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Optimization of Green Open Space in Urban Areas Based on Local Wisdom in Medan City

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ABSTRACT

Local Wisdom is a local efficient legacy to green movement, but The Green City concept is complicated regulations in Indonesia. The goverment has contributed to the priority its program. On stipulated regulation the Minister of Home Affairs Instruction number 14 on 1998 that Green Open Space (RTH) is spaces within the city or wider area both in the form of elongated areas / lanes which more open in nature with basically no buildings which functions as urban parks, urban forests, urban recreation, sports activities, cemeteries, agriculture, green lanes and green yards. There are several problems in realizing urban areas using Green City parameters. Among these problems are an increase in the population in urban areas (urbanization), a decline in the quality of the urban environment that brings various consequences of problems in the city of Medan, including increased urban poverty, traffic congestion, rising sea levels, meeting uneven infrastructure needs, increasingly many slums, and floods. The purpose of this study is to find out how the Urban Environment and its Implementation are in accordance with the parameters of Green Cities (Green Open Space, Green Waste, Green Transportation, Green Water, Green Energy, Green Building, Resilience City), to find out how the principles of Green Cities, and to find out how the policies are in implementing the Green City principles. The method used in this research is descriptive-explorative-qualitative research combined with comparative methods, descriptive-explorative research is carried out by survey and library research methods while the qualitative method is carried out with a case study method that aims to explain the application of Green City parameters in environmental design the cities studied, and the comparative method used to explain the condition of the built urban environment in accordance with the Medan City Medium-Term Development Plan (RPJMD) for 2016-2020 with Green City parameters.

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INTRODUCTION

The concept of Green City development is actually a lot of rules or regulations issued by the Government. One of them is as stated in the Minister of Home Affairs Instruction number 14 of 1998 that Green Open Space (RTH) is spaces within the city or wider area both in the form of elongated areas / pathways in which the use is more open, basically without building which functions as urban parks, urban forests, urban recreation, sports activities, cemeteries, agriculture, green lanes and green yards.

The Green City Mission with more comprehensive consequences that will meet the standards of an environmentally friendly city, has a mission, among others, to utilize effectively and efficiently water and energy resources, reduce waste, implement an integrated transportation system, and ensure environmental health. Green City will have a significant impact on other infrastructure development.

As Koesnadi, 1999 states that development contains major changes, which include changes in economic structure, physical changes in the region, changes in consumption patterns, changes in natural resources and the environment, and changes in the value system. Almost all studies on urban planning published in the form of general urban spatial plans state that the need for open space in cities ranges from 30% to 40%, including the needs for roads, pavement open spaces, lakes, canals and others . This means that the presence of green space that is only 10% to 15% feels still very inadequate. There are several problems in realizing urban areas using Green City parameters.

Among them are an increase in population in urban areas (urbanization), a decline in the quality of the urban environment that brings various consequences of problems in Medan namely increasing urban poverty, traffic congestion, rising sea levels, meeting uneven infrastructure needs, increasing number of slums, and flood. A number of these problems contribute to increasing the effects of global warming (climate change). The concept of developing Green Cities is one of the solutions offered as a contribution to solving the problem of climate change that can be done through adaptation and mitigation actions.

The Green City Vision implemented in the Municipality of Medan will have a significant impact on city residents. According to Correa (1988), the research says that if green space is abstracted into the need for social matters, it can be reflected in 3 (three) main elements, namely: a. Family room used for personal needs; b. Area to socialize / socialize neighbors; c. Areas for citizen meetings. The Medan Green City Mission is expected to not only 'green' the city. Moreover, the Green City with its broader and more comprehensive vision, which is an environmentally friendly city, has a mission including green open space, utilizing effectively and efficiently water resources (green water) and energy (green energy), reducing waste (green waste), implement an integrated transportation system (green transportation), guarantee the existence of an environmentally friendly building (green building), guarantee the health of the residence (green residence), and synergize the natural and artificial environment, based on city planning and design that is in favor of the principles the principle of sustainable development in a balanced social and economic environment.

Green Building, namely the application of energy-efficient green buildings that include green waste, green transportation, green water, green energy, and green building are attributes that we often refer to as green infrastructure. Therefore the problem formulation of this study refers to the limitation of the problem formulation of how the Urban Environment and its Implementation are in accordance with the parameters of Green Cities (Green Open Space, Green Waste, Green Transportation, Green Water, Green Energy, Green Building, Green Resilience).

THEORITICAL FRAMEWORK

Green Cities Concept

The Green City Mission with more comprehensive consequences that will meet the standards of an environmentally friendly city, has a mission, among others, to utilize effectively and efficiently water and energy resources, reduce waste, implement an integrated transportation system, and ensure environmental health. Green City will have a significant impact on other infrastructure development. As Koesnadi, 1999 states that development contains major changes, which include changes in economic structure, physical changes in the region, changes in consumption patterns, changes in natural resources and the environment, and changes in the value system.

