Foreword

TOWARDS SUSTAINABLE URBAN FUTURES: PLANNING, DESIGNING, ENGINEERING AND MANAGING

I was honoured when asked to write the Foreword for this book on one of the most important topics of our time—sustainability within the Architecture, Engineering and Construction (AEC) industries—and more specifically, on the interconnectedness of social, economic and environmental issues pertaining to the planning, design, engineering and management of sustainable urban futures.

Sustainable urban and infrastructure development requires sound economic development strategies that integrate improved management practices, and the application of best-practice engineering and innovative technologies that guide the planning and design of sustainable initiatives such as: a reduced dependency on air conditioning and more use of natural ventilation; the enhanced use of natural daylight; automated lighting control mechanisms to minimise energy wastage; generation of on-site electricity for heating and cooling; rainwater harvesting; grey water recycling; and water capture.

This book provides the reader with a better understanding of certain intricacies within the lifecycle of sustainable development; the potential benefits that can be gained from implementing improved planning and design initiatives; and appreciates the various influences that challenge the AEC industries in achieving sustainable urban and infrastructure development with a reduced carbon footprint. Sections One and Two provide much evidence of increased sustainable planning, design and engineering interest and activities within the AEC arena from across the globe. They explore a range of sustainable urban and transportation infrastructure development principles and activities that need to be considered at the early stages of the planning and design process, such as: assessing the sustainability of urban settlements; ecological planning; fresh water supplies; current and future generation lifestyles; economic growth; government capabilities and responsibilities; transportation disadvantage; travel surveys; urban public transit route choice behaviours; lifecycle costing analysis of road infrastructure projects; urban traffic pollutant build-up and wash-off; and stormwater quality.

From an engineering perspective, Section Three elaborates on the safety and integrity of urban infrastructure by exploring such topics as the vulnerability and adverse impact of concrete elements in high rise buildings, and the vibration-based damage detection, condition assessment, and acoustic emissions of bridge structures.

Section Four covers the need for enhanced decision-making practices; presents an approach to overcoming a lack of social networks and trust so as to improve knowledge transfer within project based AEC organisations; examines current methods commonly practised in measuring satisfaction level and
elaborates on the advantages of promoting these methods; finally, it explores and identifies the concept of core capabilities needed in infrastructure capacity management.

**Looking Back in Time**

In an attempt to provide an overview of sustainability and the social, economic and environmental responsibilities that come with it, I decided to take a few steps back in time and revisited the area of interest in which this book is anchored, that of sustainable development.

Over the last three decades, countless conferences and summits have been assembled across the globe, and countless Acts of Parliament, reports and books have been published—all of which emphasise one common worldwide obligation or commitment: promoting the responsibility to find innovative ways to better manage and overcome the mounting concerns, challenges and limitations that fuel our perceived inability to meet the essential social, economic and environmental needs of current and future generations.

The initial concept of sustainable development received international attention in 1972, when the Declaration of the United Nations Conference on the Human Environment was adopted in Stockholm. Following its well deserved yet overdue introduction, a commission—The United Nations World Commission on Environment and Development (WCED)—was created in 1987 to help address the global concern for the accelerating deterioration of the human environment and natural resources, and the consequences of that deterioration for current and future economic and social development. In the same year, the Brundtland Report—Our Common Future—was published. In this report, one of the more common definitions of the term ‘sustainable development’ was introduced, and is still referred to today:

*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

This definition is underpinned by two key concepts. First, the concept of needs—emphasising, in particular, the enhanced efforts that we (as guests of the globe) should make to meet the essential needs of those less fortunate. The second is the concept of limitation which refers to the constraints of today’s technology, and the lack of social, economic and environmental ability to meet the needs of current and future generations.

**Achieving Sustainable Urban and Infrastructure Development**

Achieving sustainable development within the AEC industries requires a change in current and future social, economic and environmental activities. It requires the promotion of shared responsibilities for individuals, governments and industry sectors alike at the local, national and international levels. We need to be more proactive in the entire lifecycle of developments by developing, for example, economical energy efficient methods that take advantage of new designs and innovative building technologies that will protect and/or enhance the continued supply of our natural resources, today and in the future.

