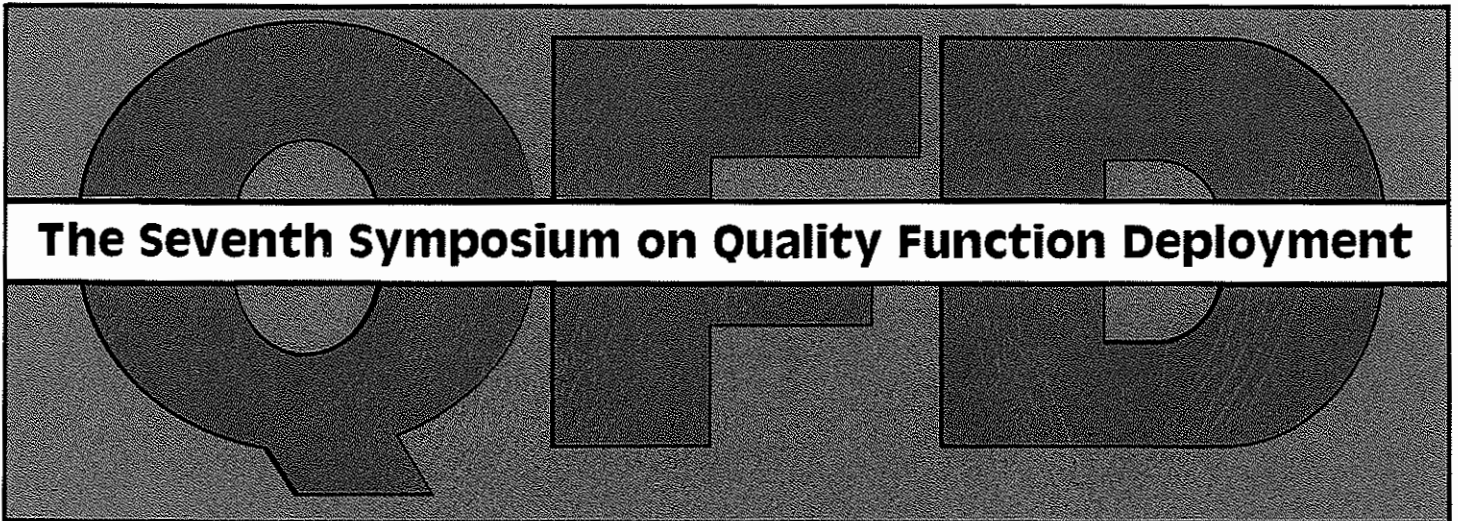


Transactions from



SM

**June 11-13, 1995
Novi, Michigan**

This collection of QFD tutorials and case study papers is the companion document to **The Seventh Symposium on Quality Function Deployment** conducted June 11, 12 and 13, 1995 at the Novi Hilton - Novi, Michigan.

Tutorials and papers are reproduced with the permission of the authors and their companies. Rights of authorship and copyright are reserved. Contents may not be reproduced without the express permission of the original authors.

Additional copies can be ordered from:

QFD Institute
1140 Morehead Ct.
Ann Arbor, MI 48103 USA
Tel: +1 313-995-0847
Fax: +1 313-995-3810
Email: 72154.355@compuserve.com
or INFO@QFDI.org

©1995 by the QFD Institute. All rights reserved.

Elicit Service Customer Needs *Using Software Engineering Tools*

Glenn H. Mazur
Japan Business Consultants, Ltd.

The Seventh Symposium on Quality Function Deployment
Novi, Michigan
June, 1995

[Faint, illegible text, likely bleed-through from the reverse side of the page]

Copyright © 1995 by Glenn Mazur All Rights Reserved.

Japan Business Consultants, Ltd.

1140 Morehead Ct. Ann Arbor, MI 48103 USA

Japan Business Consultants, Ltd. values the spread of ideas.
In this spirit, you have permission to reproduce this paper as a complete unit (no extracts). All copies must include the copyright notice as follows:

Copyright © 1995 by Glenn Mazur All Rights Reserved.
Japan Business Consultants, Ltd. 1140 Morehead Ct. Ann Arbor, MI 48103 USA
+1 (313) 995-0847 Fax: +1 (313) 995-3810 E Mail: gmazur@engin.umich.edu

Elicit Service Customer Needs

Using Software Engineering Tools

by Glenn H. Mazur
Japan Business Consultants, Ltd.
1140 Morehead Ct.
Ann Arbor, MI 48103 USA

Tel: +1 313-995-0847
Fax: +1 313-995-3810
Email: 72154.355@compuserve.com
gmazur@engin.umich.edu

Abstract

Recently, Quality Function Deployment (QFD) has been augmented with new methods to enhance its front end power. Many recent extensions to QFD focus on better prioritization of customer requirements, but not as much attention has been paid to more systematic ways to define those requirements in the first place. This can be especially problematic for service organizations whose product is highly transitory and people dependent. Since service consists primarily of processes, the author has been exploring other process intensive fields such as software engineering for more systematic techniques. This paper looks at use of the State-Transition Diagram, Data Flow Diagram, Event Table, and Event Tree to better define service customer needs. Keep in mind, the goal is not to depersonalize or mechanize service providers, but rather to use the process analysis power of these tools to enhance understanding of how customers interact with providers and how they make buying decisions. Examples are included.

