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City resilience strategies in dealing with the aftermath of the COVID-19 pandemic: Using socio-ecological systems

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Abstract

Many aspects of human life have been changed by the COVID-19. Urban development model is one of the various changes. Therefore, it is necessary to formulate strategies or policies related to landscape and urban management. This writing study the concept of urban resilience in dealing with the postCOVID-19 pandemic using a socio-ecological system to provide strategies related to these problems. This study uses a qualitative descriptive method by collecting data sources from the literature study. The data analysis used content analysis techniques. The study provides critical analysis in terms of the city's resilience strategy in dealing with the post-COVID-19 pandemic using a socio-ecological systems approach. There are three elements or strategies are found, namely economic resilience, consumer behavior (society adaptation), and environmental changes.

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Introduction

The order between countries is currently changing due to the Corona Virus Disease 2019 (COVID-19). This global pandemic has created great challenges for the world. Cities almost all over the world stated that they were shocked by the emergence of this virus, and Indonesia is no exception. The massive spread in all continents, Europe, Asia, America and Africa, forced the World Health Organization (WHO) to make a decision to declare this disease as a global pandemic from the beginning of March 2020.

Since the declaration of COVID 19 as a global pandemic, it has forced the whole world to implement a policy of isolation and social distancing for some time, which can have a major impact on various sectors, especially the economic sector. Apart from the various challenges caused by COVID-19, this phenomenon can have a positive impact on various sectors, especially the economic sector.

This is an opportunity for city leaders to learn lessons to build resilient cities in economic, social, and environmental terms. One of the triggering factors is the estimated population growth, where 65 percent of the world's population will live in cities by 2045 (Bappenas, 2019). According to research conducted by the OECD, with 1.4 million people arriving in cities every week, the global population living in cities and urban areas is expected to increase to around 70 percent by 2050 (Gonçalves, 2018). In line with this, the World Bank also estimates that 220 million people in Indonesia will be living in cities by 2045. This urban mobility crisis adds to the complexity of the problem, as more people in cities brings more challenges such as economic shocks, waste management, traffic management, air pollution issues, and can lead to increased crime rates. As research shows Rizki has done, which states that the mobility factor in the city of Jakarta has a positive impact on the increase in the spread of COVID-19 (Ghiffar, 2020).

To address these issues, city leaders need to plan in the short term for emergency response and in the long term for shock resilience. The presence of COVID-19 itself provides an opportunity for cities to learn from the experience of eradicating the virus in order to be better prepared for future emergencies. The unprecedented impact of the pandemic on every aspect of urban life has provided compelling data and information on how to improve crisis response and recovery strategies. In the future, it is not only health care and emergency response facilities that need to be prepared, but also public facilities such as conference halls, shopping areas, government offices, pedestrian areas, and transportation facilities (Sakti, 2020). In this way, if there are emergencies that threaten in the future, they can be anticipated immediately with comprehensive authorization and continuity by considering aspects of urban resilience towards a resilient city.

The resilience of a city can be seen from the state of the city when faced with challenges and shocks such as the current pandemic. How the city is able to recover, grow and develop becomes a measure. In a resilient city, there is a diverse community of both the vulnerable poor and the affluent. The dynamic relationship between these groups will strengthen the city in the face of pressures and crises (Semarang City Government, 2016). Based on this understanding, the multidimensional implications require cities to be resilient to all pressures and shocks caused by external and internal factors.

As the theory proposed by Jack F. Ahern in the "safe to fail" perspective (Ahern, 2011), which states that resilience is not understood as a return to normal or to the original state, but as the ability of complex ecosystems or socio-ecological systems, such as cities and urban communities, to change, to adapt, and

these changes are a response to the tension of internal and external pressures (Carpenter, Westley, & Turner, 2005). To respond to this theory, the socio-ecological system was actually proposed by the environmental activist group Stockholm Environment Institute (SEI) in 1988 as a strategy or solution in implementing sustainable development. This system includes three factors that affect the human life system, namely society, economy, and environment.

As explained in the background above, the problem formulation of this research can be compiled, namely, how is the city's resilience strategy in dealing with the post-COVID-19 pandemic using a socio-ecological system? Based on the theory presented by Jack F. Ahern, here the researcher intends to further study by linking the concept of urban resilience with the impact of the COVID-19 pandemic by providing strategies related to these problems (Suhada, 2015).

Method

This research used a qualitative descriptive method that attempts to interpret a phenomenon, event, or condition that occurs by presenting it in the form of a description (Wirartha, 2006). Data collection in this research is through literature studies taken from articles, books, journals, scientific papers, besides a small part of environmental observations. The data analysis technique used is content analysis, previously raw data (big data) and has been processed and classified to facilitate research, then data analysis is carried out using a qualitative approach (Azizah, et al., 2020).

