Design for Six Sigma (DFSS) Activity Implementation

Yi-Chan Chung
Associate Professor, Department of Business Administration, Yuanpei University of Medical Technology, Taiwan.

(Corresponding author: Yi-Chan Chung)

ABSTRACT: In the context of growing competition, it has been the focus of many manufacturers how to choose appropriate business strategy to incorporate market orientation and information technology concept into DFSS activities, so as to provide better service quality for customers and improve business performance. This study explores the relationship between market orientation, information technology, business strategy, DFSS activity and business performance. The findings can serve as reference for manufacturers to implement DFSS activity and enhance business performance.

I. RESEARCH BACKGROUND AND PURPOSE

Faced with growing competitions, manufacturers must make their own creative services to satisfy customers with quality, so as to attract more customer consumption and obtain better revenue. The current studies of scholars on DFSS focus on discussing the implementation steps, connotation and use time of DFSS activity, as well as the application of DFSS activity in industry and other related issues. Few studies have incorporated market orientation, input in information technology and business strategy into DFSS activities to explore their impact on business performance. Therefore, this study aims to explore the correlation between market orientation, input in information technology, business strategy, DFSS activity and business performance, so as to provide a reference for companies to carry out DFSS activities.

II. LITERATURE REVIEW

A. Market orientation

Narver and Slater (1990) divided market orientation into three dimensions, including (1) customer orientation; (2) competitor orientation; (3) cross-department coordination [17]. Market orientation defined by Kohli & Jaworski (1990) includes market information collection, market information transmission, and response to market information [13]. Naver qw& Slater (1990) tended to judge market orientation from cultural dimension, and Hurley & Hult (1998) held that market orientation was most significant from cultural dimension [10]. Based on the dimensions proposed by Narver and Slater (1990), this study classifies market orientation into three dimensions: customer orientation, competitor orientation and cross-department coordination [17].

B. Input in information technology

Sakaguchi & Dibrell (1998) held that input in information technology could be measured by investment in information technology and training [20]. Miller & Doyle (1987) held that input in information technology must pay attention to the following three dimensions: (1) Understand the importance of information technology in the company; (2) obtain benefits after making some

investment in software, hardware and personnel; (3) train personnel based on the needs of developers and users [16]. With literature review [16, 20, 24] as the basis, this study divides the degree of input in information technology into three dimensions: personnel cognition, hardware and software investment, and personnel training.

C. Business strategy

Croteau and Bergeron (2001) defined business strategy as the actions taken by the organization to achieve its goals [6]. Porter (1980) held that enterprises could implement cost leadership strategy, differentiation strategy and centralization strategy to achieve or maintain competitive advantages [19]. Miles and Snow (1978) divided business strategy into explorer strategy, defender strategy, analyst strategy and responder strategy [15]. Durand and Coeurderoy (2001) divided business strategy into cost leadership strategy, marketing differentiation strategy and innovation differentiation strategy [7]. This study divides business strategy into explorer strategy, defender strategy, analyst strategy and responder strategy.

D. DFSS activity

Banuelas & Antony (2004) pointed out that DFSS is a management philosophy of continuous quality improvement, using tools to reduce process variability and achieve six sigma quality [2]. Brue and Launs by (2003) divided the steps of DFSS activity introduction into five stages: planning stage, clarification stage, design stage, optimization stage and verification stage [4]. Chowdhury (2005) pointed out that the five DFSS action stages are improvement opportunity identification, condition definition, concept development, design optimization and verification [5]. This study adopts the DFSS stages proposed by Chowdhury (2005).

E. Business performance

Kirca *et al.,* (2005) measured performance based on indicators of overall career performance, profitability, sales volume and market share [12]. Croteau and Bergeron (2001) measured performance from the two perspectives of profitability and sales growth [6]. Slater

and Naver (2000) measured performance based on return on investment [23]. Shrader (2001) measured operational performance through profitability and sales growth rate [21]. Su *et al.*, (2003) measured business performance from the perspectives of profit revenue and customer satisfaction [24]. This study measures business performance through operating target achievement rate, quality satisfaction, revenue growth rate, efficiency improvement and other indicators.

III. RESEARCH METHOD

This study mainly discusses the correlation between market orientation, input in information technology, business strategy, DFSS activity implementation level and business performance. The hypotheses are as follows:

H1: Higher degree of market orientation has a significantly positive impact on DFSS activity implementation level.
H2: Higher input degree of information technology has a significantly positive impact on DFSS activity implementation level.
H3: Business strategy differentiation has a significantly positive impact on DFSS activity implementation level.
H4: Higher DFSS activity implementation level has a significantly positive impact on business performance.

A. Market orientation and DFSS activity
Pande *et al.*, (2006) pointed out that market demand identification facilitates DFSS activities to provide the desired products and services [18]. Brue and Launs by (2003) held that understanding the market customer demand is the key to the success of DFSS [4]. Blakeslee (1999) held that to ensure DFSS activity implementation performance, enterprises must maintain interaction with the market [3]. Based on the above literature review, H1 is accepted in this study.

B. Information technology and DFSS activity
The use of information technology is closely related to the change in enterprise process [8]. Laudon and Laudon (2010) held that the organization could develop information technology tools required by enterprises to meet the needs of activities [14]. Information technology effectively collects and analyzes all kinds of information to improve the level of product design and process control [22]. Johannessen *et al.*, (1999) held that information technology would improve corporate internal communication, change the efficiency of the existing operation process, and contribute to the implementation of activities [11]. Based on the above literature review, H2 is supported in this study.

C. Business strategy and DFSS activity implementation
Chowdhury (2005) pointed out that to promote DFSS activities, appropriate strategies should be chosen to develop products and services with robust design [5]. Brue and Launs by (2003) pointed out that enterprises should develop products and services that meet customer needs through appropriate strategies in order to carry out DFSS activities [4]. Blakeslee (1999) held that to ensure DFSS activity implementation performance, enterprises must adopt appropriate strategies to monitor and analyze market-related information at any time and keep interaction with the market to understand customer satisfaction [3]. Based

on the above literature discussion, H3 is accepted in this study.

D. DFSS activity and business performance
Brue and Launsby (2003) mentioned that DFSS activity could ensure good performance of new products and services in the market [4]. Pande *et al.,* (2006) pointed out that DFSS could avoid the cost caused by errors and enhance corporate efficiency [18]. Harry and Schroeder (2006) pointed out that by implementing DFSS activities, products and processes that meet customer needs could be developed to improve corporate performance [9]. Aggogeri *et al.,* (2009) and Tennant (2002) pointed out that DFSS activity could enhance business performance [1, 25]. Based on the above literature review, H4 is supported in this study

IV. CONCLUSION AND SUGGESTIONS

Few empirical studies have incorporated market orientation, input in information technology and business strategy concept into DFSS activities to explore their impact on business performance. The results of this study show that higher DFSS activity implementation level has a significantly positive impact on business performance. Enterprises must adopt appropriate strategies to enhance DFSS activity implementation level. In addition, both market orientation and input in information technology contribute to DFSS activity implementation. This study suggests that companies can enhance DFSS activity implementation level by strengthening market orientation and input in information technology, monitoring and analyzing market-related information at any time and maintaining interaction with the market. This study can serve as a reference for relevant manufacturers to implement DFSS activities to avoid unnecessary waste of resources and exploration time. In the future, researchers can proceed with empirical analyses on different industries (such as traditional industries) to explore the influence of the implementation level of DFSS activities in different industries on business performance to acquire more complete research results.

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