There are several problems in realizing urban areas using Green City parameters. Among them are an increase in population in urban areas (urbanization), a decline in the quality of the urban environment that brings various consequences of problems in Medan namely increasing urban poverty, traffic congestion, rising sea levels, meeting uneven infrastructure needs, increasing number of slums, and flood. A number of these problems contribute to increasing the effects of global warming (climate change).

The concept of developing Green Cities is one of the solutions offered as a contribution to solving the problem of climate change that can be done through adaptation and mitigation actions. Moreover, the Green City with its broader and more comprehensive vision, which is an environmentally friendly city, has a mission including green open space, utilizing effectively and efficiently water resources (green water) and energy (green energy), reducing waste (green waste), implement an integrated transportation system (green transportation), guarantee the existence of an environmentally friendly building (green building), guarantee the health of the residence (green residence), and synergize the natural and artificial environment, based on city planning and design that is in favor of the principles the principle of sustainable development in a balanced social and economic environment.

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Urban Environment and Infrastructure, To equate basic or initial perceptions, it is necessary to conduct a literature study related to the topics to be discussed:Urban Environment is an artificial environment created by humans that aims to fulfill their daily needs. Another understanding, is a residential area that is physically shown by a collection of houses that dominate the spatial layout and have various facilities to support the lives of its citizens independently. Understanding of the City according to Prof. Drs. R. Bintarto, Kota is a network system of human life with high population density, heterogeneous economic strata, and materialistic patterns of life. Several definitions of infrastructure have been submitted by several experts, including: According to Grigg (1988), Infrastructure is a physical system that provides transportation, drainage, irrigation, buildings and other public facilities, where these facilities are needed to meet various basic human needs both economic and social needs.

Six broad categories of infrastructure according to Grigg: 1) Road groups (roads, highways, bridges); 2) Transportation service groups (transit, railroad, harbor, airport); 3) Water groups (clean water, dirty water, all water systems, including waterways); 4) Waste management group (solid waste management system); 5) Groups of buildings and outdoor sports facilities; 6) Energy production and distribution group (electricity and gas)

Another understanding that can be used as a reference in this study is according to Kodoatie (2005) that Infrastructure is a system that supports social systems and economic systems as well as a liaison with environmental systems, where this system is used as a basis for making policies. Urban infrastructure development is one of the main aspects of development. Therefore the responsibility of the government to provide, implement and evaluate urban infrastructure. One of the urban infrastructure is transportation infrastructure, which is infrastructure that supports as well as is useful for the survival of the users of transportation equipment. Good infrastructure should be able to provide security as well as comfort for its passengers. Examples of transportation infrastructure are: stations, ports, highways, highways, traffic signs, airports, etc. Green Infrastructure is a spatial planning concept that applies environmentally friendly infrastructure. Environmentally friendly infrastructure means that the infrastructure does not damage the environment and does not interfere with the natural cycle of materials in the environment (EEA, 2001). Green Infrastructure Criteria, There are patterns that must be met in the Green Infrastructure criteria :

The ecological security pattern (ESP) for each city can be different depending on the city's environmental problems. The ecological security pattern of the city consists of security patterns against water and flood problems, air, geological disasters, biodiversity, cultural heritage, and recreation.

The pattern of water and flood security (flood and stormwater security pattern) is related to hydrological processes, such as run off, infiltration areas, and catchment areas.

The pattern of air security (air security pattern) is associated with efforts to improve air quality so that city air remains fresh, uncontaminated, and healthy for residents. Areas with high air pollution potential are the priority in providing green space to control air pollution, especially in the transportation sector. Green lane roads and industrial areas are the main focus of determining the urban green space pattern.

The pattern of geological disaster security (geological disaster security pattern) relates to the control of areas prone to landslides, subsidence of land (surface / surface subsidence), geological fault areas and other areas prone to geological disasters.

Biodiversity security patterns (biodiversity security patterns) are associated with the conservation of various species and habitats where they can live. Land suitability for the habitat of various species and the determination of areas to be conserved are the main focus so that urban spatial planning still provides opportunities for biological diversity.

The pattern of securing cultural heritage (cultural heritage security pattern) relates to the conservation of cultural sites (heritage sites), such as cultural heritage buildings and landscape areas of cultural heritage (landscape heritage).

The recreational security pattern relates to places that have social functions and recreational values for city residents. Urban parks, neighborhood parks, recreational parks, cemetery parks, areas with beautiful views, areas with unique natural features, and Green City Principle, green city when viewed from the perspective of Green Architecture or 'green architecture' is an interesting topic at the moment, one of which is because of the need to balance and empower potential sites and save Natural Resources (SDA) due to the depletion of non-renewable energy sources. Various ideas and interpretations of architects appear differently, each of which is caused by contact with the conditions of the profession they face. Green architecture is an architectural concept that seeks to minimize adverse effects on the natural and human environment and produce a better and healthier place to live, which is done by utilizing energy sources and natural resources efficiently and optimally.

