An Analysis of the 11th SDGs: Sustainable Cities and Communities in Surakarta under the DPSIR Framework

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ABSTRACT. Rapid urbanization places cities in a central position causing various problems. Therefore, the problem of global sustainability cannot be addressed without answering the question of urban sustainability. This is realized by expanding the scope of the SDGs, as stated in the 11th goal which calls on countries to increase inclusive access to safe, resilient and sustainable housing, sustainable transportation, and also green spaces, among many targets other. Surakarta City as one of the big cities in Indonesia has a dynamic urban settlement condition, so it is interesting to study the 11th SDGs (sustainable cities and communities) under DPSIR framework in order to help design environmental assessments, identify key indicators, and communicate results. The method used in this research is a literature study. In this study, the parameters used are covered in 4 aspects, namely social, economic, environmental, as well as legal and governance. The data obtained were analyzed using the DPSIR method which was carried out on each indicator in the study parameters. The study of sustainable cities and communities in Surakarta City shows that population growth is one of the driving factors for change (Drivers), followed by the lack of land availability which is a catalyst (Pressures) for changes to initial environmental conditions (State) such as reduced green open space. This certainly has an impact (Impact), such as the increasing number of slums in Surakarta City. It takes effort (Responses) to solve the problem, it can be in the form of policy review or action planning.

Keywords: City, Community, SDGs, Surakarta, Sustainable.

1. Introduction

The environment has limitations, both in terms of quality and quantity. The world's attention to environmental problems that occur has long been carried out. Started with Stockholm Conference in Sweden 1972, and continued until the year of 2000 where world leaders agreed on eight global development goals specific and measurable which called Millennium Development Goals (MDGs) (Wahyuningsih, 2017). Based on the experience of most countries implementing the MDGs where the achievement of the targets that have been set has not been optimal, it is agreed that the paradigm needs to be reconstructed for the sustainability of the MDGs (Alfa, 2019). In 2015, all of the countries member of the United Nations (UN) unanimously adopted the Sustainable Development Goals (SDGs), a comprehensive set of 17 goals and 169 targets aimed at reducing poverty and promote the health and well-being of all human beings. The SDGs also extend their scope to other important areas, including sustainable urban planning and development, contained in Goal 11 with the aim of calling on countries to increase inclusive access to safe, resilient and sustainable housing, sustainable transportation and also green spaces, among many other targets. With more than half of the world's population living in cities, SDG 11 provides opportunities to improve the daily living conditions of billions of people (Rozhenkova et al., 2019).

Urban areas account for 55% of the global population and generate 85% of global GDP. Rapid urbanization places cities in a central position causing various problems. The world's cities occupy only 3% of the earth's land area, but urban waste can pollute air resources, groundwater and contribute 75% of greenhouse gas emissions. Cities as energy consumers and producers gluttonous waste, including most of the world's greenhouse gas emissions, seen as very crucial locus of the complex and interrelated issues of sustainability, development and planning. Therefore, global sustainability issues can not be addressed without answering questions about the sustainability of urban (Klopp and Petretta, 2017; Huovila et al., 2019; Vaidya and Chatterji, 2020).

Sustainable development consists of two words, which have completely opposite meanings. Sustainability refers to maintaining the existence of ecosystems and their services while meeting human needs, while development refers to activities that improve the quality of life by depleting natural resources and destroying natural areas. Sustainability is used to describe how an ecosystem can survive over time, the addition of development to sustainability needs to be focused on establishing a balance between humans and the natural environment by using resources wisely and maintaining its existence to the next generation (Yigitcanlar and Dizdaroglu., 2015).

The idea of sustainable cities and communities emerged as a political initiative in response to the degradation that

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occurred in the urban environment throughout the 20th century. Therefore, issues related to the planning and management of settlements became a top priority at the United Nations conference held in Stockholm in 1972. The United Nations sustainable city program has defined a sustainable city as a city capable of sustaining a steady supply of natural resources while achieving economic, physical, and social progress, and also stay safe from environmental risks that could undermine those development achievement (Hassan and Lee., 2014). Cities are usually the starting point for implementation of most of the SDGs, due to the local scale at which the often hidden inequities and dysfunctionalities in national data aggregations become apparent. In addition, the range and complexity of the interdependencies between the various SDGs, including synergies and trade-offs, are greatest in cities. The success of SDG 11 will depend on the extent to which they are contextualized to local situations and mainstreamed within local urban planning frameworks and budget constraints. Indonesia has mainstreamed sustainable development into its national development through regulatory frameworks, namely Presidential Regulation Number 59 of 2017 concerning the Implementation of Achieving Sustainable Development Goals (Bai et al., 2016; Vaidya and Chatterji, 2020).

