

## INTRODUCTION

In large engineering projects, ECs can be a way to deal with clients' wishes and to solve design problems. Generally, ECs lead to increase cost and delivery time since they are hard to control. Customer and design errors are the main contributor to the amount ECs. Since companies want to satisfy their customers, changing customer requirements with is associated with ECs must be accepted as a part of doing business. Thus it is vital to product designers to understand customer requirements and appropriately translated it into functional requirements and constraints. Even though customers requirement are changed during product development but its occurrence must be kept as less as possible to reduce ECs. The reasons of customers changing the requirements are; lack of competency of designers about customers requirement, lack of customers technical competency, the quality of the requirement process, the quality of communication between designers and customers and external factors such as technology progress along the product development. To understand which factor influencing the most, the research will explore in depth the reasons of customers changing requirement through descriptive study.

## RESEARCH AIM AND QUESTIONS

The research aims to provide support to designers to deal with customers in the situation of requirement changes.

1. Why do customers change the requirement?
2. How to support product designers in the situation customers change the requirement?

### Reasons of Q1

This question mainly to draw the reasons of customers gives to change the requirement, identify sources of idea that motivate customers, recognize the most influential factor to customers to change requirements.

### Reasons of Q2

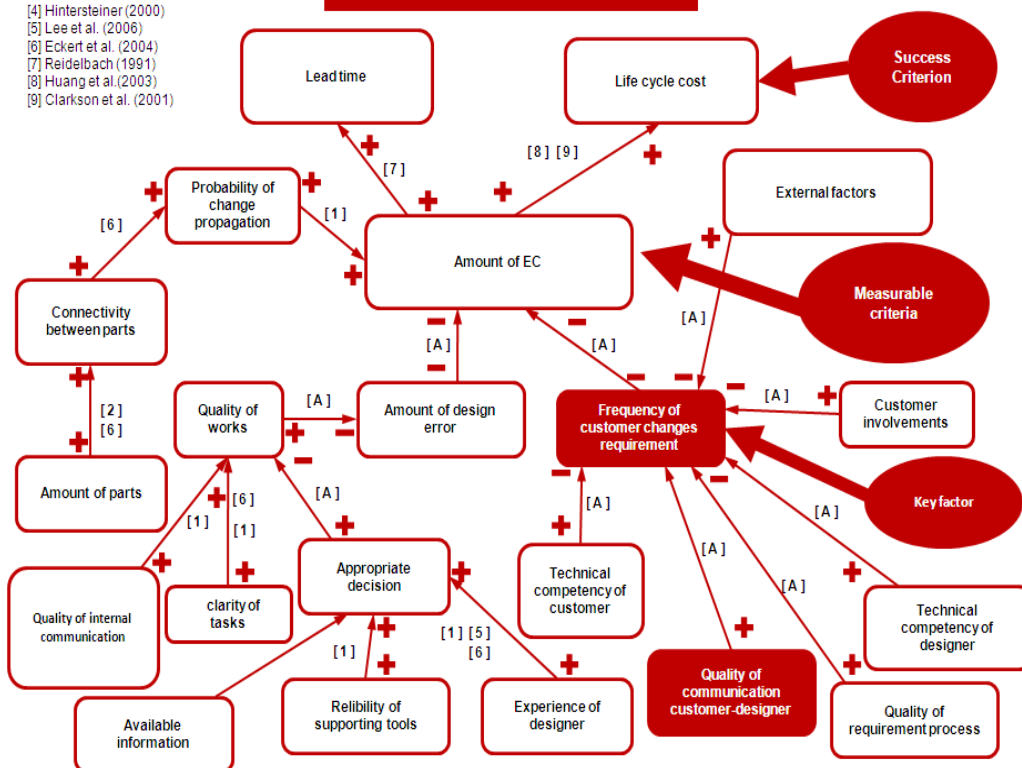
This question is to identify the types of support that is required by the designers to deal with the customers in the situation customers changes the requirements. This question is also to address the need of product designers on the characteristics of support system to deal with ECs if requirement changes.

## HYPHOTHESIS

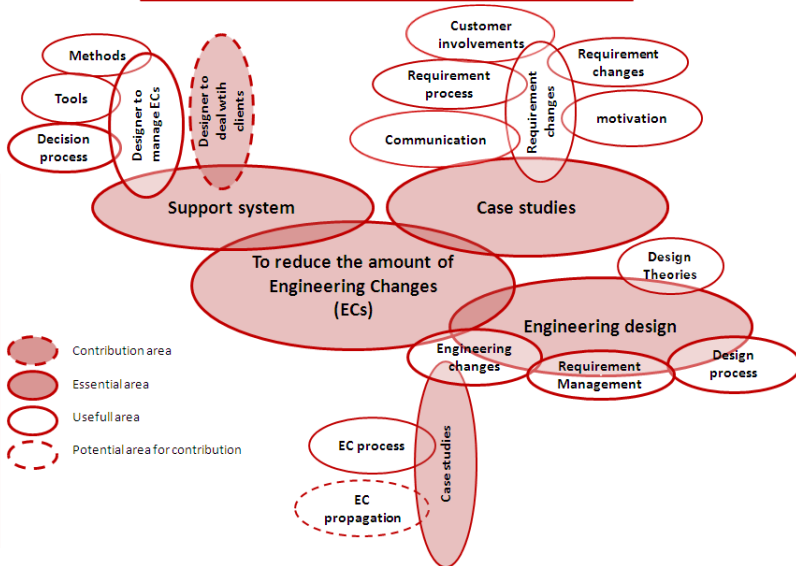
An appropriate means of communication between designers and customers will enhance the competency of designers to understand customer requirements and resulting to fewer requirement changes.

- [1] Jarrat et al. (2006)
- [2] Eckert et al. (2006)
- [3] Pokosz & Malmqvist (1998)
- [4] Hintersteiner (2000)
- [5] Lee et al. (2006)
- [6] Eckert et al. (2004)
- [7] Reidelbach (1991)
- [8] Huang et al. (2003)
- [9] Clarkson et al. (2001)

## REFERENCE MODEL



## ARC DIAGRAM BASED ON RESEARCH GOAL



## RESEARCH APPROACH

### INITIAL STUDY

#### Objectives

- TO identify research criteria and research problems with regard to engineering changes (ECs).

#### Approaches

- LITERATURE REVIEWS in the relevant topics. Refer to ARC diagram

### DESCRIPTIVE STUDY I

#### Objectives

- TO get an overview of ECs and customers involvement in ECs implementation.
- TO get insight the reasons of customers change requirements.

#### Approaches

- DOCUMENTS ANALYSIS such as minutes of meeting, ECs reports, email, log books and etc.

### PRESCRIPTIVE STUDY

#### Objectives

- TO develop framework to reduce the amount ECs during product development.

#### Approach

- FORMULATE the relevant information as needed by product designers to deal with customers in the situation of requirements change.
- DEVISE a design support system to product designer.

### DESCRIPTIVE STUDY II

#### Objectives

- TO evaluate the effectiveness of the support system in the industrial environment

#### Approaches

- EVALUATE the support system with product designers
- EVALUATE the impact of support system to the frequency of customers changing requirement

## EXPECTED FINDING

- Understand the role of customer in ECs process
- Recognize the major reason of requirement changes
- Provide an appropriate support to designers in the situation of requirement changes

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