Researchers also intend to provide problem boundaries so that this writing does not get out of the topic under study by focusing on the concept of urban resilience in dealing with the post-COVID-19 pandemic using a socio-ecological systems strategy. The description of the conceptual framework in this research is related to the concept of urban resilience in dealing with the post-COVID-19 pandemic using a socio-ecological system in providing strategies for these problems. Thus, the strategy used leads to Folke's theory where the socio-ecological system has three elements that determine sustainable development, namely economic resilience, consumer (community) behavior, and the environment.

Results and Discussion

Overview of socio-ecological systems

As stated by Folke et al. (2003) in (Hafsaridewi, Khairuddin, Ninef, Rahadiat, & Adimu, 2018) the socio-ecological system is a combination of ecological, economic, cultural, socio-political and institutional dimensions in a coherent model or framework that includes holism and complexity as a model that provides high hope in achieving sustainability. According to (Frank, Delano, & Caniglia, 2018), by developing socio-ecological in an integrated manner and further will allow to make cities sustainable with resource efficiency. Based on this explanation, the Stockholm Environment Institute (SEI) believes that the factor that determines sustainable development is the equilibrium point of the three elements of the socio-ecological system, namely society, economy, and environment. So, what if the socio-ecological system is linked to the concept of urban resilience? The three elements will be explained in detail in the following explanation.

Economic resilience

The cost to a city of a disaster, whether natural or man-made, depends on the city's economic ability to cope with and recover from the effects, whether small or large. This ability is referred to as economic resilience.

When considering resilience to a particular event, it is simply a subset of macroeconomic resilience and microeconomic resilience. Macroeconomic resilience is an important parameter for estimating the sensitivity of an entire population. Here, macroeconomic resilience is decomposed into two components: momentary resilience, which is the ability to limit the magnitude of immediate income losses for a given amount of asset losses, and dynamic resilience, which is the ability to rebuild and recover quickly. Macroeconomic resilience, on the other hand, affects people's well-being in terms of their pre-disaster income and their ability to mitigate shocks over time (Hallegatte, 2014).

Consumer behavior

The element of society here is seen from the behavior of the community as consumers in making decisions to consume a good or service. This consumer decision is based on perceptions from the results of the community's considerations and thoughts, which include utility factors, interests, and goals (Hutauruk, 2020). In the context of COVID-19, there has been a shift in consumer behavior, which is currently more concerned about the hygiene of the products consumed. According to Youswohady, marketing expert of Inventur Consulting, who explained this shift, it leads to Maslow's pyramid where consumer needs shift from the "top of the pyramid" as a form of satisfaction to a form of happiness, self-actualization to the "bottom of the pyramid" with physiological needs such as food and health (Rabbi, 2021). With consumer behavior that is concerned with hygiene, they tend to use digital technology to buy goods through e-commerce. This is also influenced by the safety factor, which can minimize meeting with many people. Actually, if examined more deeply, the existence of COVID-19 has actually accelerated the technology sector with the emergence of various sophisticated tools to help people's lives, both in the form of regenerating applications with their features, as well as the development of Artificial Intelligence (AI) to facilitate human activities.

Living environment

The element of the environment here is seen from urban spatial planning which is able to accommodate all the needs of the community both from clothing, food and shelter. Despite the negative impact of COVID-19, the policies of enclosure or social distancing implemented in cities actually provide benefits to the environment, such as a significant reduction in air pollution, traffic congestion and crime, while it can also see an increase in active travel such as walking or cycling (especially for people who do not usually do this activity) and a revival of attitudes towards nature in cities. It is the role of decision-makers or city leaders to learn from the experience, so that in the event of a recurrence of the same event, they take into account not only the infrastructure aspects of the city, but also the environmental aspects. Economic, political and industrial factors alone, but also health factors, namely the environment, must be prioritized (Rice, 2020).

The concept of urban resilience in other countries

Reporting on the Citylab site, in an article entitled "Pandemics are Also an Urban Problem," states that the factor of city formation is disease. This statement is based on the experience of urban planning in London, where a cholera outbreak occurred in the 19th century. In response, they built a sanitation network based on urban planning

and management as a solution to the crisis that threatened various aspects of life (Klaus, 2020).

Around 1908, the city of Philadelphia faced recurring outbreaks of typhoid and cholera that killed many people. As an effort to improve the city, officials decided to take the first step by making the park along the river bank known as Fairmunt Park a fortress or river protection for sewerage. Later, the park was also used as a green open space. Which is used for recreation or just sports (Rande, 2020).