Key words: QFD, Service Quality, Software Engineering, State Transition Diagram, Data Flow Diagram, Event Table, Event Tree.

Introduction

Quality Function Deployment began more than twenty years ago in Japan as a quality system focused on delivering products and services that satisfy customers. To efficiently deliver value to customers, it is necessary to listen to the "voice" of the customer throughout the product or service development process. The late Dr. Shigeru Mizuno, Dr. Yoji Akao, and other quality experts in Japan developed the tools and techniques of QFD and organized them into a comprehensive system to assure quality and customer satisfaction in new products and services [Mizuno and Akao 1994, Akao 1990].

In 1983, a number of leading North American firms discovered this powerful approach and have been using it with cross-functional teams and concurrent engineering to improve their products, as well as the design and development process itself [Akao 1983, Sullivan 1986, King, 1987]. Service organizations have also found QFD helpful. The author used QFD in 1985 to develop his Japanese translation business, **Japan Business Consultants**, and saw revenues increase 285% the first year, 150% the second year, and 215% the third year [Mazur 1993c]. QFD was an important part of **Florida Power & Light's** successful bid to become the first non-Japanese Deming Prize recipient in 1990 ["Quality System Implementation..." 1988, Webb 1990, Bodziony 1995] and in the 1994 Deming Prize awarded to **AT&T Power Systems**. It has been successfully applied in the U.S. healthcare industry since 1991 at **The University of Michigan Medical Center** [Gaucher 1991, Ehrlich et al 1993, Ehrlich 1994], **Baptist Health System** [Gibson 1994, 1995], and other leading institutions. Interesting service applications also in-

clude the author's development of an engineering TQM curriculum at **The University of Michigan College of Engineering** and the application to employee satisfaction and quality of work life at **AGT Telus** [Harries et al 1995]. Each year new applications are being reported in small businesses as well [Mazur 1993c, 1994a]. Since 1990, the author has consulted with other service organizations in distribution, education, food service, personnel, finance, healthcare, repair, and retail businesses.

Early applications of QFD in service organizations in Japan by Ohfuji, Noda, and Ogino in 1981 were for a shopping mall, a sports complex, and a variety retail store [Akao, 1990]. More recently, Kaneko has been integrating QFD, reliability, and quality circle activities in hotels, shopping centers, and hospitals [Kaneko 1990a, 1990b, 1991, 1992].

QFD has been heralded for such benefits as promoting cross-functional teams, improving internal communications between departments, and translating the customer's needs into the language of the organization. Are there other tools and techniques that can enhance QFD's power? Absolutely! This paper looks to software engineering for some new approaches. First, some QFD basics.

What is QFD?

Basically, QFD is designed to improve customer satisfaction with the quality of our products and services. What can QFD do that is not already being done by traditional quality systems? To understand QFD, it is helpful to contrast the differences between modern and traditional quality systems.

Traditional Quality Systems

Traditional approaches to assuring quality often focus on work standards [Love 1986], automation to eliminate people, or in more enlightened organizations, Quality Improvement Teams to empower employees to resolve problems.

As organizations are finding out, however, consistency and absence of problems are not enough of a competitive advantage when the market shakes out suboptimal players. For example, in the automobile industry, despite the celebrated narrowing of the "quality" (read that fit and finish) gap between U.S. and Japanese

makers, Japanese cars still win the top honors in the J.D. Powers Survey of New Car Quality.



Modern Quality Systems

QFD is quite different from traditional quality systems which aim at minimizing negative quality (such as poor service, broken product). With those systems, the best you can get is *nothing wrong* - which is not enough when all the players are capable. In addition to eliminating poor service, we must also maximize positive quality (such as convenience, enjoyment). This creates **value**.

Quality Function Deployment (QFD) is the only comprehensive quality system aimed specifically at satisfying the customer. It concentrates on maximizing customer satisfaction (positive quality) - measured by metrics such as repeat business. QFD focuses on delivering value by seeking out both spoken and unspoken needs, translating these into actions and designs, and communicating this throughout the organization. Further, QFD allows customers to prioritize their requirements, benchmark us against our competitors, and then direct us to optimize those aspects of our organization that will bring the greatest competitive advantage. What business can afford to waste limited financial, time and human resources on things customers don't want or where we are already the clear leader?

Types of Requirements

To satisfy customers, we must understand how meeting their requirements effects satisfaction. There are three types of customer requirements to consider (see Figure 1) [Kano, *et. al.*, 1984].

Revealed Requirements are typically what we get by just asking customers what they want. These requirements satisfy (or dissatisfy) in proportion to their presence (or absence) in the product or service. Fast

delivery would be a good example. The faster (or slower) the delivery, the more they like (or dislike) it.

