APPLICABILITY OF CIRCULAR ECONOMY STRATEGIES TO MINIMISE THE CONSTRUCTION & DEMOLITION WASTE IN SRI LANKA

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DECLARATION

I hereby confirm that the following dissertation is solely the product of my own effort and original work. It does not contain any material that has been previously submitted for a Master's or Degree program at any other university. Furthermore, I confirm that it does not contain any content that has been previously published or authored by someone else, except where duly acknowledged within the text.

I would like to extend my heartfelt appreciation to my research supervisor, Prof. (Mrs.) Anuradha Waidyasekara, a distinguished Quantity Surveyor, for her exceptional guidance and unwavering support during the entire process of completing this research dissertation. Her expertise and insights have been invaluable in shaping this study. I recognise and appreciate her intellectual input in this study, and I commit to including my research supervisor as a contributing author if I publish any portion of this research.

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Dissertation Supervisor Date

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Ch. QS Prof. (Mrs.) Anuradha Waidyasekara

ABSTRACT

Construction and Demolition (C&D) Waste Management (WM) poses significant issues in Sri Lanka, contributing to environmental degradation and resource depletion. To address these issues, this study explores the application of Circular Economy (CE) strategies in minimising waste generation and optimising resource utilisation in Sri Lankan Construction Industry (CI). The focus is on reducing waste generation and maximising resource utilisation during the stages of the building life cycle. These stages are crucial in terms of waste generation and resource consumption. The aim of this research is to develop a framework which is to minimise C&D WM issues using CE strategies in Sri Lankan building projects. A qualitative approach was employed in this research, utilising three rounds of semi-structured expert interviews. In the first round, fifteen experts were involved, followed by twelve in the second round, and ten in the final round. The data obtained from these interviews underwent analysis using manual content analysis techniques.

During the preconstruction stage, a study uncovered sixteen WM issues. To address these issues, relevant CE strategies were identified and discussed in regarding their potential impact on the project management iron triangle comprising time, cost, and scope. Similarly, during the construction and building renovation phase, the study identified fifteen C&D WM issues. Corresponding strategies were proposed to effectively tackle each issue, considering their influence on the project management iron triangle. For example, the introduction of on-site sorting and recycling processes was highlighted as a method to reduce waste disposal time and costs, while also minimising the project's environmental footprint. Moving on to the use and operate stage of the building, eight C&D WM issues were recognised. Appropriate strategies were suggested to address these issues. For instance, the promotion of sustainable procurement practices and the use of durable materials were identified as ways to decrease waste generation and long-term maintenance costs, positively affecting the project's overall success. Similarly, during the demolition and repurpose stage, fourteen C&D WM issues were identified. Strategies such as salvaging reusable materials and advocating for responsible demolition practices were outlined as solutions. In the material recovery and production stage, eight more C&D WM issues were identified. Strategies like incorporating recycled materials into the production process and optimising material usage were suggested. Implementing CE strategies in the CI to address C&D WM issues can perform a substantial role in creating a built environment that is more sustainable, resilient, and resource efficient. Further, this will help to minimise the demand for virgin materials and reduce the volume of waste generated. Using recycled materials also helps close the loop of the materials cycle, thereby contributing to the CE.

Keywords: *Circular Economy; Construction & Demolition; Waste Management Issues; Building Life Cycle; Strategies*

DEDICATION

I dedicate this piece of work

to my beloved parents

for their love, endless support

and encouragement!

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Victar H. C.

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LIST OF ABBRIVIATIONS

Abbreviation	Description
BIM	Building Information Modelling
CI	Construction Industry
C&D	Construction and Demolition
C&DW	Construction and Demolition Waste
CE	Circular Economy
CBE	Circular Built Environment
UK	United Kingdom
WM	Waste Management

LIST OF APPENDICES