Six Sigma Operational Methods

DESIGN FOR SIX SIGMA FOR SERVICE

- Best practices for service sector companies
- Insures operational excellence and accountability
- Eliminate non-value-added activities
- Improve call center efficiencies

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Design for Six Sigma for Service

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PREFACE

Six Sigma is the fastest-growing business management system in industry today. It has been credited with saving billions of dollars for companies over the past 10 years. Developed by Motorola in the mid 1980s, the methodology became well known only after Jack Welch from GE made it a central focus of his business strategy in 1995. In the last few years, the Six Sigma movement started spreading from manufacturing industries into various service sectors, such as banking, insurance, hospitals, schools, and many other service organizations. Many service organizations that implemented Six Sigma reported huge successes.

One of the new developments in Six Sigma is Design for Six Sigma (DFSS). DFSS is a systematic methodology that uses tools, training, and project management discipline to optimize the design process of products, services, and processes in order to achieve superior designs to maximize customer value at Six Sigma quality levels. In contrast to regular Six Sigma, characterized by DMAIC (define, measure, analyze, improve, and control), which emphasizes process improvement without fundamental design change, DFSS emphasizes the importance of the design. DFSS contends that only superior design can create products or services with high customer value, low design vulnerability, and high quality. In recent years, DFSS is getting more attention because of its perceived benefits.

Can DFSS be applied to the service industry? Based on the author's extensive research, the answer is a resounding yes.

The service industry exhibits some distinct features that are not found in the manufacturing industry. Based on the work of Sasser, Olsen, and Wyckoff (Sasser et al. 1978), these distinct features include:

1. Many services are intangible; they are not things like hardware.
2. Many services are perishable; they cannot be inventoried.
3. Services often produce heterogeneous output.
4. Services often involve simultaneous production and consumption.

However, no matter what type of service organizations they are, there are three aspects of services that are detrimental to service quality and customer satisfaction (Ramaswamy 1996):

Service Product Service product refers to the service output's attributes or the service items provided to the customers. For example, in restaurant service, the service product includes meals, use of dining utensils, tables, and chairs, music played if needed, and so on. In healthcare service, the service product includes diagnosis, treatment, and care items.

Service Delivery Process Service delivery process refers to the process that delivers or maintains the service products for customers. For example, in a car rental center, the service process includes all steps needed to rent a car to renters. These steps include collecting the driver's license and credit card, checking car availability, filling and printing the contract, obtaining customer signature, delivering the car key and contract to the customer, locating the car, and so on.

Customer-Provider Interaction In a service process, there is also a human interaction aspect, that is, the interaction between customers and service providers. The quality of this interaction will greatly influence customer satisfaction. For example, in the car rental business, the representative should greet customers politely, ask customers their preference of cars, and patiently explain all the options.

Clearly, a customer-value-based superior design and planning in a service product will make services more attractive to customers, and therefore attract more customers and create more revenue for service organizations. Superior designs in service delivery processes will increase the efficiencies of service processes and reduce cost, and therefore increase the profit for service organizations. Excellent designing, planning, and managing of customer-provider interactions will also certainly improve customer satisfaction level and will help to retain customers.

The primary objective of this book is to provide a systematic framework for implementing DFSS in various service industries. From the above discussion, it is clear that DFSS in the service industry should support the following two key activities:

1. Design and planning of service products
2. Design and management of service delivery processes

Chapter 1 of this book begins with the discussion of several key features of service industries and key success factors for service organizations. Chapter 1 also introduces the concept of Six Sigma and how it should be implemented in the service industry.

Chapter 2 introduces DFSS and discusses how itshould be implemented in service industries. In this book, DFSS for service includes two distinct aspects—DFSS for service products and DFSS for service delivery process. The DFSS roadmap for service products and DFSS roadmap for service delivery process are discussed separately.

Chapters 3 through 9 are methodology chapters on DFSS for service products, which discuss important methods that are useful in DFSS for service products. Specifically, Chapter 3 discusses the concept of customer value and how to create value by service product design. Value creation is a key component for business success.