In addition, the City of Helsinki, Finland, is using a functional city approach with three principles, namely smart city, inclusive city, and sustainable city, to overcome the effects of the COVID-19 crisis. In parallel, the focus is on improving the quality of life, strengthening energy security and improving mobility. It is these three principles that form the basis and recovery plan in the city of Helsinki.

The city of Vienna, as the capital of Austria, was also affected by the pandemic. To cope with the impact of COVID-19, the city government of Vienna adopted the model of crisis management and resilience development. Where adaptive initiatives to develop and repurpose multiple buildings, such as hospitals and housing, to create emergency infrastructure and free up resources. In addition, city and community leaders have implemented a series of "post-crisis living" measures to strengthen communities against future shocks: for example, neighborhood telephone networks organize daily assistance for vulnerable elderly or isolated residents without family support (PWC, 2020). London, Philadelphia, Helinski and Vienna are prominent examples and can serve as lessons for other cities in recovery. City leaders can add value at each stage of the framework by helping their cities navigate the current crisis.

Strategies for realizing resilient city using socio-ecological system

Based on the above explanation of the steps taken by other countries in the face of crisis to further realize urban resilience, it is good if Indonesia can imitate or at least take examples by adapting them to the conditions and structure of each city in Indonesia. The following socio-ecological strategies can be considered in urban resilience:

Economic resilience (resilience city)

Strategies for achieving economic resilience can be adapted from an evolutionary approach related to the adaptive cycle model of panarchy theory (Simme, Martin, 2009; Hill et al., 2010). The evolutionary approach suggests that cities are examples of complex adaptive systems. This means that urban resilience is dynamic, interconnected, evolving in many ways, and diversifying by adapting to internal and external influences (Batty et al., 2004). Thus, a resilient urban economy will be one of the solutions that can absorb and accommodate extreme shocks or quickly and successfully create new socio-economic structures (Simme, Martin, 2009). According to Moore, there are eleven variables of economic resilience First, the city has leaders who are able to optimize the service needs of the general public, especially the poor in the city, while increasing the naturalness of the urban environment.

Second, there is an adequate amount of green space and an effort to continually expand the green open space (RTH). This is complemented by the development pattern of residential zones, business centers and office areas in a mixed area, so that the city is more dynamic.

Third, have a low-emission industrial area development model, because the positive externalities achieved during the

COVID-19 pandemic will not last long if there are no regulations regarding carbon emissions from factories. Fourth, the city government must have a program for recycling goods that can be recycled.

Fifth, have a program to reduce the use of sustainable cars, for example by making bus transportation fast, cheap, and comfortable while still considering health protocols. It is also important to build bicycle paths along with policies or regulations to create a conducive city. In addition, there are pedestrian areas in the city center and around shopping centers. (Moore, 1994). To implement this strategy, cities need to partner and collaborate with central government as well as citizens, NGOs, academia and the private sector in a multi-stakeholder approach to ensure a consistent set of policies and coordinated actions. Cities must also become more self-reliant and innovative, involving all stakeholders in crisis response and recovery planning.

According to OECD research, a coordinated response by all levels of government, in both federal and unitary systems, can minimize management failures. Governments cannot meet the demands of crisis management alone. So, during the COVID-19 crisis, as a reminder of its scope and magnitude, levels of government are strengthening their partnerships with each other, the private sector and citizens. The research shows that 90 percent of respondents said that local governments report that coordination between all levels of government is very important in designing and implementing policies. 79 percent said additional sources of funding for subnational entities were also very important. Communication with the public and the ability to adapt policies to local circumstances are also seen as key to the success of a strategy or plan.

In addition, the importance of trust is also a fundamental factor analyzed in economics, for example, its influence on tax compliance. As reviewed by (Giuliano & Rasul) reported on the Voxeu website by Bargain and Amininjonov, the level of trust in the government leads to greater compliance with government response measures. Mobility restriction measures, for example, are more effective when public trust is high. In the United States, for example, an increase in certain strictures or social restrictions is associated with a greater reduction in mobility when trust is relatively high, and therefore a greater likelihood of reducing the spread of the pandemic. In Europe, compliance with public health policies is also higher due to high levels of trust (Bargain & Aminjonov, 2020).

This underscores the importance of successful multi-level governance. Each level of government relies on the others for different aspects of policy and service design and delivery to manage the impact of COVID-19. At the same time, ensuring policy success will depend heavily on city leaders and their ability to deliver solutions. Citizens' trust may play a role in ensuring compliance with the actions of governments responding to mitigate the impact of this pandemic (OECD, 2021). However, while the crisis may increase citizen trust in government, the challenge for public officials is to continue to build and maintain it. This is because it is easy to lose trust quickly, but conversely, it takes years to build trust (Edelmen, 2020).