There are three Green City principles as follows: 1) Conserving energy: Operation of the building must minimize the use of fuel or electricity (maximizing natural energy as much as possible around the building location); 2) Attention to climate conditions : Designing buildings must be based on the prevailing climate at our site, and the available energy sources: 3) Minimizing new resources: design optimized the needs of new natural resources, so that these resources are not used up and can be used in the future. The use

of building materials that are not harmful to the ecosystem and natural resources.

Green City Attributes, in organizing and preparing for the Green City there are 8 attributes that must be met and implemented, namely: 1.Green Planning and Design. Planning and Designing that are sensitive to green programs.; 2.Green Openspace. Embodiment of quantity quality and urban green open space network.; 3.Green Waste. The application of the 3R principle is reducing waste / waste, developing the recycling process and increasing added value.; 4.Green Transportation. Development of a sustainable transportation system, for example: public transportation, bicycle lanes, etc.; 5.Green Water. Increasing the efficiency of utilization and management of water resources.; 6.Green Energy. Utilization of energy sources that are efficient and environmentally friendly.; 7.Green Building. Implementation of environmentally friendly buildings (saving water, energy, structure, etc.); 8.Green Community. Increased sensitivity, awareness and active role of the community in developing Green City attributes. The overall attributes of the Green City do not stand alone because it is an integral whole in the development of the local ecology-economic-social as a side effect of the manifestation of each attribute.

RESEARCH METHODS

Research on Urban Environmental Assessment and Its Implementation by Using Green City Parameters is a descriptive-explorative-qualitative study combined with comparative methods. Descriptive-explorative research was conducted using survey and library research methods, qualitative methods were carried out with case study methods aimed at explaining the application of Green City parameters in the design of the studied urban environment, while the comparative method was used to explain the condition of the built urban environment in accordance with the Medium-Term Development Plan Medan City Region (RPJMD) Year 2016-2020 with Green City parameters. The scope and boundaries of the study include two things, namely: The scope of the area or research area (adjusted to the related SKPD) that has undertaken urban environmental development; and Scope of research material (directed for mapping or mapping of urban environmental conditions in accordance with the related SKPD).

This study will use a combination of several methods in accordance with the objectives of the study. Yin (2003) explains how to choose research strategies related to the What and How questions. The first research question related to 'what is the condition of the urban environment and its implementation in accordance with the parameters of the Green City' will be sought answers through surveys, field observations (grandtour and minitour) and interviews. The analysis was carried out with a deductive method that rests on the parameters of the Green City to look for the facts in the urban environment under study. The answer to the first question will produce a more complete character of the urban environment and will be used as a tool to recommend Green City application techniques according to the potential of each place / urban environment studied. This method will be used in the first phase of the study. The second question related to how the form of further research recommendations in implementing the Green City principles will be sought by using the control of the answers to the first question through the case study method (Yin, 2003).

The next step, the basic recommendations for decision making or policy in implementing the Green City principles that will use the comparative or comparison method based on the RPJMD and Green City parameters. These methods will be used in the second phase of the study. Data collection methods related to two research questions can refer to Howel (2013), namely through survey techniques, structured interviews according to the control of the results of the first research (especially related to the location of facilities in the urban environment, their function and nature), observations that are parsipatory (involved) and focus on urban environmental groups according to the related SKPD. The method of determining the sample using a purposive method (aiming) ie the urban environment sample chosen as the unit of analysis must be in accordance with the parameters of the Green City. Research Variable Design, The variables in this study can be classified into: 1.Exogenous variables, namely variables that are not predicted by other variables in the model (Ferdinand, 2002: 41). Exogenous variables are also known as source variables or independent variables. In this research, the exogenous variable is Green City (X) consisting of twenty four supporting variables (X1.1-X1.4; X2.1-X2.3; X3.1-X3.4; X4.1-X4.3 ; X5.1-X5.3; X6.1-X6.4) in Appendix 1.; 2.Endogenous variables, namely variables predicted by one or several other variables in the model (Ferdinand, 2002: 43). Endogenous variables in this study are variables that influence when exogenous variables affect endogenous variables (Sekaran, 2003: 91), namely the Environmental Sustainability variable (Y1) consisting of six supporting variables (Y1-Y6) in Appendix 1.