In order to design the services that are attractive to customers, we first need to know "what customers want." Chapter 4 discusses customer survey design, administration, and analysis. The customer survey is an important activity for obtaining the voice of customers.

Chapter 5 discusses customer value management, which is an important technique to design the survey and obtain key information to develop service designs that are attractive to customers and are competitive in the market place.

Chapter 6 presents the quality deployment method (QFD), a powerful method to guide and plan activities to achieve customer desires. QFD was originally developed in Japan and is now widely used all over the world. Two examples of applying QFD in service industries are presented.

Chapter 7 presents the method of value engineering. Value engineering is an effective method of designing products or services that can satisfy design objectives, yet minimize cost.

Chapter 8 discusses brand development and brand strategy. The success of a service organization is largely dependent on its brand image and customer opinion. Designing of a service product should be consistent with its desired brand image.

Chapter 9 presents the theory of inventive problem solving (TRIZ), which was developed in the former Soviet Union. TRIZ is a very powerful method that makes innovation a routine activity. TRIZ was first developed for technical innovation. Recently, there have been some good extensions of TRIZ into business innovation practices. This chapter will start with general discussions of TRIZ, followed by TRIZ practices in service industries.

Chapters 10 and 12 are methodology chapters on DFSS for service processes. Chapter 10 gives a very comprehensive discussion of service process design and improvement. All service delivery processes can be classified into the following 10 categories as follows:

- Office processes
- Service factory
- Pure service shop
- Retail service store
- Professional service
- Telephone service
- Project shop
- Transportation service
- Logistics and distribution
- Purchasing and supply chain

In this chapter, we discuss each of these processes in detail, and present many effective process diagnosis, design, and improvement methods, such as value stream mapping and lean operation principles. A detailed service process redesign case study is presented at the end of this chapter.

Chapter 12 discusses the theory of constraint, which is an excellent method to analyze and improve service processes in an efficient manner.

Chapter 11 is a reference chapter, which provides the necessary statistical background for service DFSS practitioners.

This book presents DFSS for the service environment in a very clear way and provides practical guidance for Six Sigma practitioners in service industries.

Kai Yang

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Readers' comments and suggestions would be greatly appreciated. I will give serious consideration to your suggestions for future editions. Please contact me at: ac4505@wayne.edu; kyang@simplexsystems.com; http://simplexsystems.com/LeanPD.htm. Also, I am conducting public and in-house Six Sigma and DFSS workshops and provide consulting services.

ABOUT THE AUTHOR

Kai Yang, Ph.D., has wide experience in quality and reliability engineering. The Executive Director of Enterprise Excellence Institute, a renowned quality engineering organization based in West Bloomfield, Michigan, he is co-author of the influential *Design for Six Sigma: A Roadmap for Product Development*. He is also Professor of Industrial and Manufacturing Engineering at Wayne State University, Detroit.

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Chapter

1

Six Sigma in Service Organizations

1.1 Introduction to the Service Industry

Entities in the service industry are called service organizations. Many service organizations are profit-earning business enterprises, such as restaurants, hotels, and retail stores; some service organizations are nonprofit organizations, such as universities and post services. In any service organization, however, one or more kinds of services are provided to customers. The service industry exhibits some distinct features that are not found in the manufacturing industry. Based on the work of Sasser, Olsen, and Wyckoff (1978), these distinct features include

1. Many services are intangible; they are not things like hardware.
2. Many services are perishable; they cannot be inventoried.
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4. Services often involve simultaneous production and consumption.

However, behind these apparent differences, there are also many similarities between the manufacturing and service industries. Figure 1.1 shows a generic business operation model for manufacturing-oriented companies.

A manufacturing-oriented company will provide one or many kinds of products to its customers. In any manufacturing-oriented company, there will always be a core operation, which is usually the product development and manufacturing process. Besides the core operation, there are also many other business processes, such as business management, financial operation, marketing, personnel, and supplier management.