Expected Requirements are often so basic the customer may fail to mention them - until we fail to perform them. They are basic expectations without which the product or service may cease to be of value; their absence is *very* dissatisfying. Further, meeting these requirements often goes unnoticed by most customers. For example, if coffee is served hot, customers barely notice it. If it's cold or too hot, dissatisfaction occurs. Expected requirements *must* be fulfilled.

Exciting Requirements are difficult to discover. They are beyond the customer's expectations. Their absence doesn't dissatisfy; their presence excites. For example, if caviar and champagne were served on a flight from Detroit to Chicago, that would be exciting. If not, customers would hardly complain. These are the things that wow the customers and bring them back. Since customers are not apt to voice these requirements, it is the responsibility of the organization to explore customer problems and opportunities to uncover such unspoken items.

Kano's model is also dynamic in that what excites us today is expected tomorrow. That is, once introduced, the exciting feature will soon be imitated by the competition and customers will come to expect it from everybody. An example would be the ability to have pizza delivered in thirty minutes. On the other hand, expected requirements can become exciting after a real or potential failure. An example might be when the

passengers applaud after a pilot safely lands the airplane in rough and stormy weather.

The Kano Model has an additional dimension regarding which customer segments the target market includes. For example, the caviar and champagne that's exciting on the domestic flight might be expected on the Concorde from New York to London. Knowing which customer segments you serve is critical to understanding their requirements.

Thus, eliminating problems handles expected requirements. There is little satisfaction or competitive advantage when nothing goes wrong. Conversely, great value can be gained by discovering and delivering on exciting requirements ahead of the competition. QFD helps assure that expected requirements don't fall through the cracks and points out opportunities to build in excitement.

In summary, Kano found that the exciting needs, which are most tied to adding value, are invisible to both the customer and the provider. Further, they change over time, technology, market segment, etc. The Japanese creators of QFD developed tools such as the Voice of Customer Tables [Akao 1990b, Ohfuji et al 1990, Nakui 1991, Marsh et al 1991, Mazur 1991a, 1991e, 1992c, 1993a, 1993c] and coupled them to affinity diagrams and hierarchy diagrams to break through this dilemma.

This process works best when the QFD team goes to *gemba* (where the customer interfaces with the service) to observe, listen, and record the problems customers experience and the opportunities they wish to seize. The voice tables provided a structure for recording the data. Going to the *gemba* can be difficult for those who are used to seeing things from an internal point of view. They tend to see more process problems and solutions than customer needs. Are there more systematic tools that could help the QFD team understand the customer better? See things from their point of view?

現場

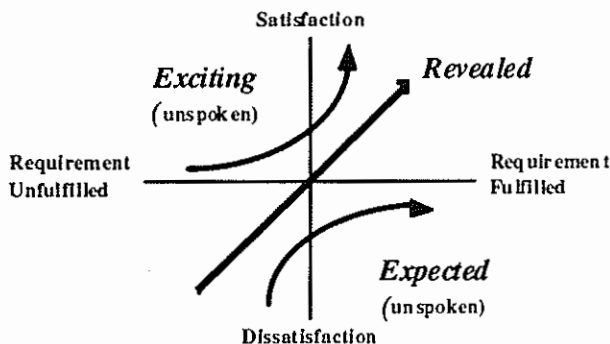


Figure 1. The Kano Model (adapted). Service businesses must meet all three types of requirements - not just what the customer says.

Software engineering tools for service?

Software engineering and its tools grew out of a need for computer system analysts and developers to better

understand the often poorly articulated needs of users by looking at things through their eyes. They address the complexities of a process better than the standard flow charts used in service blueprinting. Service processes are complex because both the provider and the customer are people interacting and reacting to each other, and thus each transaction is in itself a new "product." Also, services contain both usability and emotional components [Takasu]. A cognitive understanding of the customer can help us address some of the emotional aspects.

This paper covers a few of the tools and presents a simple example of how they could be used and the benefits that could be gained.

State-Transition Diagrams (STD)

A service can be viewed as a series of sequential and parallel tasks that achieve a certain purpose or function [Mazur 1993c]. (See Figure 2) From this viewpoint, we look at what the provider must do to satisfy the needs of the customer. The logic, thus, is provider oriented. When we go to the gemba, is there a way we can capture the customer's logic? Can we view the service transaction as different states a customer passes through on his way to a satisfying conclusion of the service?