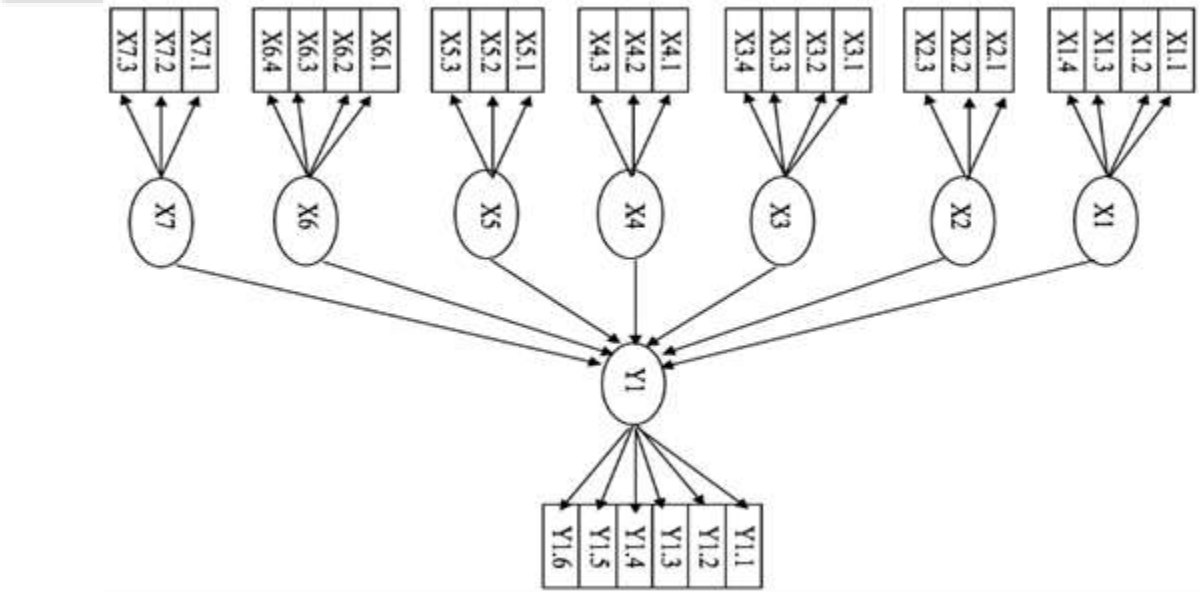

Figure 1. Conceptual framework

RESULTS AND DISCUSSION

Urban green space is an important contributor to sustainable development. For this reason, sensitive planning is needed to improve existing urban green space facilities, and to optimize urban green space policies. There has been a lot of research on the health and welfare benefits of green open space over the past few decades. As previous studies have found that the provision and access to green space or gardens can be associated with longer life expectancy (Takano et al 2002; de Vries et al 2003; Giles, Corti et al. 2005), and provide comfort for stress Aspinall et al 2013). Human activities and urban structures in green space affect species composition due to changes in environmental conditions.

Green open spaces such as parks, reserves and corridors are known to have significant ecological features which provide for the maintenance of species populations and have urban ecological functions (Savard 2000; Sandstrom et al., 2006). Green Open Space in urban areas affects the biodiversity within it as a function of ecological connectivity and the effects developed by an area. Using the green space concept reduces energy costs in building cooling. The main reason for increasing green space and tree planting in urban areas is because plants can increase air circulation and provide shade so that it provides a cooling effect and helps reduce air temperature (V. Heidt and M. Neef, 2008). The following is a tabulation of thirty variables into five question parameters and percentage data distribution.

Based on research that has been done about the condition of the urban green park area in the city of Medan, in general it can be seen that 80% of the community said that the condition of the city park is in a bad condition. This shows that the condition of parks in Medan City is currently not as expected by the community, so people still do not feel comfortable with the condition of city parks in Medan. Only 20% of the people said that the condition of the Medan City Park was good, which means the condition of the Medan City Park was sufficient to make a positive contribution to the community. As many as 82% of the community said that the condition of the city's green recreation areas was in a bad condition. There are 12% of people who say the condition of Medan's recreational green area is good. There are 78% of people who say that the green area of sports activities is in a bad condition. The condition of the green zone sports activities that have not been optimal for the community. This is due to the green area of sports activities that are very minimal. So far, Medan City has not been serious in developing green areas for sports activities. Only 22% of people said that the condition of the green area of Medan's sports activities was already good as in the Merdeka Square and the Green Campus of the University of North Sumatra. Then, there are 83% of people who say that the condition of the city's green belt is in a bad condition and not satisfactory.

This shows that the condition of the urban green belt in the city of Medan is currently still in the process of constructing water drainage channels and green belt that have not been maintained and developed. Around 17% of people who said that the condition of Medan's green lane was already good on the condition of the green lane had not yet supported the optimal concept of a green city. Based on research that has been done about the condition of waste treatment with the principle of reduce, reuse and recycle is still not understood and carried out by the community well and thoroughly. There are 80% of the community who stated that the management of waste or waste with the reduce principle has not really been done. In principle reduce is one solution in protecting the environment around us. This is very cheap and easy to do. For

example using a handkerchief instead of tissue for daily use. Only 20% of the people said that the waste management using the reduce principle had been done well, meaning that only 20% of the people had carried out the reduce principle in reducing waste to the environment. The concept of Reuse is to reuse garbage that can still be used for the same function or other functions. We found that the community was not doing well. There are 81% of the people who state that the processing of waste or waste with a reuse principle is not optimal.

