SMART CITIES

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SMART CITIES: A PANACEA FOR SUSTAINABLE DEVELOPMENT

BY

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INVESTOR IN PEOPLE

To God
Who Made All Things Beautiful

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PREFACE

Change is constant with humans. There is always the urge to move from a state to another no matter the level of comfort enjoyed at that moment. And with the client being insatiable in nature coupled with the quest to dealing with scarcity, construction professionals in the construction industry needed to act swift in order to meet the growing expectations and providing sustainable alternatives to scarcities. Surplus and reusable are the major terminologies when dealing with concepts that gave birth to sustainable development (SD). In the search for better quality of life, residents migrate at a very high rate from less developed areas to developed ones. This has however increased the pressure on the available resources present in such civilised cities. The population's growth is not slowing down soon at any moment hence the need to improve on what has been on ground. Smart cities come as a solution to the demands to the growing migrated population. The smartness of a city comes from the relationships between construction stakeholders and the citizens with general enhancement in mind as the targeted goal. It is believed that when there is a more technologically advanced society where operations are estimated and managed, there is bound to be improvements in all standards and ease of growth in social, physical and economic circumstances.

The smart city has been developed over the years and its benefits are numerous. As well as challenges and drivers that are part of its concept, the smart city framework inculcated into constructions will enhance the overall performances of cities as well as the citizens living in them. This book assists the readers in comprehending better what smart city in construction is all about. It starts by defining smart city to identifying concepts in it; also, the process, theories and models that are embedded in it are explicitly explained to give a solid basic understanding of the subject. The interaction between smart city and SD was affirmed in the context of the book. Furthermore, procurement in smart city development brings a new look to an angle presented in terms of functionality and acceptability of the smart city into construction processes even from the onset of planning to management of executions within a contract sum and duration.

As urbanisation continues to progress through several digitalisation processes, the architecture, engineering, construction and operation (AECO) industries are always saddled with delivering results due to the growing pressures within and outside the construction industry. The expected readers of the book are construction professionals in various fields; undergraduate and postgraduate students in the built environment discipline; policy-makers in the construction industry; procurement officers; government agencies in ministries, secretariats and functional integrated infrastructural project professionals; construction workers both in developing and developed countries; city and urban planners; building, civil and industrial stakeholders; value creators across several fields; individuals concerned with building a smart or sustainable city; building contractors and regulatory project personnel; financiers in terms of banks, bond, insurance companies; and local monarchs among other readers.

This book can serve as research guide, concepts and practices concerned in smart city development, construction management, SD, functionality and sustainability, and material notes for relating city development. It is of the hope that the readers will be educated and informed about the practices that are involved in smart city development.

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PART 1

GENERAL INTRODUCTION OF THE BOOK

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GENERAL INTRODUCTION

ABSTRACT

This first chapter of this book tends to bring into understanding the various definitions concepts, evolutions, characteristics and many more on smart cities. These are further explained across the other chapters of the book as to the roles and functionalities of smart cities in this modern world. This chapter starts with an introductory part that briefly describes what cities hold and the idea of inculcating smartness into it. Furthermore, various definitions were explicitly defined across other sections of the introduction. The objective of this book relates the reason and solution the book aims to offer into the construction industry as a system that is not only functional but also sustainable across various professionals of the construction industry. This chapter ends with concluding part that describes the totality of what have been discussed in the course of the chapter. The research book also contains reference for further reading.

Keywords: Smart policy and economy; smart infrastructure; sustainability; sustainable development; urban sustainability; urban system

INTRODUCTION

Cities hold the potentials to allow their habitants access developmental opportunities; they are the poles that hold human and economic activities. As they grow in complexity and size, they pose a large range of challenges and problems. In cities, the level of inequalities are very strong such that if not

properly monitored or managed, the negative effects of the inequalities can outweigh the positive effects. The concept 'Smart city' came into existence as a way to achieve efficient and sustainable cities through the innovations made possible through technological advancements. The notion of smart city is to execute specific projects, implement strategies that are accepted globally and that can mitigate challenges faced by an ordinary city.

Humans want change constantly from utility experienced. In simple term, the insatiable nature of man has driven the urge to improve profoundly in every aspect of development. Smart city as a sustainable upgrade of a city is expected to cater for the changes expected according to the locality of the city envisaged. With improvement experienced in every aspect of quality of life, life expectancy is surely heading towards that which is long and comfortable for the citizens and profitable for the stakeholders.

