Early prioritization of the United Nation's goals for sustainable development in construction projects

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Abstract. The building sector holds great potential and responsibility in achieving several of the United Nations’ sustainable development goals (SDGs). This study presents preliminary findings of an exploratory study aiming at investigating how the SDGs can be successfully implemented in construction projects in a Danish context. A focus group workshop was held with academic experts within building design and the SDGs. The participants discussed which aspects were important throughout the different phases of new construction projects for successful implementation of the SDGs, and the roles of the included actors. The results showed that the participants highlighted SDG 4 (quality education) and SDG 17 (partnerships for achieving the goals) as the most important throughout the different phases, from the programming phase to demolition or renovation. SDG 3 (health and well-being), was seen as the most important factor during the occupation phase, and the main positive effect of a successful design process. A “phase zero” was proposed to ensure a common ground and understanding the SDGs among the involved actors before the programming phase. Several barriers for implementing the SDGs in Danish building projects were identified in the study, including the need for local indicators, transfer of knowledge between the involved actors, and lack of user involvement. The results indicate that there is a need for rethinking and supporting strong partnerships among the different actors, improve knowledge management, and ensure targeted educational material regarding the SDGs towards all actors involved in the building process, including the building owner, advisors, craftsmen and users.

1. Introduction
In 2015, the 193 United Nations member states agreed on the 17 Sustainable Development Goals (SDGs), which are supported by 169 targets and 231 global indicators [1]. The 2030 Agenda offers a global and stable definition of sustainability over the next 10 years, which could benefit the construction sector and support a transition beyond the current ecological and energy performance focus [2]. To achieve meaningful integration of the SDGs in building projects, it requires a consideration of the broader potential contribution of buildings to the SDGs and their targets. Also, the global agenda should be translated to the local and project-specific level [2,3]. In Denmark, an action plan towards 2030 has been developed by the government in 2017 [4], and currently, additional SDG indicators are being developed to establish a baseline for the Danish work with the SDGs and operationalizing the indicators in a Danish context. The new indicators should be available in 2020 [5]. While sustainable building design and renovation have gained increasing attention in recent years, the academic literature focusing on implementation of the SDGs in construction projects is still
limited. However, a number of studies exist on the topic. In a comprehensive literature review published in 2019, Goubran and Cucuzzella provide a state-of-the-art overview focusing on how the 2030 agenda and the SDGs have been utilized in sustainable building design [2]. Opoku has investigated the built environment’s role in achieving the 2030 agenda [6], and Ormer and Noguchi has presented a conceptual framework for understanding the contribution of building materials in achievement of the SDGs [7]. Several other examples and investigations of application of the SDGs in the construction industry have emerged in the literature, along with tools and methods developed by building professionals supporting the practical implementation. Furthermore, multiple methods from other disciplines could be beneficial to adopt in building design, such as the SDG compass process model [8]. To support the Danish building owners and other actors involved in the building process, there is an evident need for developing practical and operational tools and methods for implementing the SDGs in building projects. This study explores which aspects are important in which phases of a building project for successful implementation, as a foundation for future development of models, tools and methods to support building owners and their advisors.

2. Methods
This paper presents the preliminary results of a research project investigating how the SDGs can be successfully implemented in sustainable building projects. The main goal at this stage is to investigate which aspects are important to include in which phases, and the role of the involved actors, when applying the SDGs in construction projects in a Danish context.

A focus group workshop was held with five academics, including the facilitators, carefully selected based on their expertise and experience in the area of either sustainable building design, the SDGs, or a combination. The authors chose to exclusively invite academic experts for this workshop, as the objective was to get useful inputs and insights in this preliminary stage of the research project. In that way, the authors were able to test the workshop design, and use the results and experience to refine the setup for future workshops with professional building owners and advisors.

The two-hour workshop was structured in three main parts. After a brief introduction, the participants were invited to discuss which factors were important when implementing the SDGs in sustainable building projects, and which SDGs were most important to include. Secondly, the participants were asked to sketch a process model for implementation of the SDGs in a building design process, from early goal setting to occupancy, demolition or renovation. For these tasks, pens, post-it’s and large pieces of paper, along with physical SDG-cubes, were available for expressing ideas. Data was collected through audio recordings, notes, pictures, observations and the physical outputs from the workshop in the form of drawings and post-its. The data was analyzed through a Grounded Theory approach [10], where the data was first coded and then inductively structured in overall themes. The limitation of this paper is that only five people participated in the workshop, and therefore the generalizability of the study is limited. However, the results provided useful insights into the topic and serves as a foundation for further investigation.

