

PAPER • OPEN ACCESS

Current work on social sustainability in the built environment

To cite this article: N B Larsen and L B Jensen 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **225** 012063

View the [article online](#) for updates and enhancements.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642384.



Current work on social sustainability in the built environment

N B Larsen¹ and L B Jensen¹

¹ Department of Civil Engineering, Technical University of Denmark, Kongens Lyngby, Denmark

nabl@byg.dtu.dk, lbj@byg.dtu.dk

Abstract. Sustainability is based on the United Nation's (UN) Brundtland Report, which defines economic, social and environmental factors that can ensure long-term economic viability while maintaining an environmental balance and showing commitment to socially desirable practices. Great focus has been on integrating environmental and economic factors into the project processes of construction. There is substantial potential in developing a strategic process to ensure that social sustainability is systematically incorporated into a project equally with economic and environmental factors. Research in the field is scarce and suggests that social sustainability is a secondary parameter even though it is integrated in building projects today. There is a tendency that decisions made regarding which social sustainability aspects is to be integrated in a project is based on experience from previous projects. There is a need of a strategic approach on how to handle and work with social sustainability that is based on more than experience. Can decisions be informed by quantifiable information about social sustainability as is the case with economic and environmental sustainability?

Keywords: Sustainability, social sustainability, economic sustainability, environmental sustainability, assessment tools, certification systems

1. Introduction

Sustainability and sustainable development has been on the agenda for several decades. It was thoroughly manifested in 1987 by the report "Our Common Future" by the World Commission on Environment and Development (WCED), also known as the Brundtland Report. In the report sustainable development is defined in the following way: "Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [1]. Sustainable development is an integrated strategy that should strive to improve the wellbeing of humans without damaging the environment of society [2].

Sustainability can be divided into three pillars; environmental, economic and social sustainability. Substantial research has been made on the development of tools and methods to work with economic (LCC) and environmental sustainability (LCA). However, it is seen in the literature, that there is still a great need for creating a common understanding of how to theorize, conceptualize and operationalize



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

social sustainability in the built environment [3]. Defining criteria and indicators of social sustainability and developing a strategy on how to support the integration in any project, would help the building industry to go beyond the work that has already been made with LCC and LCA.

In 2015 United Nations (UN) introduced the 17 Sustainability Development Goals (SDGs) for the 2030 Agenda, as a further development of the eight Millennium Goals from 2000. The 17 SDGs are based on five pillars; people, planet, prosperity, peace and partnership. The pillars manifest that sustainable development is enforced for the sake of the people to ensure future generations prosperous lives. This is achieved by maintaining a healthy relationship with the planet. Since the building industry accounts for one third of all consumptions of global resources and almost half of the world's energy use [4], many of the SDGs will have to focus on this industry to truly reach many of their environmental sustainability goals. Some of the SDGs have a great focus on the social aspect of sustainability, and there is therefore a great potential in defining and making social sustainability measurable based on the SDGs. The 17 SDGs are divided into 169 targets and 303 indicators, however rapid assessment showed that only 105 indicators could potentially be used for measurement of sustainability [5]. For the SDGs to play an active part in the development of sustainability in the building industry, the framework needs to be conceptually and methodologically designed and tested prior to adoption [5].

The aim of the paper is to outline current research within social sustainability both in academia, in the industry and on a political level. The paper presents how the academic world discusses and debates social sustainability, trying to identify possible parameters to describe this cornerstone of sustainability. In the building industry, sustainability is often described by means of different certification systems, and therefore certification systems, which focus on social sustainability, are presented in the paper. UN's SDGs are compared with the work conducted in academia and the industry to inquire a possible common understanding of social sustainability on both an academic, industrial and political level.