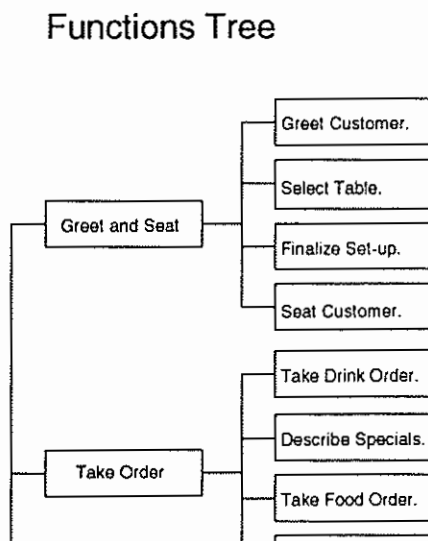


Figure 2. Function Tree for a restaurant. (Baluja et al)

If we can describe the decision making process and experiences of the customers as a transition through a series of states, we can. The STD, a specialized technique valuable for certain types of complex logic where multiple transitions among states can occur [Martin] can help.

To understand the STD, let's describe a simple example, that of turning on a light. An STD would look like Figure 3 and contain these items. The current state (light off) and the desired state (light on) in a box, an arrow showing the transition from off to on, the event triggering the change of state (switch on) written above the line and the process that then takes place when the event occurs (flow electrons) written below the line. Put differently, an event (switch on) causes a process (flow electrons) which changes the state from one (light off) to another (light on).

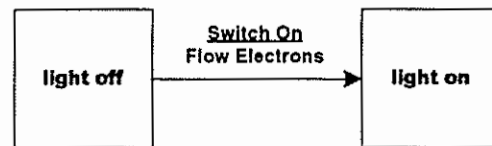


Figure 3. STD for turning on a light.

Let's look at a service example, such as a restaurant. (See Figure 4) We might diagram paying for the meal as a transition from the state of being unpaid to being paid that occurs at the event of the diners are being finished, which causes the payment procedure to be engaged.

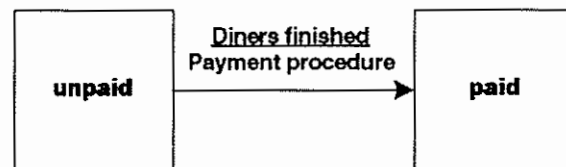


Figure 4. STD for paying a restaurant bill.

This would address the time consuming problem of signaling the waitperson, waiting for the check, and then waiting for the credit card to be brought back. The event of the diners finishing should trigger the pay-

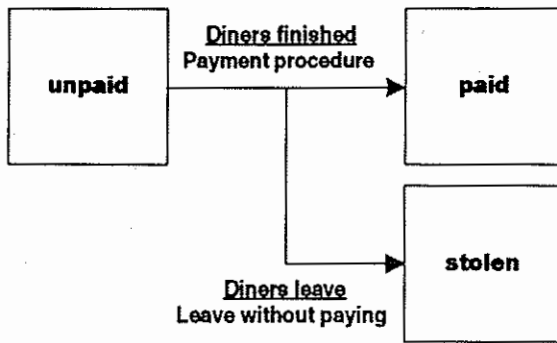
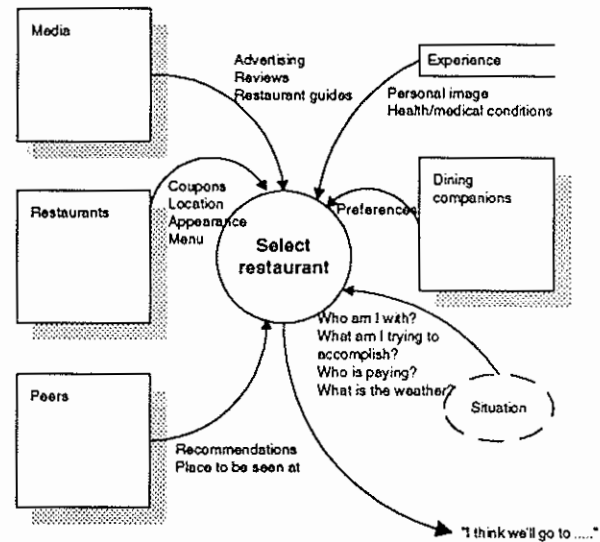


Figure 5. STD with failure mode of payment procedure identified.

ment procedure and the waitperson's responsibility would now be to assist the transition from unpaid to the paid state. A creativity process could then be applied to solving this problem. For example, just like with hotels, a credit card imprint could be taken at the time of ordering and unless there are further charges, a 15% tip could be added and the charge processed automatically. Failure to pay could also be indicated and appropriate countermeasures taken. (See Figure 5)

A series of states could represent the entire service experience. At each transition, we can examine the decision or event that triggers the transition to look for customer needs. We can identify failures of the transition to be made and look for opportunities to save a transaction. (See Figure 6)



Courtesy of Mark McDonald, Andersen Consulting

Figure 7. DFD for selecting a restaurant.

In a comprehensive QFD case where the upfront focus is on the customer's point of view, the STD can be used to identify all the deciding factors that go into a successful and satisfying service transaction. If the purpose of the study is an improvement process, variations to the STD could identify the service provider events, such as those found in the function tree above, and look for service provider processes or tasks that would help move the customer through the transition of the states.

