Circular Economy for Minimising Waste Generation During the Architectural Design Process

A A Kamel[1, *], F O Alamoudy[2] , A A E Othman[3]

[1]Senior Student, Architectural Engineering Department, Faculty of Engineering, The British University in Egypt, Cairo-Suez Desert Road, Al-Shorouk, Cairo, Egypt.
[2]Teaching Assistant, Architectural Engineering Department, Faculty of Engineering, The British University in Egypt, Cairo-Suez Desert Road, Al-Shorouk, Cairo, Egypt.
[3]Professor of Construction & Project Management, Head of Architectural Engineering Department, Faculty of Engineering, The British University in Egypt, Cairo-Suez Desert Road, Al-Shorouk, Cairo, Egypt.

*Corresponding Author Email: Abeer194322@bue.edu.eg

Abstract. The construction industry is responsible for 40% of resource extraction and solid waste generation worldwide. This is due to the industry's adoption of a linear economy model of "take, make and dispose". As a result, finite natural resources are being depleted which contradicts the concept of sustainability. This can be overcome in the design process by adopting circular design strategies. These strategies are based on the circular economy and its principles whose notion is based on eradicating waste by designing products & processes that optimally utilise resources and cycles them. Since 33% of construction waste is due to inadequate implementation of waste minimisation strategies during the design process, this research aims to investigate the circular economy principles and their corresponding circular design strategies and their relationship with minimising waste during the design process. To fulfil this, a mixed approach of quantitative & qualitative methods is used to achieve three objectives. First, the past literature is reviewed to investigate the concepts on which this study is built upon. These are waste generation, the design process and circular economy (CE), its principles & design strategies (CDS). Second, a relationship matrix is proposed between the studied concepts based on the previous literature to serve as a tool for architects to identify the suitable CDS for their projects. Finally, a case study is analysed to investigate the effectiveness of the adoption of CDS in minimising waste generation during the design process. When comparing the research's literature outcome with the case study analysis, the results corresponded. Hence, this presents an initial validation for the proposed matrix, initiating the first step for further research to develop a framework that can help architects minimise waste generation during the design process.

Keywords: Construction Waste Minimisation; Architectural Design Process; Circular Economy Principles; Circular Design Strategies