This can be seen from the campaign of environmental friendly principles and green cities to the community. For example, by bringing your own shopping bags when shopping so that it can reduce plastic waste. Recycle is a process of recycling waste or used objects into new goods or products that have beneficial value. By doing recycle, things that were previously useless and become garbage can be processed into new goods that have new benefits and uses. For example processing organic waste into compost. Based on research that has been done about the condition of waste treatment with the principle of recycle still not done well by the community. There are 77% of the people who say that the processing of waste or waste using the recycle principle is sufficiently well done with public awareness of the environment for the future. Based on research in a sustainable transportation system, it is a system that can fulfill a sense of justice, that is, safely and comfortably meets the level of efficiency of natural resources, both in terms of utilization of energy resources and the use of space, can be managed transparently and participatively, and ensure sustainability for future generations. In general, the transportation system in Medan City still does not meet the sustainability criteria, which are characterized by low quality of roads, low quality of public transportation, increasing number of accidents, high levels of congestion on main roads, decreasing average speed during rush hours, increasing pollution and high-cost transportation.

This is evident from 82% of people who state that the condition of mass transportation in Medan is bad and only 23% of people say that the condition of mass transportation is good. Accessibility is pursued by planning the transportation network and the diversity of transportation equipment with a high degree of integration between one another. As many as 80% of the people stated that mass transportation accessibility was getting worse. This is due to the low accessibility and poor quality of the public transport service network which results in the community having to make several transportation moves from the point of origin to the destination, the lack of a unified ticketing system, and the lack of modal links, and only 20% of the public said that the state of mass transportation in Medan City is good. The problem of congestion and pollution (pollution) from the land transportation system is indeed a problem that is difficult to find a solution. For this reason, transportation system planning must be a priority in the effort to overcome this, especially in suppressing negative impacts on the environment.

Less mature transportation system planning can cause various problems, including congestion and high levels of air pollutants due to various pollution from motor vehicle fumes. More than 80% of the people stated that high levels of air pollution on the streets and 20% of the people said that the solution to the impact of transportation on the environment had been handled well. The planning of pedestrian paths and bicycle paths is not only an effort to improve visual quality in urban areas but also how to provide comfort for its users so as to encourage a reduction in dependence on carbon emission vehicles. As many as 87% of the people stated that the condition of the pedestrian and bicycle paths had not been felt to the maximum, which meant that the conditions were still in the bad category. The number of violations that occur is one of the consequences of the poor path, even though the need for pedestrian facilities in urban areas is increasing but the total area of the area / pedestrian path itself is decreasing and 18% of people say that the condition of the bicycle lane is in a good category.

Provision of clean water for the community has a very important role in improving the health of the environment or the community, which has a role in reducing the number of people suffering from diseases, especially those related to water, and has a role in increasing the standard or standard / quality of life of the community. Based on research that has been done in Medan City, there are 76% of people who state that the condition of ready-to-drink water facilities in Medan City is still very poor or in the poor category. Only 24% of the people said they were satisfied with the ready drinking water facilities in the city of Medan. Gray water is produced from washing activities, bathing water and kitchen activities. Gray water is included in domestic waste. Domestic liquid waste or liquid waste generated from residential activities such as houses. Gray water can be dangerous if discharged directly into water bodies, such as rivers or lakes. For this reason, treatment needs to be done before being discharged into water bodies.

Gray water treatment has not really been campaigned to the public so there are still many people who do not know about it. As many as 83% of the people stated that the processing conditions for gray water were still very bad, only 17% of the people stated that the processing of gray water carried out in Medan was good enough. The concept of green water planning is based on fulfilling 3 aspects related to the condition of the availability of water sources, namely: Water quality, namely the development of an environmentally friendly water resource management system. Water quantity, which is the development of a water resource management system that ensures the fulfillment of community needs. Water continuity that is ensuring the availability of sustainable water. The processing of green water is also still not satisfying the people in

Medan City. This can be seen from the number of people as much as 74% of the people stating that the condition of the processing of green water is still very bad, only 26% of the community stated that the processing of green water was good enough. Solar power plants are electricity plants that convert solar energy into electricity. Electricity generation can be done in two ways, namely directly using photovoltaic and indirectly by concentrating solar energy.

Electricity in Indonesia uses more fossil energy or coal. Based on research conducted in the city of Medan, as many as 46% of the people stated that they agreed that the electricity source in the city of Medan had required electricity using solar technology and as many as 54% of the people said that they did not agree that the source of electrical energy from the solar system was very much needed. Wind power plant is a power plant that uses wind as an energy source to produce electrical energy. This generator can convert wind energy into electrical energy by using wind turbines or windmills. Electricity generation system using wind as an energy source is an alternative system that is very rapidly developing, considering the wind is one of the energy that is not limited in nature. There are 34% of the people who agree that the source of electricity requires electricity using wind power technology and as many as 66% of the public say that they do not agree that the source of electricity derived from wind power is urgently needed. The pattern of waste management until now still adheres to the old paradigm. Garbage is still considered as something that is not useful, has no economic value and is very disgusting. Garbage power plant or garbage generation or biomass waste power plant is a thermal power plant with supercritical steam and is fueled with rubbish or methane waste gas. More than 45% of the people agreed that the electricity source in the city of Medan already needed electricity using waste or waste treatment given the large amount of waste production in the city of Medan every day, and as many as 55% of the people said that they did not agree to the source of electrical energy derived from waste processing already very necessary. Recycled building materials are building materials that can be recycled and reused later. This process is carried out to reduce pollution, reduce energy use, and minimize greenhouse gas emissions caused by the process of making new goods, and to save costs. Based on research conducted in the city of Medan, 37% of the people stated that they agreed that the building materials in Medan had met the sustainable requirements by using recyclable building materials, and as many as 63% of the people said they did not agree that the building materials in Medan had met the requirements sustainable by using building materials that can be recycled.

