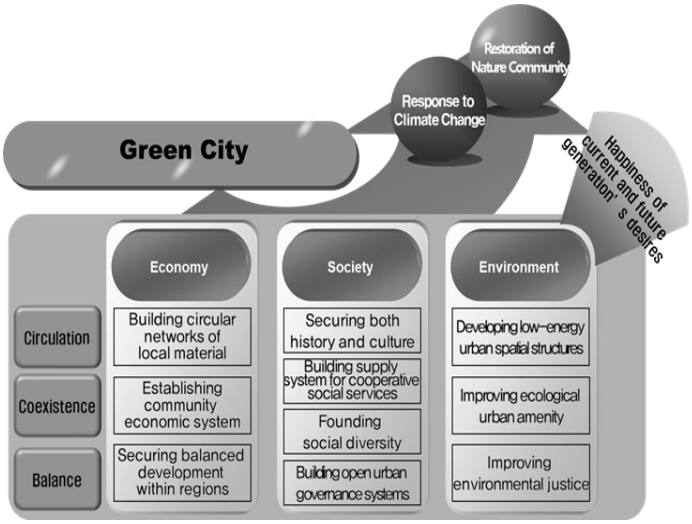

Figure 3 *Strategies for Transition toward Green City*

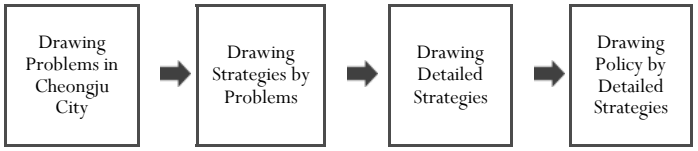

Figure 4 *Drawing Detailed Strategies and Policy of Green City*

Detailed strategies of Green City are drawn 18 through problems of each part. Main contents are establishing local economy vitalizations policy, specialization business of renewable energy, creating job for women and low-income class, an expansion of social service, establishing a connectivity program between cultural resources, an enforcement of transportation demand managements, making a green environment program, establishing a green network and blue network, and making an organic cooperation between divisions (Table 6).

4.4 Green City Value (Index) and Policy

A green city is associated with the following concepts: suitability (preserving ecology, actualizing justice, and retaining local identity), effectivity (symbolism, participation and cooperation, and effectiveness), and the future (transplantability, sustainability, and creativity). The weights of the concepts are 0.23, 0.29, and 0.48, respectively.

More specifically, the following are the weights of each of the components of each concept. For suitability, preserving ecology, actualizing justice, and retaining local identity are weighted at 0.42, 0.33, and 0.25, respectively. For effectiveness, symbolism, participation and cooperation, and effectiveness are weighted at 0.38, 0.35, and 0.25, respectively. For the future, transplantability, sustainability, and creativity are weighted at 0.23, 0.29, and 0.48, respectively.

Regional economy comprises 11 policies that deal with local economy vitalization, creating jobs, urban agriculture and local food, renewable energy businesses, etc. From among these, the core assessments are

Table 6 *Sectoral Issues and Strategies*

Sector	Issues	Strategies
Regional Economy	A structure of distribution by large supermarkets	Establishing local economy vitalizations policy
	Reducing job for local residents	Implementation of making job policy
	Agriculture decline by decreasing a agricultural population	Establishing a urban agriculture and local food system
	Consumption dependence on fossil fuels	Specialization business of renewable energy
Welfare	Lacking employment policy for a weak class	Creating job for women and low-income class
	A shortage of organic cooperation between welfare organization	Establishing a welfare infrastructure
	A omission and overlap among service	A expansion of social service
Education and Culture	A shortage of education infrastructure	Expansion of education infrastructure and service
	Low connectivity between cultural resources	Establishing a connectivity program between cultural resources
City and Transportation	CBD decline	Operating sustainable urban regeneration program
	1 vehicle per 1 household	A enforcement of transportation demand managements
	Reducing a ratio of public vehicle use	A vitalizations of green public vehicle
	Lacking a area of park per person	Establishing a living -closed park
Ecology and Environment	Shortage of program using ecological resources	Making a green environment program.
	A fragmentation of green space and low ratio of stream resource use	Establishing a green network and blue network
	Lacking a citizen practice	Making a environmental program for citizen practice
Green Foundation	Shortage of cooperation between divisions	Making a organic cooperation between divisions
	Preparing for a disaster	Making a safe Cheongju City

