REPRESENTATIONS AND METHODS FOR ENABLING DESIGN VARIETY

by

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Table of Contents

List of Figures

List of Tables

Abstract

A design is defined in this thesis as an abstraction of a physical artifact that can be represented as a set *D*, composed of design descriptors and relations. A single member of set *D* is called a design variant. Design variety is the existence of multiple design variants in a single design. A product is a physical instantiation of a design variant that is actually placed in the market. Product variety is when multiple design variants from a single design are actually placed in the market.

A firm's strategy leads to two manifestations of product variety: temporal variety and coordinated variety. Temporal variety refers to the introduction of a modification to an existing design for a future product generation. Coordinated variety refers to introducing multiple product variants into the market simultaneously or in a predefined sequence.

Firms rely on an ability to manage the underlying design variety when they make business decisions about the products they will introduce in the market. This thesis reviews the concept of design variety and presents a new way for representing design variety during product development.

Four prevalent design representations have been identified. These representations (Function, Dependence, Catalog, and Concept) are discussed in terms of their ability to represent and manipulate design variety. The capability of dependence models to use incomplete information and represent complex relationships is highlighted. Four