This research book is divided into six parts and 13 chapters across various sections of the book. The first part details the general introduction of the book; the second part explains the concept of smart cities as it introduces the subject to the reader; the third part expresses the involvement of smart cities stakeholders; the fourth part defines sustainable development along with its principles and definitions. The fifth part shows the involvement of smart cities and sustainable development and the sixth part details enhancing smart cities for sustainable development.

The first of the 13 chapters details the general introduction of the book. It introduces smart city to the readers for basic understanding on what the book entails. The next chapters do not only further introduce the book, they also discuss smart city process coupled with theories and models that makes up smart city. The fifth and the sixth chapters introduce the involvement of the smart cities teams into smart city practices. They encompass smart cities team members and partnership across stages of the smart city operations. The seventh chapter clearly defines and introduces sustainable development while the next chapter relates defined sustainable development to smart cities in terms of quality of life and the ninth chapter explains socially inclusive city. Chapters 10–13 detail drivers of smart cities, smart city dimension, challenges and procurement in smart city developments, respectively.

DEFINITION OF SMART CITIES

Smart city as it were does not have a universally accepted definition. However, it has been defined over the years as the transformation from an ordinary city to that which is sustainable. Smart city encompasses the integration of

technological innovations to cater for the needs and demands of the society. It aims to bring enhancement in every sector of the city's practices as it works in the phase of developing strategies that can better the quality of life and at the same time improve the environment.

Smart city comes with urban development in interactions with social, physical, human and the environment. The concept of this city relates with the built environment in bringing together stakeholders, residents and concerned individuals towards not only technological advancement in enhancing a city but also managing resources available for the use of all. Also, the concept of smart city is expressed within the transfer of data from one source to another through medium created. Information disseminated is vital to the general plan designed towards functionality of the smart city.

In a smart city, conservation of resources is of the most essentiality. Energies of all kinds and manners are distributed and sustained for use not just now but also for the generations to come. The sustainability to be conceptualised must be expressed in terms of ease and advancement in transportation, buildings, water system and other social amenities that forms a city.

EVOLUTION OF SMART CITIES

So many authors have come up with concept for the evolution of smart cities and these includes 'Garden Cities of To-morrow' which was published by Ebenezer Howard in the year 1898 where the author stated that urbanism should be taken as a special concept, by which the less habitable places can be transformed to a more conducive environment with available opportunities. A speech was made by a French man by the name Eugene Henard who happens to be one of the first planners for the urban city whose work has been considered to be a plus to the future development of European cities, in the speech, he said:

> *My purpose is to inquire into the effect a positive change will bring as a result of modern science industry if well implemented to plan the Cities of the Future. The Cities of Tomorrow when compared with the Cities of Yesterday will be more readily encouraging to transformation. (Eremia, Toma, & Sanduleac, 2017)*

Some other authors in the early nineteenth century also referred to the concept of Urbanism as an indispensable instrument for life and the vitality of men. In the mid-nineteenth century, the concept of sustainable city which was a term used to mean the future urban development with a strong reaction

from the United Nations. Later in the late nineteenth century, the concept of Digital cities became the second most popularly used word, where the term means a strong influence with the growth of the information and telecommunication technology with larger streams of data. Recently, especially in the early twentieth century, the term Digital cities has been jettisoned for a more and well-defined term which is Smart Cities. This term makes use of values which are sustainable with social inclusion, which conforms to the current change in the internet technologies.

CONCEPT OF SMART CITIES

The concept of Smart City has to do with innovation in the city's infrastructures, services and management. There are a wide range of definitions for Smart City although a specific definition has not yet been agreed to be best. Smart cities put into consideration two trends that can be related to its main aspects. Firstly, it considers the definitions that emphasises on one urban aspect and excluding other circumstances which a city involves that one aspect of the urban ecosystem is improved upon does not mean that all other problems in the city is solved. Secondly, some other researchers opined that the interconnection for all urban aspects that takes place in real life is the main difference of the Smart City Concept. The problem in the concept of Smart Cities lies in the fact that infrastructural, institutional and social are all intertwined in urbanisation. From all indications, it shows that the concept of Smart Cities has a lot to do with proper management and development of the urban city. Smart City has infrastructures as the central piece, technology as the enabler that makes its concept possible, but the combination, connection and integration of all the systems becomes fundamental to a city becoming smart.