creating circular networks of local material (Index 6.183) and establishing a local energy master plan (Index 5.999) as shown in Table 7.

Life welfare comprises six policies dealing with creating jobs for women and low-income people, welfare infrastructure, social services, etc. From among these, the core assessments are creating 24-hour child-care institutions and jobs for women (Index 6.179) and managing the evaluation of social welfare (Index 5.941). It is shown in Table 8.

Education and culture comprises eight policies dealing with education infrastructure and service and connectivity programs among cultural resources, etc. From among these, the core assessments are the Jeongbukdong earthen ramparts refurbishment project (Index 0.959)

Table 7 *Regional Economy Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Securing balanced development within regions	Establishing local economy vitalization policy	Promoting urban industrial cluster	5.382	7	
		Promoting and hosting green industry	5.497	6	
		Creating green industrial park	5.173	8	
		In-depth diagnosis of urban economy in Cheonju City	4.957	10	
		Building circular networks of local material	6.183	1	Core
		Building marketing system of local food	5.889	3	
		Vitalizing local money in Cheongju City	4.842	11	
Establishing community economic system	Implementation of making job policy	Leading policy for employment in the area	5.887	4	
Building circular networks of local material	Establishing a urban agriculture and local food system	Urban agriculture	5.125	9	
	Specialization business of renewable energy	Establishing local energy master plan	5.999	2	Core
		Specialized business of new and renewable energy	5.625	5	

and supporting the revitalization of a small-scale concert hall (Index 5.940) - Table 9.

City and transportation comprises seven policies dealing with sustainable urban regeneration, transportation demand management, green public

Table 8 *Welfare Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Establishing community economic system (Economy)	Creating job for women and low-income class	Child-care institution on job creating for women in the 24-hour	6.179	1	Core
Building supply system for cooperative social services (Society)	establishing a welfare infrastructure	Building local safety net at welfare blind spot using representative	5.910	3	
		Connecting medical resources network to established chronic disease management system for old-aged people in region	5.473	5	
	A expansion of social service	Managing effect evaluation of social welfare	5.941	2	Core
		Management project for elderly health	5.669	4	
		Supporting shuttle bus for migratory possibilities of handicap	5.455	6	

Table 9 *Education and Culture Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Founding social diversity	A expansion of education infrastructure and service	Supporting revitalization of mini library and school	5.671	5	
		Managing tentatively named 'green Cheongju school'	5.774	4	
Securing both history and culture	Establishing a connectivity program between cultural resources	Building new complex cultural landmark	5.399	6	
		Jeongbukdong earthen ramparts refurbishment project	5.959	1	Core
		Supporting revitalization of small scale concert hall	5.940	2	Core
		Expanded implementing culture voucher project	5.805	3	
		Project of cultural integration in Cheonju City and Cheongwon-gun	5.361	7	
		Participated art landscape project	5.318	8	

Table 10 *City and Transportation Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Securing balanced development within regions	Operating sustainable urban regeneration program	Establishing sustainable urban regeneration master plan	6.180	4	
Developing low-energy urban spatial structures	Enforcement of transportation demand managements	Creating restricted public transportation district of Sangdang-ro and Sajigno	5.768	10	
		Operating car-free streets	6.437	2	Core
		Introducing SMART public traffic management	5.942	6	
	A vitalization of green public vehicle	Building commuting system for bicycle in Cheongju City	5.780	9	
Improving ecological urban amenity	Establishing a living -closed park	Creating clean and safety playground	5.768	10	
		Creating Cheongju park	5.895	8	

vehicles, and parks, etc. From among these, the core assessment is creating car-free streets (Index 6.437) - Table 10.

