

# 9

## Sustainable Construction: Green Building Strategic Model

*Mohamed Salama and Ashraf Hana*

### Learning outcomes

By completing this chapter, the reader should be able to:

- Understand the basic concepts of sustainable construction (SC)
- Compare and contrast green buildings with traditional buildings
- Discuss the challenges facing the implementation of green buildings
- Discuss the key enablers that facilitate the implementation of green buildings.
- Understand the process of developing a green building strategic model.

### Introduction

Academic and policy literature over the past four decades (from as early as the 1970s) has been, and still is, concerned with understanding and articulating the core principles of sustainable development and sustainable construction or, in other words, *sustainable building and construction*, which is a holistic, multi-disciplinary approach. The increasing global concern with the maintenance and improvement of the environment, as well as the protection of the human health has become an important aspect to be considered by construction companies worldwide.

The chapter falls into two parts. The main aim of the first part is to present a critical review of the established theoretical frameworks in order to understand the topic in depth, and identify the main concepts and relevant dimensions or variables that have a crucial influence on promoting and implementing sustainable construction/green buildings practices.

The second part presents the findings of a research study conducted by the authors (Salama and Hanna, 2013) that sought to develop a strategic model for

implementing the green building initiative in the UAE; Green Building Strategic Model, (GBSM – UAE). Despite being based on the UAE case, the underpinning theoretical framework and the stages of modelling used in building, training and validating the model makes this section a useful read for all parties interested in the area of sustainable construction in general, and green buildings in particular, regardless of their geographical location.

## Sustainable development

The awareness of sustainable development has been growing around the globe for the last few decades. The UN Summit on Environment and Development in 1972, 'Agenda 21', the closing document of the UN Earth Summit in 1992 in Rio de Janeiro, followed by many other international and national meetings and conferences show the growing concern for protecting the environment for future generations and hence introducing the sustainable development concept.

In 1987 the UN Commission on Environment and Development (the Brundtland Commission) used the term 'sustainable development' to relate the concept of sustainability to human endeavour.

The Brundtland Report defined sustainable development as: "*Development which meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987). This is the most commonly quoted definition of sustainable development and it is appropriate in the context of construction works (Dresner, 2002; Purvis and Grainger, 2004; Bigg, 2004; Prasad and Hall, 2004; Murray and Cotgrave, 2007). On the other hand, the problem with the Brundtland definition of sustainable development is that it is vague and open to individual interpretation; the meaning of sustainability and sustainable development is evolving over time (Murray and Cotgrave, 2007).

A great deal of both academic and policy literature within the ten years immediately following the Brundtland announcement (World Commission on Environment and Development, 1987) was concerned with understanding and articulating the core principles of sustainable development. Two key conceptual approaches were clearly evident, namely: *strong sustainability* and *weak sustainability* (Scottish Executive Social Research, 2006).

## Sustainable construction and its significance

The International Council for Innovation and Research in Building and Construction (CIB, 1999) identified the significance of construction in achieving a sustainable world within their Agenda 21 report on sustainable construction. Bourdeau (1999, p. 354) reiterates this claim.

Sustainable construction was defined as a construction process that incorporates the basic themes of sustainable development (Parkin, 2000; Langston and Ding, 2001; Said et al., 2009; Ugwu and Haupt, 2007). In contrast, the European

Commission concluded that there may never be a consensus view on its exact meaning and it is probably futile to suggest an exact definition.

Other sources (Edwards and Bennett, 2003; Graber & Dailey, 2003) support the concept of sustainable construction as an approach to building which promotes the attainment of goals associated with the triple bottom line:

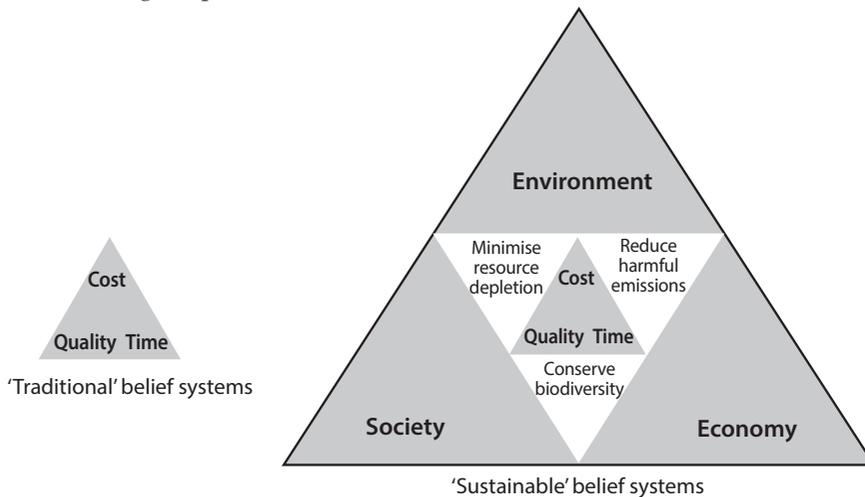
- Economic sustainability,
- Environmental sustainability and
- Social sustainability (Department of Trade and Industry, 2002).

The triple bottom line concept was endorsed by many views in the literature such as Baloi, 2003; Adetunji et al., 2003; Panagiotakopoulos and Jowitt, 2004; Carter and Fortune, 2006; Roper and Beard, 2006; Murray and Cotgrave, 2007; Elkington, 1998; Cole, 1998.

Miyatake (1996) suggested that there are three ways by which the civil engineering and construction industry can act to realise sustainable construction:

- 1 Creating built environments,
- 2 Restoring damaged and/or polluted environments and
- 3 Improving arid environments.

Vanegas et al. (1996) have drawn attention to this expanded set of belief systems for the construction industry, which was further developed by Huovila and Koskela (1998) (Figure 9.1). A new paradigm for a sustainable construction industry has incorporated these beliefs in both a model of sustainable construction, and a set of technological puzzle solutions.



**Figure 9.1:** Expanded set of belief systems for a new technical paradigm (based on Huovila & Koskela, 1998)

Khalfan, in his literature review for C-Sand (2002), highlighted that sustainable construction is generally used to describe the application of sustainable development to the construction industry. Therefore, sustainable construction could be