Chapter 8
Smart and Sustainable Cities: Challenges and Prospects for Istanbul

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ABSTRACT

Rapid urbanization brings about many challenges, such as air pollution, congestion, food insecurity, and waste management. The concepts of "smart city" and "sustainable city" have become very significant for cities that are severely experiencing these types of problems. In this study, the Sustainable Development Goals (SDGs) and smart sustainable indicators are linked to the concept of smart sustainable cities, with a particular focus on assessing Istanbul in this context. As a megacity, Istanbul possesses abundant human capital and a dynamic environment that can provide opportunities for smart and sustainable solutions. However, rapid economic and population growth may simultaneously generate new and complex challenges.

1. INTRODUCTION

Urban populations have increased dramatically, particularly over the past few decades. The rate of increase is especially striking in developing countries. In middle-income countries, the urban population rate (% of total population), which was 27% in 1975, reached 55% in 2024 (World Bank, n.d.). The United Nations has projected that 68% of the world's population will live in cities by 2050 (United Nations, Department of Economic and Social Affairs, n.d). Rapid urbanization brings about many challenges, such as air pollution, congestion, food insecurity, and waste

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management (Ahvenniemi et al., 2017). As Bibri and Krogstie (2017) pointed out, even though the rapid urbanization is an inevitable consequence of social evolution, it poses extensive challenges. To overcome these challenges, cities must present smart and sustainable solutions to current and future problems. In this context, the concepts of "smart city" and "sustainable city" have become very significant for cities that are severely experiencing these types of problems.

The notion of sustainability is largely derived from the need arising from environmental crises caused by agricultural and industrial activities, which have led to the degradation of vast areas of land and to inequalities in many respects (Bibri & Krogstie, 2017). Even though there have been many attempts to define sustainable development, the World Commission on Environment and Development (1987) was the first to define it as "not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs" (p.16). The concept of urban sustainability, on the other hand, dates to back to the 1990s. The European Union initiated several urban sustainability policies in 1991, and additional initiatives were launched throughout the 1990s to achieve urban sustainability. At the Habitat II Conference in 1996, held in Istanbul, some basic characteristics of urban sustainability were defined. During the conference, experts and scholars referred to sustainable urbanism as "urban areas' uses of environmental resources and their production of environmental pollution should not exceed nature's ability to reproduce and absorb such metropolitan inputs and output" (Whitehead, 2009, p.110).

The smart city concept has also evolved hand in hand with the concept of urban sustainability. Dameri and Cocchia (2013) stated that the idea of the smart city dates back to 1994, but it has been widely used since 2010, especially through the European Union's sustainability projects and actions labelled as "smart" in urban areas. However, there are various definitions of the smart city. Yet in any form of definitions, developments in the technologies of information and communication (ICT), logistics, energy and so on lie at the heart of this concept. As Bibri and Krogstie (2017) clearly pointed out that "smart city represents essentially efficiency which is based on intelligent management of urban systems using ICT" (p.191). Urban ICT comprises any hardware or software components. The former refers to the any computers and terminals, internet infrastructure, wireless systems, smart sensors etc, while the latter refers to the any "software applications operating and running the on these hardware systems, including big data analytics" (Bibri and Krogstie, 2017, p.190).

So far, the smart city concept has been addressed by various researchers and institutions (Angelidou, 2015; Chourabi et al., 2012; Caragliu, et al., 2011; Hollands, 2008; Marsal-Llacuna et al., 2015; Wall & Stavropoulos, 2016). The European Union