



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:

Frugal Design for Marginal Contexts: Formulating a Systematic Approach and a Design Toolkit

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SHORT ABSTRACT

This thesis examines the subject of 'Frugal Design for Marginal Contexts' to forward the scope of product design in marginalised socio-economic scenarios and equip designers with necessary tools. 'Frugal design' is defined as a low-resource intensive design process for developing affordable, optimised, performant and holistic products, and 'Marginal Contexts' (**MC**) are defined as social scenarios with poor socio-economic conditions where people lack freedom and capabilities.

The research project aimed *"to develop a framework for systematic design of frugal and holistic product concepts and implement it through a design tool."*

The research aim warranted a multi-method approach, thus, several studies were conducted to develop a systematic design approach, understand its effectiveness and create a design tool. First, a comprehensive literature review was conducted to define key terminologies, identify frugal design guidelines and uncover research gaps. The second study used a case analysis methodology to provide grounded evidence supporting various design guidelines and recommendations found in literature. A sample of successful and failed solutions in MC were analysed in two related exercises. The case study helped identify 'focus areas' for design projects, a typology of solutions in MC and led to the synthesis of specific strategies for practically implementing frugal design guidelines in practice. In another study, a

retrospective analysis of design projects was conducted to establish an exhaustive understanding of frugal design for MC. Overall insights from these studies helped synthesise two novel frameworks: 1) a **Frugal Design Conceptualisation (FDC) framework**, a systematic approach for designing holistic and frugal solutions for MC, and 2) **Contextual Evaluation Hierarchy (CEH)**, a framework for understanding design constraints and evaluating frugal solutions at early design phases. The effectiveness of these frameworks was empirically evaluated using a concept generation exercise and a repeated-measures study design. The empirical evaluation provided satisfactory evidence that the FDC framework enabled better systematic conceptualisation of frugal solutions for MC and that CEH framework could effectively help in evaluating solutions at early design phases. An extant literature review also found that Implementing a frugal design approach required a 'frugal mindset' in addition to existing designer skillsets. Therefore, interviews were conducted with 12 experts to identify strategies for imbibing a frugal mindset. The Analysis resulted in a set of unique strategies designers can use for imbibing a frugal mindset. The interviews also uncovered the motivations of designers working in MC and their strategies for finding new design opportunities. The overall research insights were then used to synthesise **FLOW - the Frugal Design Workflow Toolkit**. Finally, the appropriateness of the **FLOW toolkit** was preliminarily assessed for usability and implementability. Overall the toolkit was found to be reasonably easy to use and implementable in practice.

The thesis outcomes provide clarity on how designers must approach the development of holistic and frugal solutions for MC. Most crucially, the research work outlines how frugal design differs from a typical design process. The systematic frugal design process reported in the thesis provides practical ways for designers to develop sustainable and meaningful solutions that could improve the well-being of numerous people living in poor socio-economic conditions.