Figure 1.2 illustrates a business operation model for many service organizations. In this model, the service organization has a headquarter and many

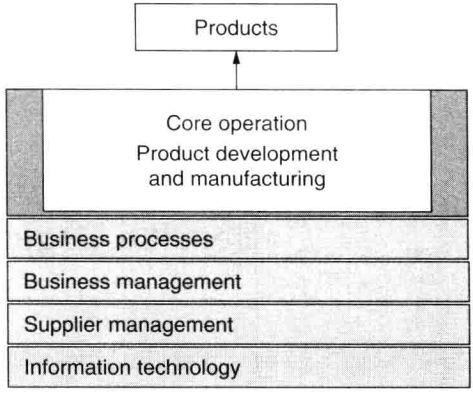

Figure 1.1 Business Operation Model for Manufacturing-Oriented Companies

branches. Each branch is a service delivery process. The service process delivers services to customers. The services provided to customers, no matter how intangible, can be treated as *service products*. For example, in the restaurant business, the meal provided to customers and the music played could be treated as service products; in the insurance business, the insurance policy and processed claims can also be treated as service products. In service organizations, usually the service delivery processes and services are closely related; many of them are in the same place. For example, in the restaurant business, the service delivery process includes the kitchen operation, order taking, the hostess, and the cashier; in the insurance business, the service delivery process includes the insurance agent, insurance policy paperwork processing, insurance claim processing, and information systems.

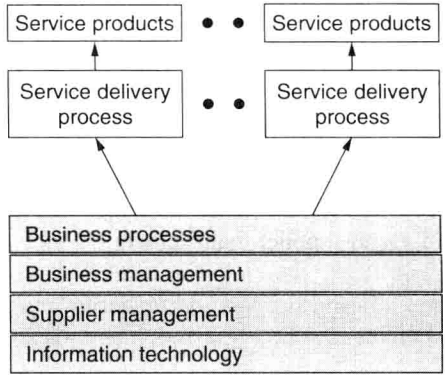

Figure 1.2 Business Operation Model for Many Service Organizations

Of course, there are many other types of service organizations. Some service organizations are one-shop organizations. Others, such as Amazon.com, interact with customers mostly via the Internet. For these organizations, the service process is centralized and the customers are everywhere in the world. It is a "one shop for the whole world" organization. Based on the classification by Schmenner (1994), and Harrell and Tumay (1995), there are 10 kinds of service processes as follows:

1. Office
2. Service factory
3. Pure service shop
4. Retail service store
5. Professional service
6. Telephone service
7. Project shop
8. Transportation service
9. Logistics and distribution
10. Purchasing and supply chain

However, no matter what type of service organizations you look at, there are three aspects of services that are detrimental to service quality and customer satisfaction (Ramaswamy 1996). These are

Service Product Service product refers to the service output attributes to the customers, or the service items provided to the customers. For example, in restaurant service, the service product includes the meals; use of dining utensils, tables, and chairs; and music played if needed. In health-care service, the service product includes diagnosis, treatment, and care items.

Service Delivery Process Service delivery process refers to the process that delivers service products to customers or maintains the service products. For example, in a car rental center, the service process includes all steps needed to rent a car to a customer. These steps include collect driver's license and credit card, check car availability, fill and print contract, obtain customer signature, deliver car key and contract to customer, and locate the car.

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Table 1.1 gives a comprehensive summary of the features of service products, service delivery process, and customer-provider interaction for

Table 1.1 Service Types and Service Features

Service Type	Features	Examples	Service Products	Service Delivery Process	Customer-Provider Interaction
Office processes (transaction process)	Sequence of paperwork, data entries, and decisions	Insurance, mortgage and loan.	Finished paperwork	Paperwork processing	Usually happens at the beginning and the end of a transaction
Service factory	Front room and back room, high equipment requirement	Restaurant, copy centers	Meals, copies, binders	Back room is similar to factory.	Important. Usually happens during the whole process
Pure service shop	Front room and back room, highly customized service	Hospitals, repair shop, court	Diagnosis and treatments, repairs, rulings	Multiple steps; service process varies from customer to customer.	Important. Usually happens during the whole process
Retail service store	Large facility, many choices of goods, customer self-service	Supermarket, hardware stores	Selection of goods, nice layouts and labeling	Purchasing and shipping, inventory management, checkout	Usually happens at checkout and during in-store help