Surakarta City as one of the big cities in Indonesia which is in the process of growth and development, has a very interesting urban settlement dynamics to study. Currently, Surakarta City has developed into a big city that has various functions, namely as a regional administrative center, an industrial city, a trade city, tourism, and culture. A city can be said to have experienced significant development if it is seen from the condition of the existing buildings ranging from settlements, educational facilities, health, offices, and other facilities are in good condition and meet the requirements, accompanied by heavy road traffic. This is also supported by a high level of population density, both from the original population and urban immigrants. Based on these conditions, it can be seen that a problem will arise, namely the uncontrolled population density of the city which is not accompanied by the readiness of the city (Prasetyo, 2009; Hardiyanto and Priyatmono, 2016).

This is the condition that is currently being faced by the Surakarta City. The development of the Surakarta City is the emergence of a high flow of urbanization due to the pace of development in the city compared to the village. This is indicated by the socio-demographic conditions in slum areas such as high population density, uninhabitable environmental conditions, and the lack of public and social facilities. This condition causes settlements to be prone to natural disasters such as fires and floods. This makes the area need to handle a safe, healthy, harmonious and orderly environment. The dynamics of urban settlements is a sustainable future, therefore making sustainable urban settlements has urgency to be implemented (Resa et al., 2017; Latif and Setiawan, 2020).

The purpose of this study is to examine the implementation of the 11th Sustainable Development Goals, which is to create inclusive, safe, durable, and sustainable cities and communities in Surakarta City. The important value of this study is knowing the implementation of sustainable city and community goals in Surakarta covering 4 main aspects, that is the economic aspect including regional economic relations; social aspect which includes studies on access to housing, public transportation, public open space and urbanization; environmental aspect which include the provision of green open space, natural disaster risk management, cultural heritage and waste management; and the last aspect is law and governance reviewing policies for increasing the number of communities adopting and implementing integrated policies and plans. The results of the study are expected to be a form of evaluation of the implementation of the 11th Sustainable Development Goals in Surakarta City, and can be a manifestation in recommendations for determining planning and management policies by the authorities to realizing Surakarta as a sustainable city and communities.

2. Materials and Methods

2.1 Parameter of Study

Sustainable development basically includes three main aspects that support each other, namely social, economic and environmental development. In its development, there are additional aspect in the form of law and governance as guarantors and protectors of the three main aspects (Dewi et al., 2019). In this study, the parameters of sustainable cities and communities in Surakarta City are limited in scope according to SDG Number 11 indicator which is then adjusted to the Surakarta City regional action plan. The results of the parameters formulated are shown in the Table 1. as follows:

Table 1
Parameters of sustainable cities and communities

Aspect		Indicator	Parameter
Economy	1	Regional economic relations	Strengthening national and regional development planning
Social	2	Housing	Access to adequate, safe and affordable housing
	3	Transportation system	Access to safe, affordable, easily accessible, and sustainable public transportation system
	4	Urbanization	Promote inclusive and sustainable urbanization
	5	Public spaces	Universal access to safe, inclusive, easily accessible, and sustainable public spaces
Environment	6	Green spaces	Provision of green spaces in communities areas
	7	Cultural heritage	Arrange to protect and keep cultural and natural heritage
	8	Natural disasters	Management of natural disaster risks and reducing the number of victims of natural disasters
	9	Waste management	Recycling waste and garbage for preserving the environment
Law and governance	10	Policy	Increase the number of communities adopting and implementing integrated policies and plans.

2.2 Methods of Data Acquisition

The method of data acquisition is literature review. Literature studies are carried out by digging up sources in the form of books, scientific articles, and other reliable literature sources related to the topic being studied. The scope of data used in this study is data in the range of 2010 to 2020.

2.3 Methods of Data Analysis

The data analysis methods used is DPSIR Assessment (Drive, Pressures, State, Impact, Response) conducted on each indicator within the parameters of the study. The DPSIR method is carried out by outlining the Driving force (causative factor), Pressures (driving factor/catalyst that accelerates changes in the condition of a situation), States (initial conditions), Impact (impact of the change), and Responses (response from stakeholders/subjects related to these changes) (Pinuji et al., 2018).

3. Results and Discussion

The study of the realization of sustainable city and community indicators aims to create inclusive, safe, durable, and sustainable cities and communities in Surakarta City. DPSIR analysis is useful for describing the causes, pressuress, status, impacts, and responses to the progress of the above study parameters (Giupponi, 2002).

