**Appendix S1.** Summary of the research questions, issues and main results of the similar papers.

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| **Reference** | **Keywords** | **Research questions** | **Highlighted Issue** | **Results** |
| Gao and Pishdad-  Bozorgi (2019) [30] | “Building Information Modeling” or “BIM”, “operation & maintenance”, “emergency management”, and “energy management” | BIM-based energy management systems | • Specific interoperability issue between systems, standards in the BIM-O&M context.  • Return on investment (ROI) justification of BIM-O&M applications. | • Authors proposed the Life Cycle Cost Analysis (LCCA) framework for BIM-O&M ROI justification.  • Extensive data of CMMS, BAS, BEMS and Machine Learning Techniques can solve the main limitation of using LCCA. |
| Matarneh et al. 2019 [16] | “BIM”; “Building Information Modeling”; “Building Information Modeling”; “FM”; “Facility Management”; “Facilities Management”; “Operations and Maintenance” and “Asset Management” | Information / maintenance / energy management; refurbishment/ retrofit; existing building audits and surveys; BIM for FM | • BIM-based technologies integration to enhance FM practice.  • Interoperability issue between the FM systems and BIM. | • Authors proposed an automated real-time and interoperable method to perform the site-to-BIM data transfer to facilitate the process of generating accurate as-built BIM models.  • The scope of future research is related to the information exchange and interoperability issues throughout the whole building life cycle and easier BIM implementation in FM. |
| Wong et al., 2018 [17] | ‘BIM’ or ‘building information modelling’, ‘digital technology’, ‘geographic information system’ or ‘GIS’, ‘point cloud’/‘laser scanning’, ‘radio-frequency identification or ‘RFID’, ‘photogrammetry’/ ‘image-based technology’, ‘Internet of Things’ or ‘IoT’, ‘virtual reality, ‘retrofit’ or ‘refurbish\*’ or ‘renovate\*’ or ‘maintenance’ or ‘facility’ or ‘post-occupancy or ‘facilities management’ or ‘FM’ | BIM for FM applications of energy management | • The diversity in software tools and interoperability issues in the FM sector's adoption of DTs (digital technologies).  • Data consistency in the FM system.  • Improvement of the designed model with as-built information. | • Authors proposed recommendations for improving the accuracy of extracted information.  • The scope of future research is related to the interoperability of GIS and BIM-based information. |
| Andriamamonjy et al., 2019 [33] | “BIM” or “Building Information Models” or “Building Information Modelling | Adoption and benefits of BIM; BIM-aided management; progress monitoring; as-built modelling; interoperability; life cycle analysis; energy simulation. | • Lack of well-established strategies of the interoperability between BIM and energy simulation tools.  • The insufficient integration of BIM and BEPS for building system and control modelling.  • Limited application during the operational phase. | • authors proposed using the open-BIM framework (IDM-MVD), allowing to satisfy a specific exchange requirement of BIM.  • The scope of future research is related to how BIM to BEPS could be integrated to facilitate Fault Detection and Diagnosis (FDD) and Model Predictive Control (MPC) implementation. |
| Shirowzhan et al., 2020 [29] | ‘Building information modelling’ and ‘compatibility’ | Compatibility; interoperability of BIM | • Compatibility issues at the organizational level.  • Interoperability issues at the technical level. | • Authors presented how to extend BIM applications and speed up the adoption rate among stakeholders with different needs and using other file formats.  • The scope of future research is related to examining the BIM adoption model; to determine the specific measures that predicted the level of BIM compatibility in different contexts. |
| Meng et al., 2020 [54] | Building life cycle, Building information modelling (BIM), Integration, Tendencies and challenges, Technology application | Application of BIM in each building life cycle stage; integration of BIM | BIM challenges from the perspectives of management, technology and promotion. | The authors provided a systematic classification framework on BIM development, BIM implementation level, and stakeholders' risks and challenges through three aspects of management, technology, and promotion. |
| Carvalho, J. P., Bragança, L. and Mateus, R. (2020) [55] | Building Information Modelling, BIM + BREEAM, BIM + LEED, BIM + SBTool | BIM implementation to assess Building Sustainability Assessment (BSA) criteria | • Lack of platforms and tools to assess sustainability.  • The need to use several BIM tools to evaluate a single BSA method.  • The stakeholder awareness of sustainable issues or the interoperability restrictions between software. | The authors identified which BSA criteria/categories can be assessed using BIM and which software is commonly used to implement this process.  The attractiveness of a new BIM-automated assessment for SBTool and the replicability of the new approach to the BREEAM and LEED methods was analyzed. |
| Li, C. Z. et al. (2020) [53] | (“life cycle energy” OR “lifecycle energy” OR “LC energy” OR “LCE”) AND (building\*) | Evaluation analysis of OE and EE; energy-efficiency characteristics of energy-saving buildings; quantification and evaluation of life cycle energy characteristics of buildings; research methods in LCE-B domain; assessment and optimization of energy efficiency and environmental performance; energy regulations and rating systems. | • Determining EE's computing boundary and parameters and combination with life cycle energy and cyclic economics to analyze EE.  • Analysis of the long-term performance of nZEBs and net ZEBs.  • Defining the boundaries of different levels and integrating different scales to establish a systematic quantization framework and quantitative analysis of irregular buildings.  • Integration of technologies and methods in different areas and improving operability amongst technologies (e.g. BIM, IoT, blockchain, AI and GIS). | Authors summarised mainstream research topics (calculation and parameter determination of embodied energy); identified existing research gaps (the spatial heterogeneity of embodied energy). |
| Murtagh et al. (2020) [51] | Sustainable and resilient construction | Insights from social sciences on sustainable construction; sustainable technologies in construction; low-carbon construction | ● Requirement of a timely environmental assessment.  ● The importance of sustainability in construction.  ● The penetration of renewable energy in the construction industry.  ● The promotion of the development of low-carbon construction globally. | The authors provided insights from social sciences on sustainable construction, sustainable technologies in construction and low-carbon construction. |
| Muller et al. (2019) [21] | “BIM and Sustainability” and “BIM and Interoperability” | Sustainability; building lifecycle; interoperability in the strategic and organizational levels; requirements for processes of construction, design, and operation; abilities of a company to register, aggregate, and consume services of external sources; need of common environment for different platforms, software and systems to work together | Lack of a holistic view of sustainability, LEED, lifecycle, interoperability | The authors provided an influence matrix of the lifecycle stages and sustainability fields, which can organize data and systematize processes and structure interoperability frameworks. |
| Solaimani and Sedighi (2020) [56] | “Lean” AND (“Construction” OR “Housing” OR “Urban”) AND (“Sustain\*” OR “Environment\*” OR “green” OR “social”) | Sustainability; economic / environmental / social view | Potential conflicts and trade-offs between economic, environmental and social dimensions of sustainability | The authors provided a palette of existing best practices, based on which scholars’ and practitioners’ can balance their efforts across three dimensions of sustainability. They identified the under-researched areas of Lean sustainable construction that future researchers can expand. |