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A DFX and concurrent engineering model for the establishment of a new department in a university

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Abstract

The natural focus of concurrent engineering (CE) and design for X (DFX), as commonly used by manufacturing industry, is on product design or new service development. The present study applies the DFX technique in a CE environment to the planning and design of a new department in a university, and thus develops a comprehensive model for such an undertaking. The model identifies two stages in the overall process: the planning stage and the design stage. The planning stage includes four dimensions, whereas the design stage includes 11 dimensions. The dimensions are interdependent; indeed, the dimensions cannot be implemented separately and sequentially. The model must be implemented in a CE environment. A case study is then presented in which a department of leisure management at a university is established using the model described. The implications of the case study and the final conclusions of the paper are then presented.

Keywords: Concurrent engineering (CE); Design for X (DFX); New service development (NSD); University

1. Introduction

The twenty-first century is the era of the globalized knowledge economy for a wide range of business activities, including university education. As the educational market has become liberalized, Taiwan has recently introduced reforms in educational policy. These reforms have been especially marked since the entry of Taiwan to the World Trade Organization (WTO). The rapid growth in university education has changed the nature of the Taiwanese educational sector from its original model of elite education to one of mass education and, subsequently, to a system of universal education (Ministry of Education Statistical Department, 2004). However, these changes have created imbalances between supply and demand in university education, leading to a reduction in educational quality. As international competition in educational services has become more intense, many countries have invested enthusiastically in university education in an effort to maintain their international competitiveness. Taiwan is no exception. To adapt to the strong competition that has accompanied

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membership of the WTO, Taiwan must immediately improve the quality of its university education (Chen and Ho, 2003).

The provision of education is a service industry characterized by a high degree of interpersonal contact (Chase, 1978; Katouzian, 1970); therefore, any exploration of the management of the education system must begin with a consideration of its service-industry attributes. However, despite the importance of the service sector, empirical research on new service development (NSD) is still sparse (Bullinger et al., 2003), and the studies that have focused on NSD (Alam and Perry, 2002; De Brentani, 1995) have largely neglected its application in the educational sector. This relative lack of attention is both surprising and a matter for concern specially in view of the fact that service design in education has been identified as a crucial factor determining educational quality (Oplatka, 2004). In particular, when planning and designing new departments in universities, few suitable models are available for reference in designing integrated models that are appropriate to practical requirements (Bullinger et al., 2003).

Universities must take care in planning new departments and satisfying their customers. Kanji and Tambi (1999) have noted that university customers include students, staff, parents, businesses, and government. To meet the demands of these customers in a competitive market, universities must promote themselves as offering high-quality education. In pursuit of this objective, unsatisfactory departments are frequently dissolved to allow new departments to introduce novel curricula, advanced technologies, first-class teaching, and improved service quality. This encourages able students to enroll and enables the university to provide graduates who meet modern recruitment criteria. This process of renewal and improvement is important to universities in the modern competitive environment. If planning and resources are insufficient, the process will fail to deliver satisfactory outcomes, thus leading to a lack of student enrollment and, ultimately, to adverse affects on the reputation and financial success of the university.

In the services sector in general, many service-design methods are available; however, these have seldom been used in the design and development of the education sector. Many studies have reported on the implementation of such methods as quality function deployment (QFD) and concurrent engineering (CE) in manufacturing industries and in NSD in general (Han et al., 2004; Stehn and Bergström, 2002; Kumar and Midha, 2001; Koufteros and Marcoulides, 2006). However, QFD is more complicated and less convenient than 'design for X' (DFX) (Hsiao, 2002). DFX emphasizes the consideration of all design goals and related constraints in the early design stage (Kuo et al., 2001) and allows the rationalization of services, associated processes, and systems (Huang and Mak, 1997). Effective utilization of DFX and CE in NSD can concurrently improve quality, costs, and cycle times (Dowlatshahi, 2001a, b; Huang and Mak, 1997). Against this background, the present study applies the DFX technique in a CE environment to the problem of establishing a new department in a university.

2. Literature review

2.1. CE

Prasad (1996) defined CE in the following terms: "concurrent engineering is a systematic approach to the integrated, concurrent design of products and their related process, including manufacture and support". In manufacturing, CE is predominantly used in product design (Dowlatshahi, 1996, 1997), and product life-cycle (Dowlatshahi, 2001a). The advantages of the use of CE are (Dowlatshahi, 1992, 1997):

- reduction in product development cycle time;
- avoidance of costly future redesigns;
- reduction in duplication of effort;
- better communication and dialogue;
- more efficient operations and higher productivity;
- overall cost savings;
- elimination or reduction of product recalls;
- lower maintenance costs;
- more reliable products;
- better customer satisfaction; and
- improved bottom line.

CE impinges on several factors in the establishment of new department in a university including customers' demands, competitive advantage, market attractiveness, financial resources, and the quality of execution of the whole process of establishing a new department. To consolidate these dimensions, it is therefore important that a new