Cities are fast booming, their challenges are to be carefully considered to ensure social progress, population growth and economic development work together. For the fact that most of the global gross domestic product is derived from the cities does not mean everything happening there is going on without challenges.

In study by Schaffers, Komninos, Pallot, Trousse, and Nilsson (2011), the theory on what a smart city should entails details the presence of technological perception, adoption and implementation with allied components that exhibit smartness, digitalisation, intelligence and so on. Cities are not just getting bigger and transformed for now, they are being transformed to cater for the needs of the future while still living in the present. The 'smart' part of the city comes out where there is synchronisation in instrumentation, connectivity,

autonomous, learning and relearning, dissemination and implementation of information, data, concepts, practices towards functionality and enhancement of relationship between the stakeholders and the citizens.

The concept of Smart City covers various definitions and this relates to how the word 'smart' has been interpreted. There are several definitions of Smart City, but until now, none have been universally recognised (Cocchia, 2014). Some examples of these blurry meanings are: Knowledge City, Wired City, Digital City and Green City, Ubiquitous City, Intelligent City, Sustainable City, etc., they all have a kind of connection politically, economically and sociocultural change. The meanings are in certain way part of the vague Smart City concept and we can say there is a kind of correlation in their meanings (Cocchia, 2014).

REASONS FOR SMART CITIES

The need for a more developed and well maintained urban city brought about the need for a more technological and social reformation which was later termed as Smart Cities.

The idea of Smart City stemmed from the development of information communication technologies, which contributes to the redefinition of the concept of natural region. Smart city is the end result of a new, innovative idea about city and urban life. It is more pleasant, more inclusive, greener and cleaner.

The Smart City is nowadays seen like a key strategy to improve the quality of life of billions of people living in cities all over the world.

CHARACTERISTICS OF A SMART CITY

A Smart City is characterised by some factors which include the intelligence of a city under some given set of values like legislation infrastructure to support the development economically, and also support the social effect of allowing the protection of the environment.

RESILIENT CITY SYSTEM, ECONOMICALLY BENEFICIAL CITY

A resilient city is a city that is able to organise themselves to deal with crises, learn from the challenges and move on, this resilience challenge borrows its solution from the smart city. The resilience can be defined as the ability of a city to resist, absorb and accommodate effects of a hazard timely and efficiently.

In order to manage natural disasters in an ever increasing urbanisation, conditions that are specific to cities must be considered. Resilience does not only focus on natural hazards but encompasses occasional crises that may affect a city and endemic problems.

Cities are known to be complex, interdependent systems which are known for being extremely vulnerable to threats from all hazards (natural and endemic) and terrorism. The features which make a city desirable and smart as it were are also the features that make it vulnerable to hazards. This therefore makes such city a very good ground in which economic activities can thrive. Apart from the security assertion of this city, the ease in carrying out operations of various kinds will propel investors from different places across the universe. This is due to the benefits derived from a functional city which makes it the centre of attraction to neighbouring locals and internationals.

OBJECTIVE OF THE BOOK

In identifying challenges and benefits of smart cities in the totality of its functions, several researchers (Giffinger & Gudrun, 2010; Shooshtarian & Ridley, 2016; Nam & Pardo 2011) had worked quite a lot in bridging the knowledge gap of both the citizens and many stakeholders. Other related publications can be found in journals, research books, conference papers and so on.

This research book will therefore identify with aspects that affect the implementation of smart city into the construction industry in peculiarity. This book will also address concepts and practices that can be channelled into various functions towards achieving sustainability. Furthermore, it will enhance the knowledge of the construction stakeholders to what stands to be benefitted not just now but also in the future when smart city is fully adopted and implemented into the industry. As this book serves as a research guide to individuals concerned with sustainability and enhanced construction, it can be employed to function as additional inputs to students, researchers in terms of concepts discussed already and the introduction of procurement of smart city.

CONCLUSION

It is very essential to have solid background study of what cities are and the smartness integrated into the system as a symbol of developmental representation further what has been used to. Cites are designed to function towards essentialities but are also limited in terms of functions and peculiarities. These