Ecology and environment comprises 12 policies dealing with creating a green environment, a green and blue network, and environmental programs for citizens, etc. From among these, the core assessments are the Moosim-chon river and forests (Index 6.563), mapping biotopes and the climate (Index 6.4415), and creating 1,000 pocket parks (Index 6.390) - Table 11.

Table 11 *Ecology and Environment Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Improving ecological urban amenity	*Making a green environment program.*	Mapping biotope and climate	6.441	1	Core
		Preparing design guideline for carbon-neutral	5.920	7	
		Beautiful signboard improvement project	5.780	9	
		Establishing Green City civic environmental center	5.555	8	
	Establishing a green network and blue network	Building Moosim-chon, river of life and citizens' forests	6.563	1	Core
		Creating environmental circulation green model complex	5.966	5	
		1000 pocket parks	6.390	2	Core
		Creating amphibians complex	5.746	7	
		Making ecological stream in Miho	5.367	9	
Building open urban governance systems	*Making a environmental program for citizen practice*	Citizen's practice project for reducing CO2	6.319	3	
		Green mileage program	6.245	4	
		'Green City' symbolization project	5.874	6	

Table 12 *Green Foundation Sector*

Issues	Strategies	Policies	Index	Local Level	Assessment
Building open urban governance systems	*Making a organic cooperation between divisions*	Diagnosis and innovation of administration system	6.543	1	Core
		Cheongju Development Institute	5.814	3	
Improving environmental justice	*Making a safe Cheongju City*	Safety Cheongju City project	6.366	2	

Green foundation comprises three policies dealing with organic cooperation between divisions to create a safe city, etc. From among these, the core assessment is the creation of an innovative administration system (Index 6.543) - Table 12.

5. Conclusions

Cheongju has prepared for transition from a traditional city to a sustainable one. In order to address this subject effectively, it is necessary to build consensus on the direction and create a comprehensive transition master plan in accordance with the economy, society, and environment sectors of the city. Securing efficiency of policy implementation requires policy prioritization because there are limited resources in terms of finance, manpower, materials, and so on.

The aim of this study was to create a comprehensive transition master plan and determine policy priorities using governance and an AHP methodology in Cheongju city, Korea. In order to create a comprehensive plan for a green city, this study developed a basic direction, concept, vision, strategy, values, and indicators. These factors were derived from participatory governance structures and processes such as workshops, discussions, meetings, brainstorming, surveys, and so on. Based on this work, the core concept of the plan is a city seeking transition from a traditional city paradigm to a sustainable city paradigm based on principles of nature such as circulation, coexistence, and balance in order to respond to the exploitation and degeneration of nature and local community by human beings and due to climate change, enabling both present and future citizens to live together in comfort and harmony. Based on this concept, this study developed values and indicators to assess the purpose of a green city through an expert-evaluated AHP survey method and determine priorities for the policies and values of the green city on the basis of the evaluation results. The vision and strategies were derived by applying the above principles to the economy, society, and environment as subsectors of the city based on consecutive group discussions among various stakeholders, including professors, NGOs, and local government officials, over several months. The vision involved 10 strategies: creating circular networks of local material, establishing a community economic system, securing balanced development within regions, securing both history and culture, creating a supply system for cooperative social services, founding social diversity, creating open urban governance systems, developing low-energy urban spatial structures, and improving ecological urban amenities and environmental justice. The following were the objectives of each Sector:

- Local economy: Creating a balanced local economy.
- Life and welfare: Providing universal welfare to guarantee a healthy life.
- Education and culture: Building a creative cultural city.
- City and transportation: Changing grey spaces to green spaces.
- Ecology and environment: Conserving a clean and green environment and responding to climate change.
- Green foundation: Laying the foundation for a green city.

