Routledge
Taylor & Francis Group

Construction Management and Economics

ISSN: 0144-6193 (Print) 1466-433X (Online) Journal homepage: https://www.tandfonline.com/loi/rcme20

Sustainable Buildings and Infrastructure: Paths to the Future

Kjell Tryggestad

To cite this article: Kjell Tryggestad (2013) Sustainable Buildings and Infrastructure: Paths to the Future, Construction Management and Economics, 31:4, 391-394, DOI: 10.1080/01446193.2013.770893

To link to this article: https://doi.org/10.1080/01446193.2013.770893

Published online: 11 Feb 2013.

Public Accounts Committee (2009) *Building Schools for the Future: Renewing the Secondary School Estate,* Twenty-seventh Report of Session 2008–2009, House of Commons The Stationery Office, London.

Woolner, P. (2012) Changed learning through changed space: When can a participatory approach to the learning environment challenge preconceptions and alter practice? *Improving Schools*, **15**(1), 45–60.

Woolner, P., Hall, E., Wall, K., Higgins, S., Blake, A. and McCaughey, C. (2005) *School Building Programmes: Motivations, Consequences and Implications*, The Centre for British Teachers, Reading.

Woolner, P., Hall, E., Higgins, S., McCaughey, C. and Wall, K. (2007a) A sound foundation? What we know about the impact of environments on learning and the implications for building schools for the future. *Oxford Review of Education*, **33**(1), 47–70.

Woolner, P., Hall, E., Wall, K. and Dennison, D. (2007b) Getting together to improve the school environment: user consultation, participatory design and student voice. *Improving Schools*, **10**, 233–48.

PAULA CARDELLINO
Universidad ORT, Uruguay

http://dx.doi.org/10.1080/01446193.2012.757338

Sustainable Buildings and Infrastructure: Paths to the Future

Annie Pearce, Yong Han
Ahn and HanmiGlobal Co Ltd, Routledge, London, 2012 482 pp, ISBN 978 0 415 69092 8, £29.99 (pb)

This is a textbook aimed at students taking courses in construction management and the built environment. Its overall aim is to support the transition to a sustainable future in 2020. While the target audience is clearly specified, this book appears to be relevant not only to current construction design and management practices but also across a wider set of audiences and academic fields.

The book is rich in terms of pictures, images and cases that illustrate current best practices in sustainable buildings and infrastructure. Several quite detailed cases are included, ranging from brownfield projects such as Duke Energy Center office building (Chapter 4, pp. 166–72) to the refurbishment and upgrading of sustainability performance for an existing facility, as in the case of the Empire State Building (Chapter 8, pp. 358–74). Other cases concern agglomerates of building and construction projects as in the case of the project Masdar City (Chapter 10, pp. 455–60). The case of the remodelling of a warehouse into the office and education centre, Trees Atlanta building (pp. 205–9, 214–17, 252–77, 323–33, 354–8, 376–7), serves as a linking pin across Chapters 5–8. This is an excellent case in showing all the work, effort and imagination that is used to accomplish a sustainable building during design, construction, project delivery, and post-occupancy. The Trees Atlanta case provides the reader with interesting insights about aspects such as site management to mitigate erosion and pollution, the management of construction and indoor air quality management during construction. In Chapter 8 the case is put to good use in illustrating the challenges of post-occupancy sustainability and how the building design and the technological installations together with the occupants can play an active role in facilitating low energy consumption and good indoor climate and lighting. The rich gathering of case material on ongoing or recently accomplished sustainability projects in building and infrastructure is a key strength of the book and chapters. Each chapter ends with a number of useful 'discussion questions and exercises' for students and references to literature.

Chapter 1 presents the authors' core message concerning the significance, prevalence, and worldwide impact of the built environment on sustainability-related topics such as social and economic welfare, energy use, water use, waste and materials, land use, indoor climate, air quality and atmosphere. The core message is similar to Hill and Bowen's (1997). For example, Pearce *et al*. cite the United Nations Environmental Programme (2009) 'With buildings being responsible for more than 40% of energy use worldwide, one third of global greenhouse gas emissions can be attributed to buildings' (p. 3). The conventional assumption among students and researchers from the social sciences is that it is humans who are responsible for energy consumption. It may come as a surprise to them to learn that buildings themselves are direct users of energy. Although the authors do not elaborate on their own theory concerning the responsibility of buildings, it seems to be on a par with a pragmatist approach that is concerned with practical outcomes and effects. The authors do not limit themselves to only consider humans, their design intentions and responsibility for the built environment. Owing to this pragmatic approach the authors are able to address important performance issues such as the building's energy use. I find their message to be important for at least two reasons.