2. ACADEMIC: Social sustainability

After 30 years of debating sustainable development, social sustainability is still the least developed, theorised and debated pillar of sustainability [3]. There is a large degree of consensus in the literature that little attention has been given to the social dimension of sustainability in the disciplines of the built environment [6,7]. Vallance et al argues that social sustainability is a "concept in chaos" [8], and there is still a need to further develop conceptual understanding of the social part of sustainability [9]. Weingaertner and Moberg write that "there is no single blueprint definition to social sustainability, and the definitions that exist are often derived according to discipline-specific criteria or study perspectives, rather than being general" [10]. Social sustainability is a cross-disciplinary concept, covering a broad range of knowledge from natural and social science to humanities [11]. It embraces disciplines such as anthropology, sociology and cultural studies, public health, architecture, economics and so on [12]. A key issue that makes it difficult to define and measure social sustainability, is its dynamic nature, which changes over time [3]. Social sustainability is directly about people and it is difficult to operationalize without involving people directly.

A critical review on the theory and practice conducted within social sustainability has been made [3]. The review concludes that the concept of social sustainability, like the generic concept of sustainability and sustainable development, lacks clear theoretical formulation. It is time to re-evaluate the concept and explore existing achievements to come up with new practical implications and outline future research. Several key aspects associated with social sustainability was mapped, and it was seen that there is a shift from the use of traditional themes such as poverty and basic needs, to parameters that are less measurable such as sense of place, happiness etc [3]. It is shift from "hard values" to "soft values" [13], which will make the measurement and validation of social sustainability even more challenging [13].

Shirazi and Keivani has proposed a conceptualisation of social sustainability, divided into seven key principles: equity; democracy, participation and civic society; social inclusion and mix; social networking and interaction livelihood and sense of place; safety and security; human well-being and quality of life [3].

3. INDUSTRY: Building Sustainability Assessment Tools (BSAT)

Building Sustainability Assessment Tools (BSAT) are used to quantify and conform sustainability of the built environment. Lots of research has been put into investigating existing tools and investigating the potential in developing new tools to assess and evaluate sustainability. For instance, J.B. Andrade and L. Braganca tries to develop a new approach for an early design support tool for residential building [14]. The tool is aimed to aid designers evaluate and compare different design alternatives, allowing them to make an informed decision based on the performance of the solutions, across the three cornerstones of sustainability. Other research has been made highlighting the most common indicators of social sustainability and gathering these in clusters, which is used for making an overview of current assessment tools [15].

Sustainable building certifications can be used to quantify and document sustainability as well as support integrated design and interdisciplinary collaboration. Danish Building Research Institute (SBI) and GxN (Development department of the architectural firm 3xN) have recently published (August 2018) a comparison between sustainable building certifications. It is seen that all examined systems vary in focus and content and all can be used for quantifying and confirming the sustainability of buildings [16]. Currently hundreds of sustainability certification systems are available for the building industry and this number is expected to rise as focus is increasing upon quantifying and confirming the sustainability of buildings. Depending on the certifications, different focus is put into environmental, economic and social sustainability. Sustainability certifications can be categorised into three types: 1) Single attribute product certifications, 2) Multiple attribute product certifications and 3) Multiple attribute building certifications. Single attribute certifications are labels that focus on a single sustainability aspects or quality of a product's performance, such as energy efficiency rating, reduced water usage or sustainable procurement of natural resources. Multiple attribute product certifications are labels that examine a range of sustainable aspects; the range of these may vary, but these systems look at several characteristics of a product. Multiple attribute building certifications are ratings and systems that look beyond individual products and address the building or projects assemble as a whole [16]. Generally, the certifications rely heavily on the environmental dimension, largely represented by the resources aspect. The social dimension follows closely after, with a focus on the health aspect, with indoor climate and comfort playing a large part. The economic dimension is generally less represented, except for DGNB. In this paper focus is on DGNB and WELL because they address social sustainability in a systematic way. DGNB is a German certification system developed by Green Building Council – Germany in 2007. DGNB is distinguished by focusing almost equally on the three sustainability dimensions: social, environment and economic [16]. Certification system like WELL focuses almost exclusively on social sustainability due to the attention to the health and well-being of the users of the building. However, the focus here is much narrower than outlined by Shirazi and Keivani.