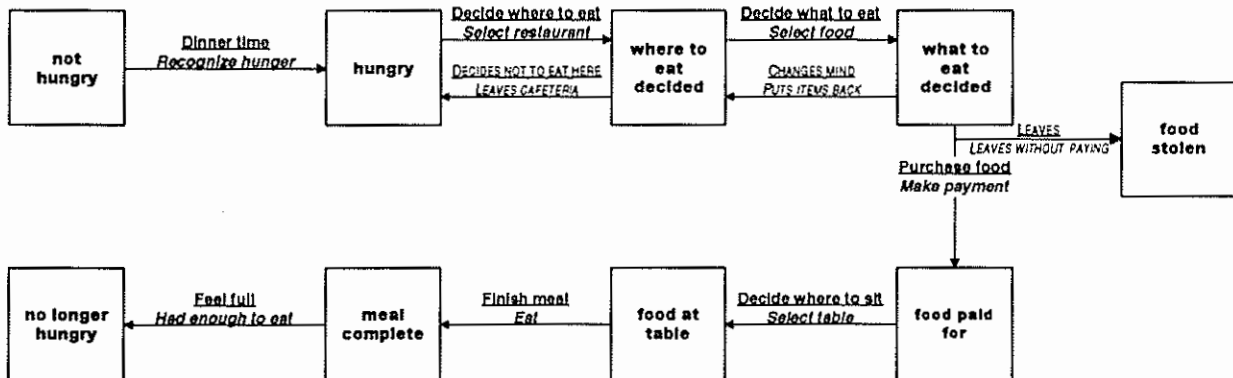


Figure 6. STD for cafeteria. Note some failure modes have been identified.

Data Flow Diagram (DFD)

The data flow diagram allows a process to be displayed at a logical level (everything the customer sees) without committing to a constraining physical implementation [Gane and Sarson]. Since customers will make decisions regarding our service based on some knowledge (data), the DFD can help us understand what these influencing factors are, so that the organization can help supply the customer with favorable data. (See Figure 7)

The DFD is constructed with a circle showing double squares which indicate the source or destination of the data, arrows which show the flow of data, a circle which shows the process (which could come from the STD) which uses the data, and an open-ended rectangle which shows a store of data. From this we can begin to capture the complexities of a person making a decision and begin to explore ways to influence that decision in our favor.

Event Table (ET)

Events are defined as time, external signals, internal failures, decisions, etc. An event table can be built from the events in the STD and the decision factors in the DFD. (See Table 1)

Ref. #	Events	Decision Factors
1	Customer determines need to eat	Hunger Time to eat (habit) Prearranged time (appointment) Most convenient time
2	Customer decides where to eat	Advertising Recommendation Coupon Companion's preference Menu (Let's do Chinese) Medical (allergies) Personal image (power lunch) Who's paying (business or personal)
3	etc.	etc.

Table 1. ET for a restaurant.
Courtesy of Mark McDonald, Andersen Consulting

The ET gives a tabular format to the events that move the customer from each state to the next and adds the factors from the DFD that influence the decision. In some QFD cases, we could apply creativity techniques to address these decision factors. Adding another column to the table above would provide some structure. Creative solutions can also be bound by a certain metaphors. *Kansei Engineering* [Nagamachi 1993, 1992, 1989 a,b, Mazur 1991b] techniques can help identify sensorial opportunities to satisfy customers. For example, if the restaurant catered to opera patrons, wait staff could dress in favorite costumes, sing orders, etc.

Event Tree

In one project still under development, the author has successfully used an event tree to develop customer needs for a personal safety product/service combination. Since most customers have never experienced the use of this type of product (and hopefully never will), traditional focus groups and other market research techniques did not give complete enough information for QFD. The Event Tree was used to identify all possible situations and to walk through the sequence of events needed to take place for the product to be successful. As each event was identified, the relevant needs were then extracted.

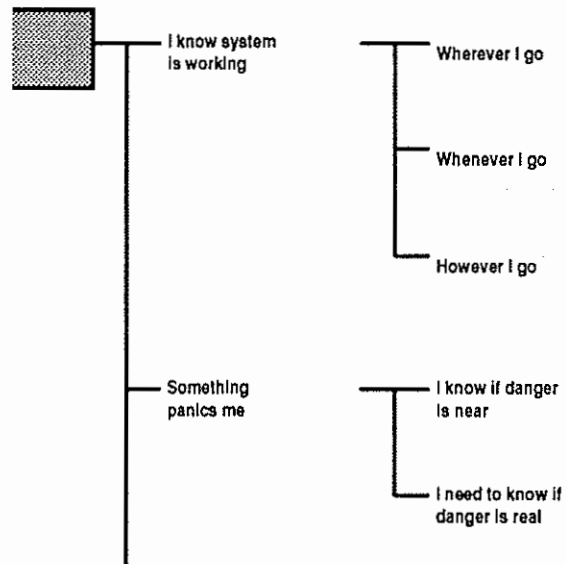


Figure 8. Event Tree for a personal safety product.

