A Digital Path to Sustainable Infrastructure Management

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A Digital Path to Sustainable Infrastructure Management: Emerging Tools for the Construction Industry

BY

AYODEJI E. OKE

Federal University of Technology Akure, Nigeria

AND

SEYI S. STEPHEN

Federal University of Technology Akure, Nigeria

United Kingdom – North America – Japan – India – Malaysia – China

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This book is dedicated to God who made all things beautiful.

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About the Authors

Ayodeji E. Oke is an Author and a Lecturer with several years of teaching and research involvement in higher institutions of learning across the world. He founded the Research Group on Sustainable Infrastructure Management plus (RG-SIM+) and he is currently the leader of the team. He has over 350 publications including eight (8) books in the area of Sustainable Infrastructure Management (SIM) with focus on Sustainable Development, Digital Construction, Quantity Surveying, Value Management and other multidisciplinary research areas. He is currently a member of the Department of Quantity Surveying, Federal University of Technology Akure, Nigeria. He is also a Research Associate at University of Johannesburg, South Africa and an Academic Fellow at Universiti Sains Malaysia.

Seyi S. Stephen is a Construction Manager and a graduate of Federal University of Technology, Akure, Nigeria. He is a Social Psychology and Behavioural Sciences Enthusiast. He is a member of the Research Group on Sustainable Infrastructure Management plus (RG-SIM+) and he is currently a research coordinator. He also has a flair for literature and his areas of specialisation are academic consultancy, psychological education and teaching. He has authored books including *Sustainable Construction in Era of the Fourth Industrial Revolution published by Taylor and Francis*, Routledge, *Value Management Implementation in Construction* published by Emerald Publication and *Smart Cities: A Panacea for Sustainable Development published* by Emerald Publication.

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Preface

The construction industry over the years has improved its activities from basic to advanced practices cutting across several construction stages (pre-construction, construction and post-construction). Through the implementation of several functional practices, the industry has been able to move towards construction that involves the application of digital advancements (construction 4.0) into enhancing project design, execution and management of developmental and infrastructural projects. With innovations in the current Fourth Industrial Revolution era (Industry 4.0 age) comes certain changes and deviations. It is, therefore, necessary to manage these differences in the best ways as the construction industry aims for the summit of project delivery with regards to traditional (cost, quality and duration) and emerging project delivery indices. There are several management practices already in place in construction such as risk management, value management, lean management and project management among others that are designed to cater for shortcomings that might occur in construction irrespective of the project phase as well as the method of execution. However, with constant changes in development and growth experienced in the construction industry as it works in line with meeting the incessant demands of the client, and considering modifications that come with management practices, especially with newly adopted technological advancements, it is important to consider how these practices will affect construction process and how these effects can be managed in this digital age.

Sustainable infrastructural management (SIM) is a concept that adopts sustainability principles in the design, construction and management of infrastructural projects using several sustainable practices and digital technologies. By inculcating these practices into construction stages, the industry is set to maximise potential in terms of benefits that come with the application of digital technologies in project delivery. While not neglecting challenges, barriers and other related peculiarities about their functionalities, this book is designed to assist the readers with general oversight of the gap these technologies and practices can fill in terms of additions to both the stakeholders and the clients. Since this book is designed for comprehensiveness, it starts with a general introduction to the chapters and contents therein. Filling the knowledge gap in terms of processes, applications and executions, the chapters explain succinctly the relationship between the adoption of sustainable practices and construction in the digital age.

This book 'A Digital Path to Sustainable Infrastructure Management' explained the usage of digital tools and technologies such as connected machines,

grid computing, mobile cloud computing, smart contract, quantum computing, smart computing, cognitive radio, cyber technology, Radio Frequency Identification (RFID), mechatronics and digital twins for delivery of construction and developmental projects. This book can be used as a research framework by professionals in the architecture, engineering, construction and operation (AECO) industries. With no limitations, the expected readers of this book include construction and engineering professionals in various fields; undergraduate and postgraduate students in the construction and built environment-related disciplines; stakeholders and policymakers in the architecture, engineering, construction and operation (AECO) industry; urban and regional planners; procurement officers in ministries (private and public); construction workers/enthusiasts in both developing and developed countries; building, civil and industrial stakeholders; project managers; value creators across several fields; individuals concerned with building a smart and sustainable city; and building contractors and regulatory project personnel amongst other readers.

Ayodeji E. Oke
Seyi S. Stephen