Accepted Manuscript

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Please cite this article as: & Bibri, Simon Elias., The IoT for Smart Sustainable Cities of the Future: An Analytical Framework for Sensor-Based Big Data Applications for Environmental Sustainability.*Sustainable Cities and Society* https://doi.org/10.1016/j.scs.2017.12.034

The IoT for Smart Sustainable Cities of the Future:
An Analytical Framework for Sensor–Based Big Data Applications for Environmental Sustainability

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Highlights
Associated with big data analytics, the IoT is one of the key components of the ICT infrastructure of smart sustainable cities as an emerging urban development approach due to its great potential to advance environmental sustainability.
Topical studies tend to deal largely with the IoT and related big data applications in connection with economic growth and the quality of life in the realm of smart cities, and largely ignore their role in improving environmental sustainability in the realm of smart sustainable cities.
The big data applications enabled by the IoT have the potential to serve a variety of the domains of smart sustainable cities with respect to operational functioning, management, and planning in line with the goals of environmentally sustainable development.
The most relevant data−centric applications enabled by the IoT pertain to transport, mobility, traffic, energy, power grid, environment, infrastructure monitoring and management, urban design and planning, and large–scale deployments.
The proposed framework, which can be replicated, tested, and evaluated in empirical research, will add additional depth to studies in the field and provide a basis for researchers to draw on analytical insights in future research.

Abstract
The Internet of Things (IoT) is one of the key components of the ICT infrastructure of smart sustainable cities as an emerging urban development approach due to its great potential to advance environmental sustainability. As one of the prevalent ICT visions or computing paradigms, the IoT is associated with big data analytics, which is clearly on a penetrative path across many urban domains for optimizing energy efficiency and mitigating environmental effects. This pertains mainly to the effective utilization of natural resources, the intelligent management of infrastructures and facilities, and the enhanced delivery of services in support of the environment. As such, the IoT and related big data applications can play a key role in catalyzing and improving the process of environmentally sustainable development. However, topical studies tend to deal largely with the IoT and related big data applications in connection with economic growth and the quality of life in the realm of smart cities, and largely ignore their role in improving environmental sustainability in the context of smart sustainable cities of the future. In addition, several advanced technologies are being used in smart cities without making any contribution to environmental sustainability, and the strategies through which sustainable cities can be achieved fall short in considering advanced technologies. Therefore, the aim of this paper is to review and synthesize the relevant literature with the objective of identifying and discussing the state–of–the–art sensor–based big data applications enabled by the IoT for environmental sustainability and related data processing platforms and computing models in the context of smart sustainable cities of the future. Also, this paper identifies the key challenges

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