The first Danish version of DGNB was launched in 2012 and modified to fit the Danish Building Regulations. The DGNB manual is divided into the different building typologies, only minor deviation is seen in the criteria between the different building types. Table 1 presents the DGNB criteria related to social sustainability for “New office buildings”.

Table 1. DGNB criteria related to social sustainability for “New office buildings 2016” [17].

Theme	Criteria Group	Number	Criteria
Social	Health, Comfort and user satisfaction	SOC 1.1	Thermal comfort
		SOC 1.2	Indoor air quality
		SOC 1.4	Visual comfort
		SOC 1.5	User control
		SOC 1.6	Quality of indoor spaces
		SOC 1.7	Safety and security
		Functionality	
SOC 2.2	Public access		
SOC 2.3	Cyclist facilities		

Quality of design	SOC 3.1	Design qualities
	SOC 3.2	Integrated art
Plan layout	SOC 3.3	Plan layout

By Table 1 it is seen that DGNB has a great focus on the indoor environment of building, which is a parameter that was not identified as one of the parameters describing social sustainability by Shirazi and Keivani.

A building in which humans can thrive during their everyday life, needs to have a healthy environment, thus it can be argued that it makes sense to define social sustainability, among other parameters, as the quality of the indoor environment.

Other qualities related to the architectural perspective of the building is also included in the DGNB criteria and could be closer related to some of the parameters that Shirazi and Keivani identify, for instance terms such as “social networking and interaction” could be related to SOC 2.1, SOC 2.2 and SOC 3.1, and “safety and security” could be related to SOC 1.7.

WELL is a tool for advancing health and well-being in buildings globally and was launched in October 2014. The WELL Building Standard seeks to implement, validate and measure features that support and advance human health and wellness. The social sustainability is a significant aspect of WELL, covering over 4/5th of the entire focus in the certification. Table 2 presents the eight criteria evaluated in WELL Building Standard. Since all criteria is in some way associated to social sustainability, every criterion is presented as well as examples on focus areas for selected features.

Table 2. WELL criteria [18].

Criteria	Number of features	Example of focus areas
Air	29	Air quality standards, ventilation effectiveness, VOC reduction, air filtration, operable windows, etc.
Water	8	Fundamental water quality, agricultural contaminants, water treatment, periodic water quality testing, etc.
Nourishment	15	Fruits and vegetables, hand washing, safe food preparation materials, responsible food production, food environment, food storage, etc.
Light	11	Visual lighting design, solar glare control, colour quality, daylight modelling, right to light, etc.
Fitness	8	Activity incentive programs, physical activity spaces, active furnishings, injury prevention, etc.
Comfort	12	Accessible design, ergonomics: visual and physical, thermal comfort, sound reducing surfaces, individual thermal control, etc.
Mind	17	Health and wellness awareness, integrative design, post-occupancy surveys, adaptable spaces, building health policy, stress and addiction treatment, health through housing equity, education space provisions, etc.
Innovation	5	Innovation proposal ^a

^a which goes above and beyond the current requirements of the existing WELL features.

Table 2 presents a clear picture of a focus on the social aspect of a building. Comparing criteria from DGNB and WELL, a common understanding of the importance of the indoor environment in a building is seen. Both certification systems focus on the thermal comfort, air quality, and visual comfort. WELL has a Water criterion with eight features to evaluate water quality, water treatment etc. It could be discussed whether this criterion should be associated to social sustainability. DGNB also focuses on water, but this criterion is not presented in Table 1, since the criterion is placed under environmental sustainability in the DGNB system. Further, WELL has a great focus on more undefined values such as “health and wellness awareness”, “active furnishings”, “health through housing equity”, etc. which could be closely related to some of the parameters that Shirazi and Keivani present in their analysis of social sustainability.

4. POLITICAL: Sustainable Development Goals (SDGs)

In March 2015 UN’ 17 Sustainable Development Goals were introduced. The 17 SDGs are divided into 169 targets and 330 indicators, however rapid assessment showed that only 105 indicators are quantifiable [5]. There is a great need for operationalising the SDGs targets and evaluate the indicators in relation to the building industry. [5]. There is a call for action to construct solutions for the sustainable development goals, and different networks is currently working on quantifying the SDGs [19].