3.1 Identification of DPSIR Component

a. Drivers (causative factors)
A drivers is a condition that causes change, usually in the form of global economic and social growth, thus triggering the occurrence of Pressuress either directly or indirectly. Based on the results of a literature review of these parameters, the results are shown in Table 2. as follows:

Table 2
Drivers Component

	Drivers
1	Population growth
2	Expansion of new settlements
3	Economic Growth
4	The need for green space and public space
5	The need for transportation system
6	The need for disaster knowledge

Based on the 2010 Population Census, Surakarta City ranks 27th based on its population of 94 cities in Indonesia, or 14th out of 30 cities on the island of Java. The ranking of Surakarta City continues to decrease from year to year due to the relatively narrow area of the city, which is 46.01 km², thus providing more impetus for urban development outside the city administration area than inside (Mardiansjah et al., 2018). The population in Surakarta City tends to continue to increase from year to year. Based on the Central Statistics Agency for Surakarta City, in the last 10 years, from 2010 to 2020, the population growth rate in various sub-districts in Surakarta including Laweyan 0.27%, Sarengan 88%, Pasar Kliwon 0.54%, Jebres 0.05%, and Banjarsari 0.68%. High population growth will trigger better economic conditions. Furthermore, various population needs will emerge such as the need for green open spaces, public spaces, and of course an adequate transportation system (Krisnawati, 2017). This condition will have a bad impact if the population is not equipped with good disaster knowledge, because population growth and higher economic

conditions have a positive correlation with environmental damage (Hardini, 2011).

b. Pressures (catalyst)
Pressures is any human activities that put pressures or speed up (the catalyst) the occurrence of changes to the initial condition of the environment. Based on the results of a literature review of these parameters, the results are shown in Table 3. as follows:

Table 3
Pressures Component

	Pressures
1	Low population quality
2	Low job opportunities
3	Very limited land availability
4	Natural disasters
5	Anthropogenic disasters

Surakarta City as the center of the growth of the first order which has become the strongest "magnet" for residents in the buffer zone. They come to Surakarta City with the strongest reason is there are many choices to get various opportunities in an effort to improve their lives. They have the perception and hope to get a higher income than in their hometown, especially those who living in rural areas. However, not all of these migrants have sufficient knowledge and adequate skills, plus job opportunities are getting fewer and fewer in urban areas. The growth of Surakarta City as the center of the economy has a direct impact on increasing the population and the need for land for housing in the midst of limited land. As the result the new problem arise, which is the gap between the housing built and the amount of housing needed by the community (Oktavia, 2010; Basworo, 2019). This high land requirement has the potential to increase the potential for flood disasters in Surakarta City. Surakarta City has the potential for flooding every year because of the lowlands with an altitude of ± 92 m above sea level and is an inter-mountain basin area surrounded by mountains in Boyolali, Karanganyar, and Sukoharjo. In addition, Surakarta is one of the cities traversed by the Bengawan Solo River. This causes the city to have the potential for flood disasters. Also, the increasing development of Surakarta City has caused a lot of land conversion from open land to built up land. The conversion of land functions from open land to built land will have an effect on surface runoff. The imbalance between rainfall, infiltration, and runoff results in rivers not being able to accommodate water flows that exceed their capacity (Harsini, 2014; Pramitha et al, 2020).

c. State (initial condition)
State is defined as environmental quality such as water, soil, air, and includes socio-cultural elements. State is a consequence of pressuress that encourage humans to carry out activities that have an impact on changing the quality of the environment to meet needs. Based on the results of a literature review of these parameters, the results are shown in Table 4. as follows:

Table 4
Identification of State Component

	State
1	Limited availability of green open land
2	Availability of green space under the minimum required rules
3	Limited access to public spaces

4	The transportation system is not optimal
5	Economic factors attract mobility

The growth of the urban population causes an increase in the demand for land and space in urban areas. The high flow of urbanization, uneven land distribution, is an urgent problem and almost impossible to be prevented because it is a consequence of the risk of developing a city. The government of Surakarta City seeks to provide Green Open Space to minimize environmental degradation. Based on data from the Surakarta City Environmental Service in 2019, the area of green open space in Surakarta reached 3,729,713.81 m2 (372.97 Ha) or only 8.47% of the total area of Surakarta City, This illustrates that the existing green open space in Surakarta City has not been able to meet the 30% green open space standard with a composition of 20% public green open space and 10% private green open space according to Law Number 26 of 2007 concerning Spatial Planning. In addition, the physical condition public space and green space has minimal maintenance, there is still a lot of garbage, unkempt plants, missing or damaged monuments, damaged garden facilities and vandalism. Economic growth also brings logical consequences to urban transportation systems and patterns as well as impacts on the environment. It is certain that there is an increase in motor vehicle traffic because it is almost certain that the movement of the economy in Surakarta City is always accompanied by human movement in the distribution of goods and services (Muhammad, 2016; Mastuti and Setiyono, 2017; Prabowoningsih et al., 2018).