**Sustainable Development: Social Perspective**

From a social perspective, sustainable urban and infrastructure development requires a change in current and future lifestyles of citizens (stakeholders). The planning, design, engineering and management
stages of sustainable urban and infrastructure development need to consider the social well-being of all current and future stakeholders. Those responsible for all these stages need to provide citizens and organisations with adequate and comprehensive information pertaining to practical (attainable) options, and offer life-long learning in, and awareness of, ways in which to achieve and maintain sustainability within their respective communities.

This new philosophy of sustainable lifestyles can be supported through, for example: government decision-makers (through new legislation, acts of parliament, incentives/rebates); high-level community representatives and leading organisations (that demonstrate extensive experience in all aspects of sustainable development) promoting increased participation in formal sustainable development decision-making processes within their respective environments; implementing formal communication practices (through local and international media groups, publications, etc.); and through providing ready access to value-adding counselling/ information sessions, training and education (public seminars, help lines, etc.). These initiatives will increase the involvement, commitment, skill-sets and general knowledge of today’s generation toward achieving enhanced sustainability in urban and infrastructure development.

Changing government, community and AEC stakeholder perceptions of, and attitudes towards, achieving sustainable urban and infrastructure development—particularly the attitudes and perceptions of those in key/influential positions—could change the traditional patterns and lifestyle expectations of future communities. This, in turn, would promote a global culture of commitment to, and shared responsibility for, sustainability. Through the promotion of sustainable initiatives in planning, design, engineering and management of urban and infrastructure development, and by embracing a “practice what we preach” philosophy, we will influence others to imitate those sustainable undertakings that they believe are likely to lead to individual satisfaction and/or overall success—thus satisfying the “what’s in it for me?” factor.

**Sustainable Development: Barriers and Challenges**

The AEC industries have to realise that investing in sustainable urban and infrastructure development should not be viewed as a ‘quick-fix’ or one-off approach; rather, it is a long term investment in the process of sustainable change itself. Indeed, the survival and sustainability of current and future generations is dependent on the long-term decisions we make today.

Unfortunately, the nature of the AEC industries’ geographically dispersed constructed products, its project-based organisations, and its traditional processes tend to hinder achieving and maintaining the enhanced commitment and shared responsibility required to satisfy the needs of sustainable urban and infrastructure development. The AEC industries’ resistance to sustainability (in general) is further fuelled by, for example:

- having a preference or commitment to continually using what is considered to be ‘tried and tested’ (traditional) techniques, tools, systems and processes for erecting, assembling and installing their unique products and services
- their legacy of ‘sunken costs’ from investing in sustainable change initiatives
- their exceptionally fragile level of trust
- their reluctance to share knowledge and experiences and
- their multiple levels of sub-cultures—each with its own unique perceptions, beliefs, value sets, and attitudes towards “doing things differently”.


From an individual stakeholder’s perspective (senior management, employee, client, project team member, supplier, manufacturer, end-user, etc.), resistance to long-term sustainable change and investment in sustainable urban and infrastructure development may reside in, for example, having a fear of the unknown and of the potential threat sustainability may have on the ‘world’ they’ve created around them. On the other hand, it may be due to people (in general) being habitual creatures by nature; the numerous habits and programmed responses that have developed and become entrenched within them over time may, in themselves, become a source of resistance to investing in sustainable urban and infrastructure development.

Within any society across the globe, we often forget that people are our most valuable resource. People (within their respective environments) are influenced by various internal and external factors that determine the unique way in which they interact with one another, and how they (consciously and subconsciously) respond to a new, better or more sustainable way of ‘doing something’. Therefore, when promoting a long-term sustainable change philosophy within the AEC industries, governments, community representatives, and leading organisations need to seriously consider the various features, characteristics, perceptions and expectations of their stakeholders, and to make these an integral part of the social, environmental and economic (whole-of-life) decision-making processes that are needed to meet the demands of current and future sustainable urban and infrastructure development.