Quite a lot of buildings in Indonesia are designed without energy saving considerations so that the consequence is the high operational costs of electricity every month. If the building is designed without energy considerations, difficulties will arise in the future, namely in terms of overcoming the high electricity operational burden. As many as 44% of the community stated that they agreed that the buildings in Medan City had fulfilled the sustainable requirements using the principle of saving energy, and as many as 56% of the people said they did not agree that the buildings had met the sustainable requirements using the principle of saving energy. Buildings by implementing rainwater catchment systems are buildings that have used rain water for daily use to save energy. Processed rainwater harvesting systems can be used in everyday life such as to flush toilet water, flush plants or to wash clothes. Based on research conducted in Medan City, as many as 40% of the public agreed that the buildings in Medan had met the sustainable requirements by using rainwater catchments for the principle of saving energy, and as many as 60% of the people said they did not agree that buildings in Medan had met the sustainable requirements by using rainwater catchments. In a development, it is not only the quality of the material that needs to be considered, but also the material selection.

The choice of material is very important because it is directly related to health, especially if the building is to be occupied by itself. That's why choosing the right and healthy building materials really needs to be considered. Sustainable construction is carried out by the use of alternative materials and alternative fuels that can reduce CO2 emissions so that it is lower than the normal content of raw materials produced previously. There are 38% of people who agree that building materials in Medan City have met the sustainable requirements by using emission-free building materials, and as many as 62% of the people said that they do not agree that building materials meet the requirements for using emission-free.

Climate change has an impact on the increasingly high intensity and type of climate change disasters that occur such as floods, tides, droughts, tornadoes, seasonal uncertainty, decreased agricultural productivity, and disease outbreaks. This resulted in the amount of loss experienced by people in urban areas, both materially and immaterially. Anticipatory steps should start from now before things get worse. As many as 77% of people stated that Medan City was not included as a city that was resilient to the threat of disasters due to climate change, but as many as 23% of people stated that Medan City was already good in dealing with disasters due to climate change. Food is a basic need for humans to be able to sustain life and hence the adequacy of food for everyone at all times is a basic right that is fulfilled. Based on this fact, the problem of meeting the food needs for all residents at any time in an area becomes the main target of food policy for government. Food security is part of economic resilience that has a major impact on the entire community, especially in this case the city of Medan. As many as 72% of the community stated that Medan City was not included as a city that was resilient to the threat of the food crisis, but as many as 28% of the

people stated that Medan City was already good in dealing with disasters due to the food crisis. Maintaining security is a condition as the main prerequisite for all autonomous regions in Indonesia. So that the security of an area and its surroundings can be created, the resilience of the city is not only focused on security, but also on defense and efforts to face and overcome challenges, threats and disturbances, both coming from outside and inside, both directly and indirectly. Based on research conducted in the city of Medan, as many as 75% of the people stated that they were not included in a city that was resilient to riots.

For this reason, this research will examine the effect of how the above variables affect the sustainable environment. In structural analysis there are 7 paths (paths) which will later answer the relationship between variables to be tested for influence. The variables to be tested are Green open space (X1), green waste (X2), green transportation (X3), green water (X4), green energy (X5), green building (X6) and resilience city (X7) to environmental sustainability (Y1).

Table 1. Effect in Variables of Stucture Equation Models X1-X7

Effect	Standardized Estimate	S.E.	C.R.	P	Sig.
Sustainable (Y) ← GOS (X1)	1,000	0,064	0,864	0,387	NS
Sustainable ← GW (X2)	-0,553	0,063	-0,657	0,511	NS
Sustainable ← GT (X3)	0,033	0,096	0,421	0,674	NS
Sustanable ← GW (X4)	-0,231	0,060	-2,400	0,016	NS
Sustainable ← GE (X5)	0,248	0,076	3,310	***	**S****
Sustainable ← GB (X6)	0,422	0,101	5,690	***	**S****
Sustainable ← RC (X7)	1,034	0,127	9,715	***	**S****