First, their pragmatic approach distributes the responsibility for energy use to a wider group of stakeholders: the energy performance is not only a responsibility of the end-user of the building, but also a responsibility of the built facility. It is what the two do together that determines the more or less responsible energy use. Secondly, and related to the first, this pragmatic approach opens up the practical possibility that

the building can perform differently depending upon how sustainability is taken into account during design, construction, use, decommissioning and deconstruction. The book's subsequent chapters are organized according to such a life cycle model for the built facility.

Chapter 2 thus engages with the history of sustainability for the built facility and notes the many local, national and international initiatives and interventions, ranging from Rachel Carson's (1962) agenda setting book *Silent Spring* to national and international institutions and initiatives such as The Brundtland Commission Report (World Commission on Environment and Development, 1987), the United Nations Conference on Environment and Development (1992), the Kyoto Protocol (United Nations Framework Convention on Climate Change, 1998), the United Nations Environmental Programme (2009). The reader can also follow how some of these initiatives are further translated into an 'international sustainable design and construction movement' (p. 44) and research, as in the case of the Counseil International du Batiment. While there are many good intentions and important initiatives, the authors also refer to studies that point to the obstacles. For example, the *Vision* study from the World Business Council for Sustainable Development (2010) points out that business leaders need to change perspective and that the business models and the markets might fail to consider sustainability as important. The authors dedicate Chapter 9 to making the convincing business case for sustainability by using the case of Reedy Fork Elementary School to show the importance of supplementing the traditional calculations of cost items in the project budget with a more holistic approach that considers costs and benefits for the built facility in operation/during its whole life cycle.

The reader will also learn more about these approaches and policies in Chapter 3, such as the 'triple bottom line' of sustainability in construction, i.e., social sustainability, environmental sustainability and economic sustainability and the skills requirements, as for example detailed by the Construction Industry Council in the United Kingdom. Further considerations about effective objectives are provided along with helpful guidance to their use. For example, the authors note that objectives should be attainable, yet such objectives are most useful when they 'require an additional effort beyond common practice' (p. 93).

The authors are to the point in stressing the importance of going beyond common practice and expectations. However, it seems warranted to consider in some more detail the possible tensions between reliance on for example specific measurable objectives and performance indicators on the one hand and the quest to deliver beyond them. The tension concerns the possible role of such explicit objectives and performance indicators to preserve rather than challenge existing performances in the building and construction sector. This tension could be dealt with in a more elaborate way.

Chapter 4 addresses the task of valuation and evaluation of building designs. A quite detailed catalogue of existing rating systems and tools for evaluation of sustainability is provided, from the more generic ones at the product and component level, to the more specific ones that concern rating systems for buildings. Approximately 25 different generic green label systems are described. Another nine green rating systems are about building assessment. The reader is also introduced to infrastructure, regional and country rating systems as well as corporate rating systems such the corporate sustainability report. The building rating system Leadership in Energy and Environmental Design (LEED) is given particular emphasis due to its widespread international use. The chapter includes a case of how LEED was used as the developer's project team and tenants were involved in the evaluation process during design and construction. But as the authors further note, in many cases there are local rating standards in use and they are also often preceding the national and international rating systems.

Given this bewildering multiplicity of rating systems the authors consider the challenges of putting them to good use. For example, while several rating systems remain on a material or component level, others consider aggregates up to the level of complex products such as the building construction. The challenge and complexity of building rating increase with the many different types of buildings, purposes, functions, users and usages. The complex links between the building and the built environment are yet another challenge for the rating as they can involve roads and other access paths, other buildings and open built spaces in between, adjacent infrastructures, cities and regions. To the authors, this variety in the building project's specificity and context represents a problem. In a scenario for year 2020, the fundamental problem is 'the lack of a widely accepted operational definition of the construct sustainability' (p. 180). Yet, the specificity of the building project and context is also acknowledged in that 'there is no "one size fits all" approach'. So, the challenge for 2020 is to develop rating systems that are both sensitive to the project's specificity while simultaneously being sufficiently generic to allow comparisons across projects, building types and contexts. While input from local users and regional bodies is acknowledged as an important and valuable

contribution in order to calibrate the ratings systems, the authors also wish for more 'objective algorithms rather than subjective weightings developed by local interests' (pp. 181–2).