Sustainable Development: Bridging the Sustainability-Knowledge Gap

In addition to promoting sustainable lifestyles and embracing a ‘practise what we preach’ philosophy, the AEC industries can further bridge the investment/need gap of non-sustainable vs. sustainable urban and infrastructure development, by encouraging all private and public AEC industry stakeholder organisations to foster a comprehensive ‘sustainability-knowledge-sharing’ philosophy that is strongly committed and dedicated to protecting and/or enhancing the continued supply of natural resources for current and future generations. This philosophy hinges on the assumption that seeking and using information and experiences is part of a holistic approach to making better sense of the world we live in—a world that is driven by both external and internal factors that have seemingly infinite social, environmental and economic implications.

Sustainable Development: Final Thoughts

This book explores a range of interests and activities pertaining to the lifecycle of sustainable urban and transportation infrastructure development from four distinct perspectives: planning, designing, engineering and managing. Despite the diversity of the sustainability work (tools, models, techniques, suggestions, concepts, statistical approaches, etc.) presented in this book, the lack of joint/common considerations, measures and interactions, and the levels of resistance to achieving enhanced and long-term economic, social, and environmental sustainability within the AEC industries is still evident. We therefore need to continuously ask ourselves:
How can we enhance the planning, design, engineering and management of sustainable development to help control global warming and reduce the current and future consumption of space, energy and resources?

We need to continue to pay greater attention to the human aspects of today’s and tomorrow’s citizens and of members of the AEC industries. That is to say, if our most valuable resource (people) is not properly aligned with, and fully supportive of a ‘sustainable way of doing something’, then achieving sustainable urban and infrastructure development within any community will be that much more of a challenge.

Meeting the various local, national and international needs and expectations of the AEC industries and the community at large (in relation to current and future sustainable urban and infrastructure development), will also require enhanced efforts from individuals, governments and industry sectors alike. All need to promote:

- innovative approaches, shared insights and best-practice activities on how best to address various sustainability-related economic, social, and environmental limitations
- in-depth investigations and continued monitoring of best-practice sustainable development applications and initiatives from across the globe
- transparent (short and long-term) sustainability-related costs, risks, benefits, opportunities, etc.
- increased stakeholder involvement and investment in sustainable urban and transportation infrastructure development
- the development of good governance practices, policies and effective rebate incentives
- the development of value-adding sustainability indicators/codes of conduct, as well as improved management/monitoring systems to ensure compliance with indicators/codes
- enhanced decision-making practices
- the development of new sustainability indicators and benchmarking approaches
- the consultation of a wider range of stakeholders (not only AEC professionals) and
- a focus on innovative R&D efforts.

Unfortunately, many presume to rarely have the time, inclination or financial capacity to analyse (in depth) the economic, social, and environmental conditions in which they operate/live, or to fully investigate and understand how the limitations and potential opportunities of sustainable change may impact on their future success and/or survival. The AEC industries, government organisations and communities at large, therefore, need to be made increasingly aware of the social, environmental and economic impacts and challenges that tend to threaten sustainable development. They also need to be aware of the essential need to achieve an integrated longer-term balance (at a local, national and international level) among these three sustainable development impacts.

Finally, the social, environmental and economic needs and limitations related to the delivery and application of sustainable urban and infrastructure development within our communities will remain. They will relentlessly drive the AEC industries and the community at large to source new and improved sustainability decision-making models and innovative initiatives for planning, designing, engineering
and managing the successful delivery of sustainable development. This book provides a collation of insightful AEC research related to this challenge. Its four dedicated sections present a wide range of innovative solutions, perspectives, concepts and approaches to achieving a sustainable setting within urban and infrastructure development, and promote innovative approaches to addressing actual and/or perceived limitations within current and future urban and infrastructure settings.

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