Other SWE Tools

The author is still exploring the use of other software engineering tools for their applicability to services. Suggestions and contributions are welcome.

Acknowledgments

My appreciation goes to Richard Zultner of ZULTNER & CO. and to Mark McDonald of Andersen Consulting for their advice and diagrams.

References

- Akao, Yoji, ed. 1991. *Hoshin Kanri: Policy Deployment for Successful TQM*. Translated by Glenn Mazur. Cambridge, MA: Productivity Press. ISBN 0-915299-57-7
- Akao, Yoji, ed. 1990a. *Quality Function Deployment: Integrating Customer Requirements into Product Design*. Translated by Glenn Mazur. Cambridge, MA: Productivity Press. ISBN 0-915299-41-0
- Akao, Yoji, ed. 1990b. *Introduction to Quality Deployment*. (In Japanese) Tokyo, Japan: JUSE. ISBN 4-8171-0257-8
- Akao, Yoji. 1983. *Company-Wide QC and Quality Deployment*. Chicago, IL: The Cambridge Corporation.
- Akao, Yoji and Michiteru Ono. 1993. "Recent Developments in Cost Deployment and QFD in Japan," *EOQ '93*, Helsinki Finland.
- Baluja, Sanju, Brian Elliott, Eric Endsley, Jim Kaounas, Robert Lepler, Elizabeth Lewis. 1995. *Shalimar, Haute Cuisine of India: Total Quality Management Guide*. University of Michigan.
- Bodziony, Bob. 1995. "QFD and Deming Prize Activities at FPL." *Transactions from the Seventh Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Brassard, Michael. 1989. *The Memory Jogger Plus*. Methuen, MA: GOAL/QPC. ISBN 1-879364-02-6
- Brass, Bob. 1994. "Neural Nets for Customer Preferences." *QFDI Forum Hardcopy*. Ann Arbor, MI:QFD Institute. Jan. 1994.
- Brown, S.W., E. Gummesson, B. Edvardsson, and B. Gustavsson. 1991. *Service Quality: Multidisciplinary and Multinational Perspectives*. Lexington, MA: Lexington Books. ISBN 0-669-21152-4
- Ehrlich, Deborah. 1994. "Health Care: Tailoring a Service Industry." *Transactions from the Fourth Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Ehrlich, Deborah and Dennis Hertz. 1993. "Applying QFD to Health Care Services: A Case Study at the University of Michigan Medical Center." *Transactions from the Third Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Gane, Chris and Trish Sarson. 1977. *Structured Systems Analysis: Tools and Techniques*. New York:Improved System Technologies, Inc. ISBN 0-931096-00-7
- Gaucher, Ellen, T. Daly, J. Walker, and V. Walter. 1991. "Quality Function Deployment Process: Experiences in an Ambulatory Care Service." *Proceedings from the GOAL/QPC Eighth Annual Conference*. Boston, MA: GOAL/QPC.
- George, William R. and Barbara E. Gibson. 1991. "Blueprinting: A Tool for Managing Quality in Service." Brown, S.W., E. Gummesson, B. Edvardsson, and B. Gustavsson. 1991. *Service Quality: Multidisciplinary and Multinational Perspectives*. Lexington, MA: Lexington Books. pp. 73-91. ISBN 0-669-21152-4
- Gibson, Jeff. 1995. "Happy Feet Part II: Return of the Princeton Foot Clinic." *Transactions from the Seventh Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Gibson, Jeff. 1994. "Health Care Services: Princeton Foot Clinic." *Transactions from the Fourth Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Gustafsson, Anders. 1993. *QFD and Conjoint Analysis: The Key to Customer Oriented Products*. Linköping Studies in Science and Technology Thesis No. 393. Linköping, Sweden. Page 122.
- Harries, Bruce and Mathew Baerveldt. 1995. "QFD for Quality of Work Life." *Transactions from the Seventh Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.