Although the authors have put much work and effort into the task of providing a good overview of the existing rating systems, this reader would like to hear more about their actual use (and eventual abuse) in particular localities. It would be interesting to learn more about the rating systems' more or less active role in shaping sustainability performances of a building and infrastructure project. It is not clear to this reader if these many rating systems help the project to go beyond existing expectations or rather hinder the project from doing so. The authors' wish for a more 'objective' rating seems to imply an assumption that stakeholders' local and subjective interests cannot be trusted. But can this belief in and wish for a future objective rating system not run the risk of reducing expectations for sustainability in construction by making the expectations more homogenous and less imaginative? A related question and concern is the 'objective algorithms' eventual exclusion of the valuable contributions from the local stakeholders. Several of the cases provided by the authors seem to imply such valuable local contributions. For example, the case of Skanska (pp. 121–3) tells the story of a construction firm's 'quest for sustainability' and its first environmental report in 1997. But the environmental wake-up call for this large construction firm has presumably less to do with its links to global sustainability standards and rating systems and more to do with what was going on 'on the ground' in Skanska's major infrastructure project, i.e., the tunnel through the Hallandsås ridge in Sweden. Although our research team's findings are still preliminary they suggest that this project became a matter of concern to local farmers as their cattle turned ill and fish in the creeks died due to the toxic water flow produced during the construction. Their local concerns then escalated into a full-blown environmental controversy in 1997 as farmers organized themselves and went public with their concerns and stakeholder requirements (see also Skanska: http://goo.gl/lcghf). In brief, it is not clear to me how such valuable local contributions from farmers and other stakeholders can be reconciled with a trust in and wish for objective algorithms and global evaluation and rating standards.

This brings the reader to Chapter 5 which concerns stakeholder involvement during the facility's life cycle. While the first generation of users of a building and infrastructure might be directly involved in the project from the early phases of design, future generations of users pose a different management challenge. The challenge for stakeholder management during the early phases concerns how to represent these and other indirect stakeholders and interests. According to the authors, indirect stakeholders are represented by the project owner and/or developer. This is probably most often the case, but it also raises the related question about other ways of representing the building project and its many different stakeholders. The stakeholder theory that is used by the authors might be useful when representing present stakeholders and interests, but seems to be less well adapted to address non-humans as stakeholders and the dynamics of stakeholders and interests over time. In the context of sustainable buildings and infrastructure projects these can be important limitations of the theory. Such projects are invariably related to a construction site and the creation of 'footprints' during construction and in use. Both humans as well as non-humans such as trees, animals and other living species might be affected. To the extent that developers and project owners follow the conventional stakeholder theory and only acknowledge humans as stakeholders, this might have less desirable implications for sustainability in the form of stakeholder exclusion.

The book contains telling images and observations of how construction management can take care of and protect trees, ground and soil on the site (for example Chapter 7, p. 296). There are also several additional useful considerations concerning site management during construction and building commissioning. But while trees, plants, soil, ground and even water are considered and taken care of, animals are almost absent in the 'best practice' cases. In practice, as the Skanska case also suggests, animals are presumably more often than not a stakeholder in the built environment. How do we involve and represent the animals that might become extinct or are forced to move away as the built environment is expanding? How can we know more about these animals and those that are moving in due to the very same expansion? These are difficult questions in need of further research. As has been argued elsewhere (Tryggestad *et al.*, 2013) the conventional stakeholder theories and approaches are insufficient when dealing with the question of animals in the construction project and built environment. A final but related remark concerns the book's dedication. It is 'dedicated to a sustainable future for the built environment and the new ways of thinking for the people who occupy it'. I can only agree, but would like to see this dedication expanded to the above-mentioned animals and non-humans.