*) processed with SEM in Appendix 1; **) Significant

SEM calculation results as presented above show that Green Open Space cannot be said to have a positive effect on environmental sustainability. This can be seen from the path coefficient which is positive at 1,000 with a CR value of 0.864 and a significant probability (P) of 0.387 is obtained. This means that when more green space such as urban parks, green recreation areas, sporting green areas and urban green belt areas, it will improve the quality of the environment in line with a sustainable environment by 1,000. The main driving factor is the effectiveness of the use and maintenance of facilities that are a concentration of the concept of sustainability to realize Medan as a Green City. In accordance with Law No. 26 of 2007 concerning Spatial Planning, the proportion of Green Open Space (RTH), for urban areas is at least 30% of the urban area, which consists of 20% public green open space and 10% private green open space. However, in this study, we found that open space cannot yet be a pillar of sustainability for the development of the Green City Concept in Medan Municipality. In the results of the analysis of green waste variables we get results that have not yet significantly influenced environmental sustainability. This can be seen from the path coefficient that is negative at 0.553 with a CR value of -0.657 and a significant probability (P) of 0.511 is obtained. This means that when an increase in waste treatment with sustainable principles such as reduse, reuse and recycle will decrease environmental sustainability by 0.553. This is a strong indication that pollution in the form of waste in the city of Medan is very high. The treatment of B3 waste is an obligation stated in Law 32/2009 on Environmental Protection and Management, in 2018 the city of Medan became one of the cities that was not livable. From 27 uninhabitable cities in Indonesia based on the results of the study, Medan ranked 26 as uninhabitable cities.

Green Transportation Analysis results have a positive effect on environmental sustainability. This can be seen from the path coefficient that is positive at 0.033 with a CR value of 0.421 and a significant probability (P) of 0.674 is obtained. This means that we have not yet found an increase in mass transportation that is comfortable and has wide accessibility, although in the process of improving quality with the Mebidang Bus that connects Medan Municipality with the surrounding areas such as Deli Serdang, mitigating the environmental impact of transportation and pedestrian and road-friendly road spaces, attention pedestrian and bicycle users have not been optimal, coupled with habits and culture that have not implemented a healthy lifestyle to fill environmental sustainability in sustaining the Green City. The results of the analysis of green energy variables have a positive effect on environmental sustainability. This can be seen from the path coefficient that is positive at 0.248 with a CR value of 3.310 and a significant probability (P) of 0.000 is obtained. This means that when an increasing source of solar energy, wind power and electricity from waste treatment, it will also increase environmental sustainability by 0.248. Renewable energy is prioritized as a solution to the limitations of fossil fuels, this energy will be an alternative and

mainstream to maintain the environmental ecosystem cycle in Medan Municipality as Megapolitan becomes more strategic and environmentally friendly. As an alternative to the remaining production or palm oil derivatives that can be used as biodiesel or for electricity.

Deepening the discussion aspects related to Resilience City which turned out to have a positive effect on environmental sustainability. This can be seen from the path coefficient which is positive at 1.034 with a CR value of 9.715 and a significant probability (P) of 0.000 is obtained. This means that when the city's resilience to disasters (climate change) increases, the city's resilience to the food crisis and the city's resilience to riots, it will also increase environmental sustainability by 1,034. Medan Municipality has sufficient potential to face a new era of regional development towards the Green City. Climate Change that occurred in the Municipality of Medan is quite a concern. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as climate change caused either directly or indirectly by human activities so that it changes the composition of the global atmosphere and variability natural climate at comparable time periods. Climate change can be measured statistically through the International Panel on Climate Change. One of the frequent changes in climate is natural disasters related to the increase in earth's temperature. Food security in monitoring the stakeholders and the community will be directly affected by the fulfillment of food needs in meeting the needs of life, providing access to food and basic needs is one form of government attention to the existence of the community. And regarding the handling of riots, in terms of public security, coordination between law enforcement officers and community institutions whether structural or functional is very contributing to security and reducing the occurrence of riots. In Medan Municipality related to social conflicts and land issues that often arise as cases of riots, either between communities or vertically to the government, in this case the demands that arise are conflicts of interest or injustice that have peaked after a long time.

Table 2. Effect Intervening Variable Z-Y

Effect	Standardized Estimate	S.E.	C.R.	P	Sig.
ESP (Y) ← S (Z)	0,938	0,016	6,075	***	

The Ecological Security Pattern / ESP (Y) study provides a variety of important information that is at the core of research in looking at aspects of Green City sustainability by safeguarding six aspects, namely Safeguards against water and flood problems (Y1.1); Safeguards against air pollution problems (Y1.2); Safeguard against natural disasters (Y1.3); Safeguarding biodiversity (Y1.4); Safeguarding cultural heritage (Y1.5); and Safeguarding green open recreational spaces (Y1.6). This research specifically discusses how the concept of ecological security patterns becomes the output for environmental sustainability with this Green City becoming a side effect that becomes a reality. Variable S (Z) to ESP (Y) contributes an effect of 0.938 or 93.8% as a direct effect and thus the direct effect gives a significant result with a positive standardized estimate. The mathematical equation of the relationship between the variables ESP (Y) S (Z) as a correlation equation that follows the assumptions of classical statistics and has a positive significance and influence.