- Hauser, John R. and Don Clausing. 1988. "The House of Quality." *Harvard Business Review* 66, no. 3 (May-June): 63-73.
- Hoffmeister, Kurt and Bill Slabey. 1992. "QFD Primer - Excerpts from the QFD Course Manual." *Transactions from the Fourth Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Hosotani, Katsuya. 1992. *Japanese Quality Concepts: An Overview*. Translated by Glenn Mazur. White Plains, NY: Quality Resources. ISBN 0-527-91651-X
- Imai, Masaaki. 1986. *Kaizen*. New York: McGraw-Hill. ISBN 0-07-554332-X
- JUSE. 1991. *TQC Solutions: the 14-Step Process*. Portland, OR: Productivity Press. ISBN 0-915299-79-8
- Kaneko, Noriharu. 1992. "QFD Applied in a Restaurant and Hotel Chain." *Transactions of the 1st European Conference on Quality Function Deployment*. Milan, Italy.
- Kaneko, Noriharu. 1991. (In Japanese) "Using QFD in a Service Industry." *Transactions of the First (Japanese) Symposium on Quality Function Deployment*. Tokyo, Japan: JUSE.
- Kaneko, Noriharu. 1990a "Quality Assurance in Service Industries." *ASQC Congress Transactions*. San Francisco, CA: American Society for Quality Control.
- Kaneko, Noriharu. 1990b. "QFD at a Supermarket." *Case Studies*. Austin, TX: Kaizen Institute of America 3-day Public Seminar.
- Kano, Noriaki, Nobuhiko Seraku, Fumio Takahashi, and Shinichi Tsuji. 1984. "Attractive Quality and Must-Be Quality." Translated by Glenn Mazur. *Hinshitsu* 14, no. 2. (February): 39-48. Tokyo: Japan Society for Quality Control.
- Kawakita, Jiro. 1986. (In Japanese) *The KJ Method: Seeking Order Out of Chaos*. Tokyo: Chuokoronsha. ISBN 4-12-001517-3
- King, Bob. 1987, 1989. *Better Designs in Half the Time: Implementing QFD Quality Function Deployment in America*. Methuen, MA: GOAL/QPC.
- Love, John F. 1986. *McDonald's: Behind the Arches*. Toronto: Bantam Books. ISBN 0-553-05127-X
- Marsh, S., J.W. Moran, S. Nakui, and G. Hoffherr. 1991. *Facilitating and Training in Quality Function Deployment*. Methuen, MA: GOAL/QPC. ISBN 1-879364-18-2
- Martin, James and Carma McClure. 1985. *Diagramming Techniques for Analysts and Programmers*. Englewood Cliffs, NJ:Prentice-Hall, Inc. ISBN 0-13-208794-4
- Mazur, Glenn. 1994a. "QFD for Small Business: A Shortcut through the 'Maze of Matrices'," *Transactions from the Sixth Symposium on Quality Function Deployment*, Ann Arbor, MI:QFD Institute, June, 1993.
- Mazur, Glenn. 1993a. *Basics of Service Quality Function Deployment*. Ann Arbor, MI: Japan Business Consultants, Ltd.
- Mazur, Glenn. 1993b. "Using QFD for a Medical Device," *Proceedings of the Sixth Annual IEEE Computer-Based Medical Systems Symposium*, Ann Arbor, MI.
- Mazur, Glenn. 1993c. "QFD for Service Industries: From Voice of Customer to Task Deployment," *Transactions from the Fifth Symposium on Quality Function Deployment*, Ann Arbor, MI:QFD Institute, June, 1993.
- Mazur, Glenn. 1992a. "Task Deployment for Service QFD and the Americans With Disabilities Act," *Proceedings from the GOAL/QPC Ninth Annual Conference*, Boston, MA.
- Mazur, Glenn. 1992b. "The Seven Management and Planning Tools and QFD," *Annual Review of Communications*, National Engineering Consortium, Vol. 46, 1992-93, pp. 804-811.
- Mazur, Glenn. 1992c. "Voice of the Customer Table," *Transactions from the Fourth Symposium on Quality Function Deployment*, Ann Arbor, MI:QFD Institute.
- Mazur, Glenn. 1992d. *Basics of Quality Function Deployment*. Ann Arbor, MI: Japan Business Consultants, Ltd.
- Mazur, Glenn. 1991a. "Voice of Customer Analysis," *Proceedings from the GOAL/QPC Eighth Annual Conference*, Boston.
- Mazur, Glenn. 1991b. "Sensory QFD: Matching Product Image to Customer Image Using Kansei Engi-