Figure 1. UN' 17 Sustainable Development Goals.

Not all SDGs are relevant for the building industry, since goals like ‘Zero Hunger’ are not directly influenced by the built environment. However, there is still a great potential in contribution to the fulfilment of the SDGs, since the building industry affects several of the goals, such as “Good health and well-being”, “clean water and sanitation”, “sustainable cities and communities”.

Social sustainability in the built environment could also be identified within the SDGs’ terminology and Table 3 identifies goals and targets that are addressing social sustainability in the building industry.

Table 3. SDGs relevant to social sustainability is presented [20].

Goal	Relevant target/-s	Description of target/-s
	3.1	By 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination

	5.2	Eliminate all forms of violence against all women and girls in public and private spheres, including trafficking and sexual and other types of exploitation
	11.7	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities
	15.4 15.9	By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits which are essential for sustainable development By 2020, integrate ecosystems and biodiversity values into national and local planning, development processes and poverty reduction strategies, and accounts
	16.1	Significantly reduce all forms of violence and related death rates everywhere

5. Findings

The review of current work with social sustainability shows different approaches to work with social sustainability, however common understandings of the social sustainability is seen on both an academic, industrial and political level.

Comparing the SDGs targets with the reviewed certification systems SDG target 3.9 could be related to DGNB SOC 1.2 (indoor air quality). The aim of SOC 1.2 is to ensure that the indoor air quality does not have a negative impact on occupants' well-being and health. Also, the WELL criterion "Air" evaluates the indoor air quality to ensure a healthy indoor environment.

SDG target 5.2 aims to eliminate all forms of violence against women and girls. DGNB SOC 1.7 – Safety and security aims to create safe space within and around the building to prevent violence in private and public spaces. The safe spaces are evaluated based on openness, overview of the area and lighting that creates a safe environment, thereby increasing the perceived safety and minimizing the risk of attack on both women and men.

SDG target 11.7 focuses on providing universal access to safe, inclusive and accessible, green and public spaces. DGNB SOC 2.1 aims at ensuring free movement and accessibility for everyone, especially elderly and people with disabilities. Both target 11.7 and SOC 2.1 addresses equality, which is one of the parameters that Shirazi and Keivani also pointed to in their analysis of social sustainability.

SDG targets 15.4 and 15.9 ensure the conservation and development of biodiversity. These targets could be compared to DGNB SOC 1.6, which evaluates documented sustainable strategies on planting urban spaces as well as facades and roofs, considering properties of the existing area.

The last target highlighted in Table 3 is 16.1, which aims to reduce all forms of violence and related death rates. Again, comparing to presented parameters related to social sustainability in the built environment safety and security is commonly understood as a parameter related to social sustainability in the building industry both in academia and the industry.

6. Discussion

This paper, figures and tables identifies a lack of understanding and consensus within the research field of social sustainability. The lack of published research within the field supports this finding. During the last 30 years sustainability and social sustainability have been debated, but it is clear, that a common understanding of the terms is still missing in the field.

In some literature it is proposed that it is not necessarily negative, that there is a lack of a clear definition of social sustainability [3]. Shirazi and Keivani argues that “[..] instead of providing a fixed definition and a solid framework applicable to all cases, scales, and contexts, it hints at some general values, essential relevant concepts, and basic characteristics which should be adapted and re-formulated to fit the given context”. However, if social sustainability should be operationalized and implemented on a daily basis in the building industry, there is a need to make social sustainability measurable. There is a need of at least a common definition of indicators within the built environment, to compare and document levels of social sustainability - for instance in relation to the global goals (SDGs) towards a more sustainable world. If each party in the building industry defines how to measure and document the sustainability of a project, how can we ensure that the assessment is objective? The 17 SDGs will push the importance of social sustainability forwards; however, they are still vaguely defined when it comes to making it work.