ESP (Y) = 0,938 S(Z) + 0,016

Hypothesis testing is done by testing the significance of the regression based on the F test at $\alpha = 0.05$ on each coefficient of the equation, both directly and partially. After testing the basic assumptions of SEM and the suitability test and statistical test, the next step is to modify the model that does not meet the test requirements that have been done. After the model is estimated, the residual must be small or close to zero and the frequency distribution of the residual covariance must be symmetrical (Tabaknick and Fidell, 1997). Hair et al. (1998) provide a guideline to consider whether or not modifications to a model, namely by looking at a number of residuals generated by the model. If the amount of residuals is greater than 5% of all covariance residuals generated by the model, modifications need to be considered. If it is found that the residual value generated by the model is quite large (residual; 2.58), then another way of modifying is to consider adding a new path to the estimated model. A residual value greater than or equal to 2.58 is interpreted as statistically significant at the 5% level and this significant residual indicates a substantial prediction error for a pair of indicators.

Every increase in efforts made to improve sustainability will increase by 93.8% ecological security patterns in an area, especially in the Municipality of Medan. This significant and positive result is an indication for academics to continue to contribute in the form of research in various fields of research related to Green City and direct relations with the Municipality of Medan.

One approach as an analytical surgical tool is the theory of agglomeration approach, Montgomery defines agglomeration as a spatial concentration of economic activity in urban areas because of "economies of proximity (economies of proximity) ... associated with the spatial clusters of companies, workers, and

consumers "(Montgomery, 1988). This is in line with Markusen (1996) which states that agglomeration is a location that is "not easy to change" due to external savings that are open to all companies that are located close to other companies and service providers; and not due to the calculation of the company or individual workers. Environmental awareness and sustainability emerge simultaneously with economic improvement and sustainability. In Law No: 7 of 1996 concerning food, the definition of food security is the condition of the fulfillment of food for households which is reflected in sufficient availability, both in quantity and quality, safe, equitable and affordable. From this understanding, it is implied that efforts to realize national food security must be better understood as meeting the conditions of conditions: (1) Fulfillment of food with sufficient availability conditions, with the understanding of food availability in a broad sense, including food originating from plants, livestock and fish and meeting the need for carbohydrates, vitamins and minerals and derivatives, which are beneficial for human growth and health. (2) Fulfillment of food with a safe condition, which means that it is free from biological, chemical, and other objects that can interfere with, harm, and endanger human health, and is safe for religious principles. (3) Fulfillment of food with equitable conditions, means that food distribution must support the availability of food at all times and evenly distributed throughout the country. (4) Fulfillment of food with affordable conditions, means that food is easily obtained by households at affordable prices. In general, food security covers 4 aspects, namely sufficiency (access), access (security), security (security), and time (time) (Baliwaty, 2004). With this aspect in mind, food security is seen as a system, which is a series of three main components namely food availability and stability, food accessibility and food utilization. Building environmental sustainability needs to be in line with human development, according to Tjondronegoro (1990), concepts, models, approaches, and paradigms of human resource development that are feasible to be adopted should highlight the principles of community development, namely bringing about peaceful social change, orderly, fair, harmonious, participatory, transparent, gradual, and sustainable. One approach to developing human resources that is considered in accordance with the principles of community development is empowerment. Like other countries in the world, community empowerment is also a concern of the Indonesian people.

CONCLUSION

The results of this study indicate that Medan City has not been included in the Green City category with the concept of sustainability. This can be seen from the results of the questionnaire which shows that the average opinion of the people of Medan towards the state of Medan. Based on these conditions, an urban planning effort with a sustainable green perspective concept is needed to save energy, a friendly and comfortable environment and reduce urban activities that exploit the environment. In this planning it is necessary to set the concept of planning in accordance with the guidelines for sustainable planning policies. Sustainable development carries out development to meet current needs without compromising the needs of future generations by emphasizing environmental carrying capacity, achieving social, economic and environmental sustainability. The concept of sustainable development is formulated to prevent or reduce the impact of unstructured urban sprawl (urban sprawl) so that cities become inefficient and ineffective in serving life in them. The success of sustainable development does not only depend on the economic sector but the need for intervention from the holder of power, in this case the government, in order to implement sustainable development so as to achieve equitable prosperity. Therefore, sustainable development is oriented towards the development of a Green City that has a good quality of life and conducive environmental conditions can be achieved.

Based on the discussion and results of the primary data survey, recommendations that are in accordance with the outcomes of this study are as follows: 1) Basic recommendations for further research in implementing Green City principles: Given the important role of a study or research prior to program planning, it is recommended to conduct studies of Green city parameters in a sustainable manner. 2) Basic recommendations for policy making in implementing Green City principles: Implementation of work programs (in accordance with the RPJMD) between Medan City SKPDs has not been well coordinated, so there has not been even distribution of programs and related to Green City implementation. The recommendation that can be proposed is to create an acceleration Task Force Team that works to oversee and evaluate the implementation of Green City programs in Medan, both from the Government and the private sector.

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