- neering," *Proceedings from the GOAL/QPC Eight Annual Conference*, Boston, MA.
- Mazur, Glenn. 1991c. "Quality Function Deployment: Should You Really Function Without It?" *The Quality Management Forum*, ASQC, Vol. 17, no. 3.
- Mazur, Glenn. 1991d. "QFD - The House of Quality: Practicing What We Preach," *OMNEX News*, Ann Arbor, MI, Fall, 1991.
- Mazur, Glenn. 1991d. "Getting Started with Quality Function Deployment," *OMNEX News*, Ann Arbor, MI, Summer, 1991.
- Mazur, Glenn. 1991e. "Voice of the Customer Analysis and Other Recent QFD Technology," *Transactions from the Third Symposium on Quality Function Deployment*, Ann Arbor, MI:QFD Institute, June, 1991.
- Mizuno, Shigeru and Yoji Akao, ed. 1994. *Quality Function Deployment: The Customer-Driven Approach to Quality Planning and Deployment*. Translated by Glenn Mazur. Tokyo:Asian Productivity Organization. ISBN 92-833-1122-1
- Mizuno, Shigeru, ed. 1988. *Management for Quality Improvement: The 7 New QC Tools*. Cambridge, MA: Productivity Press. ISBN 0-915299-29-1
- Nagamachi, Mitsuo. 1993. *The Art of Kansei Products*. (in Japanese) Tokyo:Kaibundo. ISBN 4-303-72820-9
- Nagamachi, Mitsuo. 1992. "Kansei Engineering and its Methods." (in Japanese) *Keiei Systems*. Vol. 2 No. 2.
- Nagamachi, Mitsuo. 1989a. "QC Activities for Service Industries: Kansei Quality Control." (in Japanese) *Engineers*, 11/89 Tokyo.
- Nagamachi, Mitsuo. 1989b. *Kansei Engineering*. (in Japanese) Tokyo:Kaibundo. ISBN 4-303-71320-1
- Nagasawa, Shinya. 1993. "Analysis and Evaluation of Kansei: Fuzzy Integrals." (In Japanese) *Hinshitsu Kanri*. Tokyo: JUSE, Vol. 44 No. 3. March, 1993.
- Nakui, Satoshi. 1991. "Comprehensive QFD System." *Transactions from the Third Symposium on Quality Function Deployment*. Ann Arbor, MI:QFD Institute.
- Nakui, Satoshi and Yoji Akao. 1990a. "Determining Demanded Quality Through Questionnaires." Tone, K. and R. Manabe, ed. (In Japanese) *Case Studies in AHP*. Tokyo: JUSE Press. pp. 136-145. ISBN 4-8171-5016-5
- Nakui, Satoshi and Yoji Akao. 1990b. "Function Deployment Applied to Manufactured Housing." Tone, K. and R. Manabe, ed. (In Japanese) *Case Studies in AHP*. Tokyo: JUSE Press. pp. 145-159. ISBN 4-8171-5016-5
- Nishihara, Ryoji, Chiyokatsu Yokogura, Kageo Yamaguchi. 1991. "Research on Image Deployment in QFD for New Product Development." (in Japanese). *Transactions from the First Japan QFD Symposium*. Tokyo: JUSE.
- Ohfuji, Tadashi. 1993. "Analysis and Evaluation of Kansei: AHP - Subjective Evaluation Method for Verbal Data," *Hinshitsu Kanri*. Tokyo: JUSE. Vol. 44. No. 2. Feb. 1993.
- Ohfuji, Tadashi, Michiteru Ono, and Yoji Akao. 1990. (in Japanese) *Quality Deployment Methods: Procedures and Practices for Making Quality Charts*. Tokyo: Union of Japanese Scientists and Engineers. ISBN 4-8171-0258-6
- Ozeki, Kazuo, and Tetsuichi Asaka. 1990. *Handbook of Quality Tools: The Japanese Approach*. Cambridge, MA: Productivity Press. ISBN 0-915299-45-3
- Porter, Michael E. 1985. *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: The Free Press. ISBN 0-02-925090-0
- "Quality System Implementation at Florida Power & Light Company." Presented to Professor Yoji Akao, March 28, 1988.
- Saaty, Thomas L. 1990. *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in a Complex World*. rev. 2nd ed. Pittsburg:RWS Publications. ISBN 0-9620317-0-4
- Shiino, Jun et al. 1992. "Research on Image QFD for New Product Development." (in Japanese) *Transactions from the Second Japan QFD Symposium*. 4th Annual QFD JUSE Research Committee.
- Takasu, Hisashi. 1994. "QFD for Demanded Services: A Restaurant Case" *Standardization and Quality Control*. (in Japanese) Tokyo: Japan Standards Association. Vol. 47. Sept. 94. pp. 52-61.

Tone, K. and R. Manabe, ed. (In Japanese) *Case Studies in AHP*. Tokyo: JUSE Press. ISBN 4-8171-5016-5

Webb, Joseph L. and W. C. Hayes. 1990. "Quality Function Deployment at FPL." *Transactions from the Second Symposium on Quality Function Deployment, Ann Arbor, MI:QFD Institute.*

Zemke, Ron and Dick Schaaf. 1989. *The Service Edge: 101 Companies That Profit from Customer Care*. New York: Plume Books. ISBN 0-452-26493-6

Zultner, Richard E. 1993. "The AHP in QFD: Priorities That Fit Your Project." *Transactions from the Fifth Symposium on Quality Function Deployment, Ann Arbor, MI:QFD Institute, June, 1993.*

Zultner, Richard E., 1992. "Quality Function Deployment (QFD) for Software: Satisfying Customers." *American Programmer*. Feb. 1992.

About the author

Glenn H. Mazur has been active in QFD since its inception in North America, and has worked extensively with the founders of QFD on their teaching and consulting visits from Japan. His primary focus is in the service industry, as a manager for over 15 years in automobile repair and parts warehousing, as a teacher, and as an owner of a translating and consulting business he started in 1982. He is one of North America's leaders in the application of QFD to service industries, sits on several advanced QFD research committees, and sits on the steering committee of the Symposium on Quality Function Deployment held annually in Detroit. He is also Executive Director of the non-profit QFD Institute and an Adjunct Lecturer of Total Quality Management at the University of Michigan College of Engineering. He lectures and trains in QFD worldwide

Mazur holds a Master's Degree in Business Administration and a Bachelor's Degree in Japanese Language and Literature, both from the University of Michigan.