Consumer behavior (society)

The current shift in consumer behavior is inevitable, as people tend to consider hygiene and comfort factors. For example, consumers are changing their shopping patterns by using social media, namely e-commerce. In line with this, this change in behavior has also been predicted by economists that when the COVID-19 outbreak ends, people's consumption patterns will continue to use

e-commerce media or online to buy goods and daily needs. If this change continues or is prolonged, it may affect traditional stores, which will begin to lose interest. Therefore, it is necessary to formulate a strategy that leads to Think New Normal (Post-COVID-19), as for the strategies, namely: First, it must be careful in responding to shifts in consumer behavior patterns towards the use of online media to buy basic needs and other needs, so that the number of online markets will increase. In this way, business people need to implement the DTC (direct-to-customer) channel model, not just limited to relying on previously available marketplaces.

For example, in a Muslim-majority country, products or goods with a halal label will be of particular interest to consumers because of the hygiene and comfort factors. Third, there needs to be rebranding to build an image and add proportional or spiritual value. Thus, the brand or trademark can realize a spiritual connection with consumers as a solution that provides a sense of comfort or security to consumers.

Fourth, with the rise of food delivery services due to changes in consumer behavior, various companies need to change the perspective of what has sometimes become a habit, and what was once just a pleasure has become an opportunity. So that the existing market will grow more and those who have not started can be changed, for example, using online catering services. Fifth, there is a need to increase the functions of the official store function on various marketplaces, so that businesses will be increasingly in demand by consumers (Hatta, 2020).

Environment

Strategies for the city's environmental resilience can use a circular economy model, which aims to design out waste. In fact, the circular economy is based on the idea that there is no such thing as waste. To achieve this, products are designed to be durable (quality and well-used materials) and optimized for reuse, which facilitates their handling and transformation or renewal.

Therefore, post-Covid 19 cities can take the initiative to develop and reuse some buildings such as hospitals and housing units to create emergency infrastructure. If there are buildings that have not been completed or are still in the planning stage, residential functions and building floor coefficients can be added. This is done so that development planning can still be carried out due to the influence of the real estate sector on businesses. Reuse and upgrading of buildings should be prioritized over demolition, and construction waste should be recycled where possible. This strategy can be implemented if there is cooperation between the government, stakeholders and the community. The definition of the model used is the same as that used in the City of Vienna, where development is through reuse.

In developed countries, many cities are moving towards clean electrification and smart grids to reduce their carbon footprint and work towards net zero emissions. However, this requires long-term investments that may not be financially feasible for developing countries. Therefore, it is necessary to first address basic infrastructure gaps and invest in renewable energy infrastructure, which can also drive job creation and economic growth (Hui, 2021). When discussing a city in both developing and developed countries, it is not far from the concept of resilience itself.

As explained in the above description, the concept of urban resilience is a topic that makes sense because the factor is related to the human life system. Especially in the context of the global COVID-19 pandemic, the discussion will continue with an uncertain period of time because it depends

on the biggest factor of the pandemic, which is human or society or ourselves as actors. Although it is not possible to predict when the pandemic will end, the government, especially the city leaders, must adopt policies or organize strategies comprehensively and continuously, so that if similar conditions recur in the future, these policies or strategies can alleviate the effects caused.

Therefore, to respond to these problems, this researcher uses the strategy of socio-ecological system, namely the relationship between ecology and social systems or with other systems that have elements in the form of economic resilience, consumer behavior (society) and the environment. These three elements are considered capable as one of the many strategies with all perspectives out there that can realize resilience city.

Conclusion

The concept of urban resilience is a sensitive issue because it affects the life of the city. To deal with the shifts and changes that occur after the COVID-19 global pandemic, it is necessary to formulate strategies or policies related to it. This research uses a socio-ecological system as a response to problems related to the resilience of a city in the post-COVID-19 period. The strategy used leads to three elements of the system, namely economic resilience, consumer behavior (society) and the environment.

Urban resilience strategies implemented in other countries by creating sanitation networks, riverbank recovery, smart cities, inclusive cities and sustainable cities, crisis management and development resilience. While urban resilience strategies that can be considered to be applied in our country include: urban resilience strategies such as expansion of green open spaces (RTH) and construction of bicycle lanes along with the rules, Think New Normal (Post COVID-19) strategy by paying attention to the comfort, safety and hygiene aspects of a product, and environmental strategies such as reuse and renewal of buildings.

Although Indonesia is not yet at an optimal level in developing strategies or policies related to urban resilience, it is currently entering a period of economic recovery by providing various incentives and policies to communities affected by the COVID-19 pandemic.

Declaration of Ownership

This article is our original work.

Conflict of Interest

There is no conflict of interest to declare in this article.

Ethical Clearance

This study was approved by the institution.

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