Substantial work has been made within the DGNB system, and the presented comparison of the SDGs with academic research and industrial tools shows a great potential in optimizing the perception of sustainability to also address social sustainability in a systematic way.

7. References

- [1] Brundtland GH. Our Common Future: Report of the World Commission on Environment and Development. *United Nations Comm.* 1987;4(1):300.
- [2] Flint RW. Practice of Sustainable Community Development [Internet]. 2013. 25-54 p. Available from: <http://link.springer.com/10.1007/978-1-4614-5100-6>
- [3] Shirazi MR, Keivani R. Critical reflections on the theory and practice of social sustainability in the built environment – a. *Local Environ.* 2017;9839.
- [4] Braune A. Saving the world – the DGNB’s contribution to the United Nation’s SDGs [Internet]. 14. march 2017. 2017. Available from: <https://blog.dgnb.de/en/sustainable-development-goals/>
- [5] Hák T, Janoušková S, Moldan B. Sustainable Development Goals: A need for relevant indicators. *Ecol Indic.* 2016;60:565–73.
- [6] Littig B, Griessler E. Social sustainability: a catchword between political pragmatism and social theory. *Int J Sustain Dev* [Internet]. 2005;8(1/2):65. Available from: <http://www.inderscience.com/link.php?id=7375>
- [7] Dempsey N, Bramley G, Power S, Brown C. The Social Dimension of Sustainable Development: Defining Urban Social Sustainability. *Sustain Dev* [Internet]. 2011;19(May 2009):289–300. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/sd.417/pdf>
- [8] Vallance, S., Perkins, H.C, Dixon, J.E. What is social sustainability, a clarification of concept. *Geoforum.* 2011;42:342–8.
- [9] Cuthill M. Strengthening the ‘social’ in sustainable development: Developing a conceptual framework for social sustainability in a rapid urban growth region in Australia. *Sustain Dev.* 2010;18(6):362–73.
- [10] Weingaertner C, Moberg Å. Exploring social sustainability: Learning from perspectives on urban development and companies and products. *Sustain Dev.* 2014;22(2):122–33.
- [11] Åhman H. Social sustainability - society at the intersection of development and maintenance. *Local Environ.* 2013;18(10):1153–66.
- [12] Dillard, J, Dujon, V, and King M. Understanding the social dimension of sustainability. New York: Routledge; 2009.
- [13] Colantonio A. Social sustainability: a review and critique of traditional versus emerging themes

- and assessment methods. *Sue-Mot Conf 2009 Second Int Conf Whole Life Urban Sustain Its Assess* [Internet]. 2009;865–85. Available from: <http://eprints.lse.ac.uk/35867/>
- [14] Andrade JB, Bragança L. Extending buildings' life cycle: sustainability early design support tool. *Int HISER Conf Adv Recycl Manag Constr Demolition Waste* [Internet]. 2017;(June):105–8. Available from: http://www.bamb2020.eu/wp-content/uploads/2017/07/Extending-buidings'-life-cycle_sustainability-early-design-support-tools.pdf
- [15] Rahdari AH, Anvary Rostamy AA. Designing a general set of sustainability indicators at the corporate level. *J Clean Prod* [Internet]. 2015;108:757–71. Available from: <http://dx.doi.org/10.1016/j.jclepro.2015.05.108>
- [16] GxN and SBi. Guide to Sustainable Building Certifications. 2018.
- [17] DK-GBC. DGNB System Denmark - Office Buildings [Internet]. Vol. 1.1. 2016. 435 p. Available from: <http://www.dk-gbc.dk>
- [18] International WELL Building Institut. www.wellcertified.com [Internet]. Available from: <https://www.wellcertified.com/about-iwbi>
- [19] Thuesen C, Opoku A. a Call for Action : Constructing Solutions for the Sustainable Development Goals. 2018;(September):3–5.
- [20] Tata Group. We Dream Of A Better world. 2017;5–81.

Acknowledgments

The authors want to acknowledge the Innovation Fund Denmark (an independent public foundation established by the Ministry of Research and Education) and Sweco Denmark for funding this industrial PhD.