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Editorial

BIM-Based Life Cycle Sustainability Assessment for Buildings

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The construction of buildings has a high level of environmental impacts. Life Cycle Analysis (LCA) has been configured as an effective tool to anticipate, evaluate, and optimize these impacts. The conventional application of this methodology in the field of building construction involves the consumption of a large amount of time and resources. The recent development and progress in the integration of digital tools such as Building Information Modeling (BIM) in the LCA methodology is generating important advances in the process of optimizing environmental impacts in the buildings sector. This Special Issue, "BIM-Based Life Cycle Sustainability Assessment for Buildings", gathers some of the advances that are currently taking place in the integration of Building Information Modeling platforms in the process of minimizing the impacts that buildings cause throughout their entire life cycle.

This Special Issue covers three important areas of study: (1) workflows in LCA calculation procedures based on BIM platforms; (2) the automation of Building Assessment Analysis processes via the integration of LCA and BIM; and (3) the implementation of BIM platforms for the life cycle management of buildings.

Regarding workflow issues in calculating LCA from BIM, two papers (contributions 4 and 5) deal with the procedures used when linking BIM platforms with LCA. The paper by Regitze Kjær Zimmermann, Simone Bruhn and Harpa Birgisdóttir (contribution 4) investigates the needs and practices of integration between BIM and LCA in the building sector. This paper analyzes the BIM–LCA workflows of eight companies that have integrated LCA into BIM, identifies the data used for the BIM–LCA integration, and compiles the main challenges facing this integration. Sungwoo Lee, Sungho Tae, Hyungjae Jang, Chang U. Chae and Youngjin Bok (contribution 5) propose a method of the practical integration of Life Cycle Inventory calculation from the elaboration of BIM libraries and templates.

Advances in the automation of Building Sustainability Analysis (BSA) processes from the integration of LCA and BIM are covered by two investigations (contributions 2 and 4), which propose different procedures to generate building evaluations from two different geographical perspectives: South and Central Europe. Jan Růžička, Jakub Veselka, Zdeněk Rudovský, Stanislav Vitásek and Petr Hájek (contribution 2) describe a BIM–BSA–LCA data workflow for automatic assessment based on the experience gained on a case study of a residential building. The building quality was tested using SBToolCZ, the Czech national assessment method. José Pedro Carvalho, Ismael Alecrim, Luís Bragança and Ricardo Mateus (contribution 4) address the relationship between BIM, BSA and LCA by performing an LCA for a Portuguese case study. A set of sustainability criteria from SBTool were assessed simultaneously during the process.

Concerning the implementation of BIM platforms for the management of the life cycle of buildings, four papers (contributions 1, 3, 7 and 8) cover various phases of the building life cycle from different perspectives. Manuel Castellano-Román, Antonio Garcia-Martinez and María Luisa Pérez López (contribution 1) analyze and evaluate the maintenance and management workflow of social housing. To do so, they take the case study of AVRA, one of the public companies that manages more than 70,000 homes, proposing a BIM-based life cycle management workflow. Mochamad Agung Wibowo, Naniek Utami Handayani and Anita Mustikasari (contribution 3) propose a reverse logistics model for the construction

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industry, incorporating the dimensions, elements and indicators needed for the evaluation of the reverse logistics configuration. Nawal Abdunasseer Hmidah, Nuzul Azam Haron, Aidi Hizami Alias, Teik Hua Law, Abubaker Basheer Abdalwhab Altohami and Raja Ahmad Azmeer Raja Ahmad Effendi (contribution 7) review targets of the BIM interface, the BIM multi-model approach and the role of employing algorithms in BIM optimization to introduce the need for automation in the BIM technique. Abubaker Basheer Abdalwhab Altohami, Nuzul Azam Haron, Aidi Hizami Ales@Alias and Teik Hua Law (contribution 8) provide a comprehensive review that explores and identifies common emerging areas of application and common design patterns of traditional BIM–IoT integration, followed by devising better methodologies to integrate IoT into BIM.

To summarize, various areas are covered in this Special Issue. We hope that the contributions gathered in this Special Issue can offer solutions and inspire new research in the field of integrating Life Cycle Analysis methods and Building Information Modeling platforms.

List of Contributions

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