d. Impact (impact of the changes)

Impact is a change in ecosystem function, has a negative externality on environmental health, and affects changes in ecosystem services, both socially and economically. Based on the results of a literature review of these parameters, the results are shown in Table 5. as follows:

Table 5
Impact Component

	Impact
1	Slum Area
2	Increasing the volume of garbage and waste
3	Decrease in the carrying capacity of environment
4	Decreasing air quality
5	Cultural and natural heritage threatened

The development of slum area in Surakarta City is significant from year to year based on the Decree of the Mayor of Surakarta Number 032/97.C/1/2014 and verification of the RKP-KP for the 2015 Surakarta City Slum Settlement Area Plan due to various factors, including the dynamics of the development of Surakarta City, the character of the occupants and the physical character of the environment. Factors causing slums in Surakarta City, at the level of severe slums, the factors causing slums are the level of income and condition of drainage infrastructure, at the level of moderate slums, the factors causing slums are building materials and at the level of light slums, the factors causing slums are the culture of disposing of garbage and building density. The high population growth in Surakarta City also produces high emissions. The total emission of Surakarta City from various sectors according to the DLH of Surakarta City in 2012 was 1,383,284 tons of CO_2. The development of settlements in Surakarta City also threatens the existence of cultural and natural heritage if there is no preparation of special building regulations regarding the design of building control areas adjacent to existing sites (Ananda, 2016; Rully, 2016; Prabowoningsih et al., 2018).

e. Responses (response from stakeholders)

Response is an effort made by the community (both local communities and government/policy makers) in solving problems as described in the other four components. Responses can be in the form of policy reviews or planning actions aimed at solving environmental problems. Based on the results of a literature review of these parameters, the results are shown in Table 6. as follows:

Table 6
Responses Component

	Response
1	Strengthening national and regional development planning
2	Increasing the number of sustainable communities
3	Integrated policy and plan making
4	Smart City Concept
5	Integrated City Concept

The dynamics of the development of cities in Indonesia today seems to be based more on the paradigm of exploitation of resources. The current development policies are still centralized and sectoral with spatial planning, out of sync with the preservation, protection and management of the environment, including the lack of interaction between the two which has not been harmonious and mutually supportive. Seeing the aspects that are considered in sustainable development policies, sustainable development is important to be encouraged, especially in dealing with the problems of the dynamics of development that have existed from the past, present and in the future. In addition, Surakarta City is also the "Cultural Capital of Central Java". The position of Surakarta City is what triggers the development of urban development in Surakarta, such as an increase in physical growth in the need for land and the city's activity system because it is a target city for migration and tourists (Wijayanti, 2012).

Sustainable development planning needs to be accompanied by the formulation of integrated national and regional plans and policies so the sustainability will not only stop in central areas such as Surakarta City but can extend to the supporting districts and further at the national stage. The concept of sustainable communities has various forms, one of which is the Smart City Concept. Smart City is a city development concept in order to overcome the problems that exist in the city to facilitate public access to meet all their needs. Smart City has the meaning of a Smart City which is able to have a positive impact on government, social life, transportation, quality of life, healthy competition in all fields by utilizing information and communication technology. The goal of smart city development is to improve the quality of life by using urban information and technology to improve service efficiency and meet people's needs. The application of smart cities is expected to be able to reduce problems that occur in urban areas, some of these problems include slum settlements, public services, floods, congestion, and others. Even on a wider scale, this application is expected to further improve the welfare of the community (Yuliani and Rosyida, 2017; Setyawan, 2018).

4. Conclusion

The study of the implementation of Sustainable City and Community parameters in Surakarta City shows Population growth, Expansion of new settlements, Economic Growth, The need for green space and public space, The need for transportation system, The need for disaster knowledge as Drivers (D); Low population quality, Low job opportunities, Very limited land availability, Natural disasters, Anthropogenic disasters as Pressures (P); Limited availability of green open land, Availability of green space under the minimum required rules, Limited access to public spaces, The transportation system is not optimal, Economic factors attract mobility as a State (S); Slum Area, Increasing the volume of garbage and waste, Decrease in the carrying capacity of environment, Decreasing air quality, Cultural and natural heritage threatened as Impact (I); Strengthening national and regional development planning, Increasing the number of sustainable communities, Integrated policy and plan making, Smart City Concept, and Integrated City Concept as a Response (R).

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