3. Results and discussion
Two main themes emerged from the data analysis. First, the participants emphasized the initial phase of construction projects as highly important for establishing a common ground among the involved actors, including choosing and prioritizing the SDGs relevant for the specific project. Second, the participants identified barriers for successful implementation of the SDGs in a Danish context. In the following, the two themes are elaborated.

3.1. Establishing a common ground in “phase zero”.
The participants discussed which aspects were important to include at an early stage, and which actors should be involved. The overall phases within Danish construction projects are described in the description of service document [9] as; programming, proposal, design, construction, and delivery. The building owner and the advisors can then make a commissioning agreement, otherwise the
building owner is responsible for the full maintenance of the building during the occupation phase. At the end of the building’s life cycle, it can be renovated or demolished, and materials potentially reused. The participants stated that a common understanding of the term “sustainability” in building design, along with an understanding of the SDGs and their related targets, should be a prerequisite for all involved actors before the project starts. This activity was suggested to be included as a new phase before the programming phase and was named “phase zero”. The participants emphasized the importance of educating both the building owner, advisors, contractors, construction professionals and users regarding the SDGs, and sustainable building design in general. SDG 4, quality education, is therefore seen as an important goal at this stage, and throughout all phases. This aligns with the process model presented in the “SDG compass” [8], where the importance of understanding the SDGs is emphasized as the first step before creating a strategy for SDG-implementation. The SDGs are still a relatively new concept and there is a need for new tools and educational material to support especially the building owner, but also the architects, engineers, craftsmen, and the users within the building industry. A few tools applicable within the Danish building industry in “phase zero” have already emerged (e.g. [13, 14 and 8]), and some have the potential to support an early dialogue regarding the SDGs (e.g. [13, 14 and 8]). In “phase zero”, it is also important to form strong partnerships to ensure a feeling of ownership and responsibility among all included actors, to make a solid foundation for successful implementation of the SDGs, the participants expressed, and therefore SDG 17, partnerships for the goals, was also seen as important at this stage. It was suggested that both craftsmen and user representatives should be involved in “phase zero” as well, which is not common practice today.

3.2. Barriers for implementing the SDGs in construction projects in a Danish context

One of the barriers identified by the participants was that the actors change throughout the different project phases, due to the Danish law on tenders [15]. This stresses the importance of handing over the relevant information between phases and entails the risk that the preceding decision rationale and prioritizations are not fully comprehended (or agreed upon) by the new actors. Several factors affect this process. First, the challenge of making tacit knowledge explicit, which, according to Polanyi [16], is not done easily, as people are often not aware of the knowledge they possess or how it can be of value to others. Therefore, effective transfer of tacit knowledge normally requires extensive personal contact, regular interaction and trust among the involved actors [16]. Even though the focus on the benefits of e.g. an integrated design process [17,18] and early user involvement in construction projects [14] are increasing, the building owners do not often adopt these in practice, where money is still the driving factor, according to the participants. Knowledge management in sustainable building projects is therefore another area which needs further development to strengthen the implementation of the SDGs, the authors suggest, agreeing with Martins et al. [19]. Other barriers expressed by the participants were that the SDG targets and indicators have not yet been adapted to a Danish context, different budgets for construction and maintenance, laws which make it harder to reuse construction materials, more focus on money than “value”, and insufficient communication among the actors and across phases.

4. Conclusions

The preliminary findings from this exploratory study show that to follow the 2030 Agenda, the different actors involved in sustainable building projects need to think differently. A focus group workshop was held with academic experts, who were given the task of discussing which aspects were most relevant for ensuing successful implementation of the SDGs throughout the different phases of a building project, the role of the included actors, and which SDGs overall were most relevant. The results showed that SDG 3, SDG 4, and SDG 17 were most important to include when designing a new building, according to the participants. A “phase zero” was suggested to ensure a common ground in the very early stage of a project, where education of the involved actors and strong partnerships are a necessity. Furthermore, the study highlights several barriers for successful SDG implementation.
The preliminary findings of this study contribute to existing knowledge by providing insights into current barriers for SDG implementation, and is a first step towards developing innovative solutions which can support building owners and advisors in the construction industry.

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