LESS MATERIAL PROJECT[1]

Post-Earthquake Measures for Cities in Turkey

by Burcu Hiçyılmaz, 22 March 2023

Two major strong earthquakes struck Turkey's southeast region on February 6, 2023. This earthquake caused widespread devastation and casualties in eleven provinces. It is critical that many of the homeless people in these cities return to their rebuilding homes as soon as possible. After so much death and suffering, both the reconstruction of damaged towns and the execution of precautions for structures in all cities that are not resistant to a potential earthquake came to the fore and emerged as priorities. All of these developments are significant because they call for a significant transformation. In fact, the future of cities will be decided by every new infrastructure, building, park, etc. project that will be established. Within the scope of their fields of expertise, scientists' role in this process is to bring their ideas and various perspectives on the cities to be rebuilt to the attention of policymakers. The purpose of this text is to emphasize that building earthquake-resistant cities is an unavoidable necessity, but also to discuss what can be done in the context of sustainability to avoid climate change.

The implementation of the Smart City (SC) concept is currently one of the most crucial solutions. Various key components of the smart city concept are presented in Figure 1 [1]. A smart environment is a key component of an SC that focuses on improving the sustainability and livability of urban areas through the use of advanced technologies. Smart environment initiatives can include a wide range of measures such as energy efficiency, waste and natural resources management, air quality, and water management. Thereby, SC contributes to the long-term sustainability of cities by reducing carbon emissions and promoting sustainable development.

Smart grid systems, energy storage systems, green roofs, and LED street lighting are a few potential examples of smart environment energy efficiency measures. Furthermore, new buildings must be smart buildings that optimize energy use through sensors and automation. Some smart applications that will reduce energy use include automatic adjustment of heating and cooling systems based on weather conditions and providing sensors to lighting systems.

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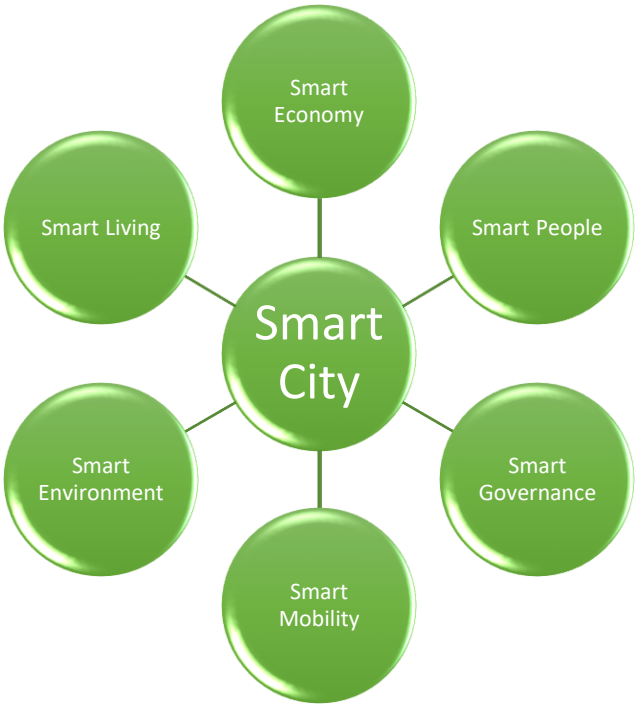
Figure 1. Key components of a smart city



In terms of a smart environment, the establishment of waste sorting, recycling stations, composting facilities, smart irrigation systems, and rainwater harvesting systems can be given as examples of material efficiency measures. In addition, the design and construction of the building, as well as its location and the seismicity of the area, play important roles in determining its earthquake resistance. Thereby, the selection of earthquake-resistant but sustainable materials that can be used in smart buildings is also important. This will mean that both climate-resilient and earthquake-resistant buildings can be built. For example, some green materials, such as cross-laminated timber (CLT) and green steel, can also show resistance to earthquakes. Additionally, it's crucial to consult with experts and follow local building codes and regulations to ensure the safety of the building and its occupants.

At this point, it should also be emphasized that material efficiency does not imply reducing used materials such as steel, concrete, and iron in a way that reduces building earthquake resistance. Such action causes the same suffering and puts people's lives in danger. Engineers and architects must find a way to integrate climate and earthquake resistance into building designs without risking human life while maintaining efficiency and sustainability.

References

[1] Albino, V., Berardi, U., & Dangelico, R. M., “Smart Cities: Definitions, Dimensions, Performance, and Initiatives”, Journal of Urban Technology, 22:1, 3-21, 2015, DOI: 10.1080/10630732.2014.942092.