Finally, this study determined policy priorities on the basis of the evaluation of the green city values of each policy. The top five policies were the conservation of Moosim-chon river and forests, creation of an innovative administration system, mapping biotopes and the climate, creating car-free streets, and creating 1,000 pocket parks.

Thus, this plan encompasses the economy, society, and environment issues of sustainable development through consideration of the regional economy, life and welfare, education and culture, green foundation, city and transportation, and ecology and environment. It used a participatory governance approach that includes professors and local governmental officials involved in these sectors. However, it is unlikely that there will be consensus among citizens regarding the green city. The city administration and Policy Planning Corps for a Green City are going to move forward with the plan through mutual consultation with the citizens. Greening the promotion policies in Cheongju city will be one of the most important issues.

References:

Ban, Yong-Un, Lee, Yong-Hoon, Na, Sang-Il, Youn, Joong-Shuk, Beak, Jong-In., (2009). Evaluating Objective Landscape of Rural Region Using Additive Integration Index Calculation Model – Focused on Seondong Resion, Gochang-Gun, Jeollabuk-do, Korea -, Journal *of the Korean Institute of Landscape Architecture*, 37(3):69-81

Ban, Yong-Un. et al, (2011). Urban Planning Strategies in Integrated Response to Climate Change through Expert Survey. *Seoul Studies*. 12 (4): 41-64

Falloon, P. and Betts, R., (2009). Climate impacts on European agriculture and water management in the context of adaptation and mitigation-The importance of an integrated approach. *Science of the Total Environment*. doi: 10.1016/j.schitotenv. 2009.05.002.

Girardet, H., (1999). *Creating sustainable cities,* Schumacher briefing, Bristol: Green Books, Schumacher Society.

Hawkins, C. V. and X. H. Wang, (2012). Sustainable Development Governance: Citizen Participation and Support Networks in Local Sustainability Initiatives. *Public Works Management and Policy* 17(1): 7-29.

Kangwon National University, Korea Forest Research Institute(2006), *Development of the indicator and indices for the sustainable forest management*, Ministry of Food, Agriculture, Forestry and Fisheries.

Keun Tae Cho, Yong Gon Cho, Hyun Soo Kang (2003). *Analytic Hierarchy Process*, Donghyun Publishing Co.,Ltd

Roy, M., (2009). Planning for sustainable urbanisation in fast growing cities: Mitigation and adaptation issues addressed in Dhaka, Bangladesh. *Habitat International*. 33:276-286.

Saaty TL. (1980). *The analytic hierarchy process*. New York: McGrawHill, 1980.

Saaty TL. (1985). Decision making for leaders. Belmont, California: Life Time Leaning Publications.

Saaty TL. (1990). How to make a decision: the analytic hierarchy process. *European Journal of Operational Research*, 48:9-26.

Saaty TL, Kearns KP(1991) . *Analytical planning: the organization of systems*, Pergamon Press.

UNFPA(United Nations Population Fund). (2007). State of world population 2007. UNFPA.

Wende, W., Huelsmann, W., Marty, M., Penn-Bressel, G., and Bobylev, N., (2010). Climate protection and compact urban structure in spatial planning and local construction plands in Germany. *Land Use Policy*, 27: 864-868.

Xiao, L., X. Li, et al., (2011). Integrating climate change adaptation and mitigation into sustainable development planning for Lijiang City. *International Journal of Sustainable Development and World Ecology* 18(6): 515-522.

Yazar, K. H. and O. M. Dede., (2012). Sustainable urban planning in developed countries: Lessons for Turkey. International *Journal of Sustainable Development and Planning* 7(1): 26-47.

Young Keun Chung, Jun Lee (2003), *Indexation of Sustainable Development Indicators,* Korea Environment Institute.