

The contribution of smart parks to achieving the resilience of cities

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Abstract:

Public parks are considered one of the most important uses of land in cities, they are spaces that contribute to achieving resilience by purifying the urban environment from carbon emissions and air pollution. Recreational activities also contribute significantly to the psychological and physical satisfaction of their visitors (Alsonny et al., 2022; Chepesiuk, 2009; Hamdy, 2022), **Statement of the Problem:** many parks are not in active use, especially in developing countries, due to a lack of maintenance and other basic aspects that meet various user needs, such as safety and social activities. The cost of revitalizing a public urban park poses great pressure on the government, especially in developing countries, and many cities are exposed to the challenges of climate change. We find that gray or green infrastructure alone cannot respond to these conditions and solve these problems. Smart technologies offer many benefits and contribute significantly to solving these problems. Therefore, green infrastructure and nature-based urban systems combined with smart solutions can help reduce negative environmental impact. Hence, a new wave of thinking involves promoting the integration of green and smart solutions that encourage well-being, security, and societal cohesion rather than focusing on efficient smart systems that only enhance economic efficiency. The development of technologies and the emergence of a new concept called smart parks that rely on modern technologies to save energy increases the park's contribution to achieving resilience for the city. It plays a major role in achieving urban resilience and combating climate change challenges, such as stormwater management (Carter, 2013) (Wright & Marchese, 2018), floodwater management (Beadenkopf, 2019), coastal infrastructure management (Agency, 2016), and waste management. urbanization (Bande & Shete, 2017), recreation and outdoor space management (Foster et al., 2016), and asset management (Martinez et al., 2018), providing responsive and adaptable infrastructure. This requirement ensures that systems, including networks, sensors, and communication channels, are strictly monitored, and data is collected and reported effectively to make appropriate decisions. The analysis indicates that switching from gray infrastructure to integrated smart and green infrastructure systems provides environmental, health, social, and economic benefits. However, additional insights and research are needed in several areas (e.g., cost-benefit analysis of climate change adaptation, city performance indicators, urban systems, smart grid modeling, community engagement, and engagement via digital technology) to advance towards achieving resilience for cities. **Objectives:** The research aims primarily to identify the extent to which smart parks contribute to achieving resilience in cities, through an analysis of some experiences of smart parks at the global and regional levels. **Methodology:** The inductive approach was followed by identifying the difference between traditional parks and smart parks, identifying the determinants of public parks, the theoretical foundations of designing public parks and smart parks, and the various standards and foundations that would govern smart parks. Then, the analytical approach was followed in the research by analyzing global and regional models of smart parks, to identify the extent to which smart parks contribute to achieving resilience in cities. The study will first clarify the goal and criteria for selecting these smart parks and the methodology for analyzing them. After that, the park will be introduced, its location conditions, and a historical background about it, then the smart elements and technologies for each park will be analyzed, and the conclusions will be clarified according to the main dimensions and value criteria of the smart park, and the extent to which each of these smart parks will contribute to achieving resilience through applications of integrated, smart, and green infrastructure systems will be explained. **Results:** Through the theoretical and analytical study of the research, the importance of smart parks in achieving resilience in cities became apparent through analytical studies conducted on six global and regional parks, where smart parks play a major role in achieving urban resilience in the city, in addition to providing the city with a more sustainable environment. Improved resilience allows cities to adapt and

transform to meet many challenges, including climate change, overpopulation, inadequate infrastructure, or pandemics. As the threat of climate change due to extreme weather events increases, it is essential to maximize the resilience of smart and green infrastructure, of which smart parks are a part. Smart parks also naturally mitigate the effects of floods because they provide a permeable surface for stormwater to drain off. Large green spaces also contribute to creating a healthy living environment and increasing human productivity. The dimensions and applications achieved through smart park experiments were monitored and analyzed to contribute to achieving resilience. The research recommends that planners and stakeholders shift to resilience thinking and complete the study by developing indicators to measure the resilience and smartness of the park.

Keywords :

Smart parks, Urban Resilience, Resilient cities

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