# DEVELOPMENT AND VALIDATION OF FRAMEWORK FOR SUSTAINABLE BUILDINGS


## Abstract

This dissertation examines how the salient factors influencing sustainable buildings can be validated within an integrated framework and subsequently used to inform a future system dynamics model. It begins with a brief introduction to the research context, followed by a comprehensive literature review of the key concepts associated with the thesis topic.

A hierarchical model, developed using argumentation-based Total Interpretive Structural Modelling (TISM), serves as the foundation for predictive modelling. The conceptualised TISM model for sustainable buildings is simulated to generate a secondary database and is subsequently tested using responses collected from stakeholders involved in sustainable building projects. Compared with existing frameworks, the proposed framework has several distinctive features: it consists of five hierarchical levels, incorporates multiple interrelationships, provides validated interpretations for all linkages, identifies leading and lagging attributes, and demonstrates that the antecedents of sustainable buildings positively influence sustainability outcomes.

The study also includes a primary database analysis involving factor analysis and empirical testing of the conceptual hierarchical model. In addition, case studies of two sustainable building projects are undertaken, followed by a cross-case analysis. An attempt is made to examine the dynamic behaviour of sustainable building systems through a system dynamics-based study focusing on three essential factors: sustainable materials, sustainable energy, and sustainable water.

Finally, through synthesis and triangulation, the dissertation provides a comprehensive understanding of the sustainable building framework. It concludes with a summary of the major findings, recommendations, significant research contributions, and directions for future research.