

Chapter 16

An ASP–Based Product Customization Service System for SMEs:

A Case Study in Construction Machinery

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ABSTRACT

A product customization system with integrated application services is helpful for small to medium-sized enterprises (SMEs). The mode of application service provider (ASP) particularly targets SMEs by providing integrated applications. The current product customization system seldom considers integrating with ASPs and orienting product lifecycle. In this article, an ASP-based product customization service system operating in lifecycle-oriented customization mode is proposed. Resource share, product data transform, and product configuration are three important aspects for effectively supporting lifecycle-oriented product customization service. A resource collection method for distributed resource share is put forward. An XML-based data mapping model for isomeric/isomorphic product data transform is presented. A new algorithm for rapid product configuration is designed, and an interactive virtual environment for collaborative configuration is suggested. Using this system, SMEs can develop their Internet-based sales and customization systems smoothly, in a short time, and at low cost. A construction machinery oriented product customization service platform is introduced as a case study.

INTRODUCTION

Due to the ever-increasing economic globalization, product variation and customization is a trend in current market-oriented manufacturing environments. The success of mass customization systems depends on a series of external and internal factors, given as follows (Silvira, Borenstein & Fogliatto, 2001):

- Products should be customizable
- Customer demand for variety and customization must exist
- The willingness and readiness of suppliers, distributors, and retailers to attend to the system demands
- Technology must be available
- Knowledge must be shared.

To achieve those, a firm has to face the particular challenge of quick response to dynamic customer needs, wide variations, increasing complexity of product design, rapid design, and product technology changes. It is important to evolve e-business environment by improving an enterprise-competitive capability to meet the customers' individual demands efficiently (Yang, Zhang, Liu, & Xie, 2005). However, small to medium-sized enterprises (SMEs) may not make socially optimal investments in product customization. It is even difficult for SMEs to develop Internet-based customization systems because of technology difficulties (Wang Li, & Jiang, 2003; Zhao, Ju, Wang, & Yin, 2003). In fact, reports suggest that SMEs in China are not keeping up with new information technology and manufacturing cases and most of them do not have enough money to buy or have no technical capability to utilize advanced software such as CAD, CAM, PDM, SCM, and CRM. An integrated service platform, which evolves e-business environment by integrating knowledge, technologies, and resources among customers, suppliers, and other business partners to improve SMEs' competitive capability and

meet customers' individual demands efficiently has been a trend in recent years.

Application service provider (ASP), which is viewed as a subset of e-commerce (Heart & Pliskin, 2001), is a third party service organization whose core value propositions are to lower total cost of ownership, make monthly fees predictable, reduce time to market, provide access to market-leading applications, and allow businesses to focus on their core competencies (Jaruzelski, Ribeiro, & Lake, 2000; Kern, Lacity, & Willcocks, 2002). ASP stresses the roles of collaboration and interaction between a provider and a consumer as a key feature. ASPs particularly target SMEs by providing applications that these firms normally cannot afford (Nigel & David, 2005). The ASP mode is helpful by setting up an ASP service platform that provides services such as system development, system integration, and technology support (Yang et al., 2005; Pan & Jia, 2005; Xu, Li, & Zhang, 2004). The integration of the product customization system and ASP is seldom considered in current researches of product customization systems.

In this article, an ASP-based product customization service system for SMEs operating in lifecycle oriented product customization mode is proposed. Key technologies to support the system are studied in detail. The purpose of this study is to effectively reduce the time and cost of product customization for SMEs by providing an integrated product customization service environment. The rest of this article is organized as follows. First, the system structure is presented. Next, a lifecycle-oriented product customization mode driving the system operation is described. Key technologies to support product customization are examined in depth. Then, as a case study, a construction machinery oriented product customization service platform is developed based on the system and used to verify the studies. Finally, this article is concluded avenues for future work are suggested.

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