This textbook is an important contribution that provides a very good overview of the topic of sustainable

buildings and infrastructure. In addition, the book provides many and quite detailed cases that allow students within construction management as well as readers from other domains to recognize the key role the construction sector plays in connection with sustainability, locally as well as globally. Even for readers from within construction research and practice, the many illustrative contemporary cases on sustainability should facilitate new insights and ideas about its challenges and opportunities. The book will be a good choice for most readers interested in sustainability.

References

Carson, R. (1962) *Silent Spring*, Houghton Mifflin, Boston, MA.

Hill, R.H. and Bowen, P.A. (1997) Sustainable construction: principles and a framework for attainment. *Construction Management and Economics*, **15**(3), 223–39.

Skanska (n.d.) Endurance cuts through the Hallandsås Ridge: from environmental wake-up call to breakthrough, available at http://goo.gl/lcghf (accessed 19 December 2012).

Tryggestad, K., Justesen, L. and Mouritsen, J. (2013) Project temporalities: how frogs can become stakeholders. *International Journal of Managing Projects in Business*, **6**(1), 69–87.

United Nations Conference on Environment and Development (1992) *Agenda 21. Programme of Action for Sustainable Development: Rio Declaration on Environment and Development. Statement of Forest Principles, United Nations* Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil, 3–14 June, United Nations, New York.

United Nations Environmental Programme (2009) *Buildings and Climate Change: Status, Challenges and Opportunities*, UNEP, Paris, available at http://goo.gl/fdFYU (accessed 23 January 2013).

United Nations Framework Convention on Climate Change (1998) *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, United Nations, Geneva, available at http://goo.gl/Vhz34 (accessed 3 January 2013).

World Business Council for Sustainable Development (2010) *Vision 2050: The New Agenda for Business*, WBCSD, Conches-Geneva, available at http://goo.gl/ghbuF (accessed 23 January 2013).

World Commission on Environment and Development (1987) *Our Common Future* (The Brundtland Commission Report), Oxford University Press, Oxford.

KJELL TRYGGESTAD
Copenhagen Business School, Denmark

http://dx.doi.org/10.1080/01446193.2013.770893

Modern Construction: Lean Project Delivery and Integrated Practices
Lincoln H. Forbes and Syed M. Ahmed, CRC Press, Boca Raton, FL, 2011
490 pp, ISBN 978 1 4200 6312 7, US$130.00

For some time now, I have had two books on my desk. The newer book, *Modern Construction: Lean Project Delivery and Integrated Practices*, by Forbes and Ahmed, is the subject of this review. It was published in 2011, and is arguably the most comprehensive treatment of the subject of lean construction to date in a book. The older book, its cover worn and its pages slightly yellowing, is *Productivity Improvement in Construction*, by Oglesby, Parker and Howell, from 1989 (Oglesby *et al.*, 1989). Both books essentially deal with the same fundamental question: 'How can we achieve maximum productivity in construction on site?' Like two book ends at either end of a shelf, they frame a period of 22 years during which the best practice of construction management has changed and developed under the influence of novel construction methods and materials, information and communication technologies, and lean thinking. The litmus test for the newer book, with the adjective 'modern' defining 'construction' in its title, is whether it reflects the best practices in construction management as they stand today.

There are a number of striking similarities between the two books. Both have chapters on productivity and performance measurement, safety in construction, productivity improvements, ergonomics, worker motivation and management–labour relations, systems integration approaches to construction on site, and computing in construction. Even discrete event simulation, considered a relatively modern tool, was treated in the earlier book. So what knowledge and skills do Forbes and Ahmed offer us, practitioners and academics, that we could not learn from Oglesby *et al.*?

Forbes and Ahmed's most important contribution is their treatment of the application of various aspects of lean thinking to design and production control in construction. They provide a reasonable theoretical and historical background to the foundations of lean construction, tracing its roots to Koskela's groundbreaking 1992 study in which he considered the applicability of what he called the 'new production philosophy' to construction (Koskela, 1992). The term 'lean construction' was coined at the first meeting of the International Group for Lean Construction in Helsinki in 1993. Forbes and Ahmed present the Lean Project Delivery System™ and discuss the application in construction of tools developed in lean manufacturing, such as value-stream mapping, first-run