Chapter 12

Expected and Realized Costs and Benefits from Implementing Product Configuration Systems

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ABSTRACT

Product configuration systems (PCS) are a technology well suited for mass customization and support the task of configuring the product to the individual customer’s needs. PCS are at the same time complex software systems that may be tailored to solve a variety of problems for a firm, e.g. supporting the quotation process or validating the structure of a product. This chapter reports findings from a study of 12 Danish firms, which at the time of the study have implemented or are in the process of implementing product configuration systems. 12 costs and 12 benefits are identified in literature, and using radar diagrams as a tool for data collection the relative difference are identified. While several of the firms are mass customizers it is not the primary driver for implementing PCS. The analysis reveals that expected and realized benefits are consistent: 1) Improved quality in specifications, 2) Using less resources, and 3) Lower turnaround time. Interestingly, the realized benefits are all higher than the expected benefits. The expected benefits highlight the motivation, and this has implications for human factors as they point in the direction of significant changes to come in the adopting organization. It is observed that product configuration projects are treated as simple technical projects although they should be regarded as organizational change projects.

INTRODUCTION

Customers have become accustomed to the price of mass produced goods and are increasingly demanding that products are customized to their personal needs. But, unlike previously, customers do not wish to pay a premium for customized goods, which are now becoming a commodity rather than a special case. This is referred to as mass customization (Davis, 1987) and has indeed become an important issue for many firms.
Expected and Realized Costs and Benefits

A means for firms to achieve mass customization is the use of product configuration systems. A product configuration system consists of a computer model of a product, which contains information about the relationship between the individual components of the product and any noteworthy restrictions, which one component imposes on another. For instance, a product model of a bicycle would have information regarding the frame, wheel, tube, tires, saddle, color and style of the different components etc. Restrictions in the model define what size of wheel fits with a given frame – no use in mounting a 26” wheel on a 12” frame.

The purpose of this paper is to identify the expected and realized costs and benefits from implementing product configuration systems. The paper draws on empirical evidence from a study of twelve Danish firms, which have implemented or at the time of data collection were in the process of implementing product configuration systems. The data used in this paper was collected ultimo 2003 through primo 2004. The main thrust of the chapter is to identify costs and benefits. The identified benefits are then used to understand the organizational implications – which essentially are organizational changes rather than a mere technical project.

The chapter is structured as follows: The next section explain what a product configuration system is. This is followed by a section briefly describing the project, study and methodology, which again is followed by a description of the involved firms and the results. The results are presented, and the implications for human factors discussed.

Product Configuration Systems

In order to appreciate product configuration systems these must be placed within a context of mass customization. The definition of mass customization is by itself a subject of controversy; Gilmore and Pine (1997), Duray et al. (2000), Tseng and Jiao (2001), Piller (2004) give a number of different definitions. This is not unexpected, as the field of mass customization attracts scholars from diverse fields such as computer science, engineering, strategy and marketing, see Silveira et al. (2001) for a literature review. In this paper the definition by Duray et al. (2000) is used as it has both an engineering and a cost perspective, which is in agreement with the views of this paper. In this definition mass customization is defined by two dimensions: 1) The basic nature of customization, and 2) The means for achieving customization at or near mass production costs.

The basic nature of customization refers to the observation that variety in itself does not constitute customization, and the customer must be involved in the specification of the product. The means to achieve mass customization at or near mass production costs are essentially economics of scale as a consequence of the modularity of the product. By modularizing a product and reusing as many modules as possible in all product variations it is possible for these modules to be produced at or near mass production prices.

Product configuration systems are enablers in both dimensions. A product configuration system allows the customer or sales person to easily configure a product to their specific needs. The product configuration system keeps track of the possible combinations of product properties that are allowed. A product configuration system also influences costs, as the costs of configuring a “standard” product are the same as a custom product. The costs of making product specification are the same for all product configurations.

A product configuration system is basically a model of a product, describing the relationship between individual parts. This makes it possible to interactively design a product by specifying which parts should be used in the final product. Product configuration systems can be categorized based on the type of knowledge (performance/structure) and number of decision variables (few/many) (Ladeby, Edwards, & Haug, 2007).
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