

**DEVELOPING A MODEL FOR QUALITY MANAGEMENT PROGRAM
IN AN AMERICAN UNIVERSITY IN THIS NEW MILLENNIUM**

By

Jayanta K. Bandyopadhyay and Lata Amilinine
College of Business Administration
Central Michigan University
Mt. Pleasant, Michigan, USA

ABSTRACT

With significant growth in quality chain activities in manufacturing and other industries in the United States, there has been a tremendous opportunity for preparing our university students into a Quality Management (QM) career path in this new millennium.

This paper presents a model for developing a syllabus for a Quality Management (QM) course, and for developing a major program in Quality Management (QM) to prepare students for meeting the needs and challenges of Quality Management career path in manufacturing and service industries in the United States in this new millennium

INTRODUCTION

With significant growth in quality management activities in manufacturing and service industries in the United States, there has been a tremendous need for preparing our university students into a Quality Management (QM) career path in this new millennium. Unfortunately, very few university has a program in Quality Management, and only a handful of universities has a quality management course within the Production/Operations Management major. Consequently, manufacturing and other industries in the United States have been facing a critical shortage of personnel in QM areas, and unless efforts are made for launching some viable programs in QM areas in American universities for preparing our university students in a QM career path, our manufacturing and service industries shall be heading towards a crisis.

Managers in nearly every industry have begun to realize that quality has become the order qualifier for doing business in global arena.(2) This has been generating increasing needs for quality management practitioners, and has given birth to an entire industry of quality management consulting companies. Demand for quality management expertise has been growing exponentially in this decade. On the contrary, as late as 1989, a study of quality curriculums of ten Midwestern universities by Grabowski, a quality assurance engineer of Caterpillar, Inc. of Aurora, Illinois reveals that none of these universities had an undergraduate quality management program, and a few of their business or engineering schools. had even a courses dedicated to quality management(5). In June of 1991 Secretary of Labor's Commission on Achieving Necessary Skills for the year 2000 submitted its SCANS report for America 2000 which heavily emphasized on the need for quality management education (11). A current survey by Sinn in 2002, revealed that a consortium of seven universities in the Midwestern United States has been developing an innovative approach to quality management education using on-line education and various technologies to enhance the flexibility and overall experience of students (10). The survey also revealed top business and engineering school in the Midwestern United States, has at

least one dedicated course in quality management, and many have integrated quality management topics into a core POM course (10). Many schools of management and engineering in the United States are also adopting integrated curricula that prepare students to design and manage activities and information flows associated with quality assurance in global supply chains (2)..Also, a few other universities are teaching some of the quality management concepts in courses under the label of "Operations management." Currently, however, some top business schools and some top engineering programs in the United States have a course entitled "Quality Engineering" or "Quality Management" and more are being added each year(6)

Similar to "quality control" in the 1970s and "lean manufacturing" in the 1980s, "quality management" had been one of the popular management topics of the late 1990s. But a closer look at both business practices and MBA programs reveals that stronger forces are currently at work creating an environment ready for quality management concepts and integration may be considered as the key unifying force behind the quality management curriculum and practices (6). Although, quality management pioneers like Armand Feigenbaum and Kairu Ishikawa have maintained that Total Quality Management (TQM) should be viewed as an integrated system, and the practitioners of TQM might have long been interested in integration. Due to lack of availability of information technology, it was impossible to implement "TQM" approach until the recent explosion of information technology (1). However, while technology is clearly an enabler of integration, it alone cannot explain the radical organizational changes in both individual firms and whole industries. Changes both in technology and in organization structure can set the stage for integrated total systems approach to quality management (1).

EXPERIENTIAL LEARNING IN QUALITY MANAGEMENT

Because of virtual non-existence of a quality management program in American universities, the use of experiential learning, consultants, seminars and workshops had been a common practice for quality management education in many industries in the United States in the past decade. A large number of consultants under the umbrella of American Society for Quality (ASQ) of Milwaukee, Wisconsin, U.S.A. and International Institute for Quality (IIQ) of London, U.K. grew in the past decade like mushrooms to offer quality management education and training and it continues to be a lucrative business even at the present time. Unfortunately, such spree of unchecked and unaccredited quality management education varied widely in quality, costs and effectiveness, while American universities stood aside without participating in this quality management education crusade. Consequently, companies recruiting college graduates in their entry level jobs prefer that their college graduate recruits have a good education in quality management, are eventually spending substantial amount of money in quality management training using workshops, seminars, and consultants (8)

A SURVEY OF TOTAL QUALITY MANAGEMENT CURRICULUM

Total Quality Management (TQM) is an enormous topic which covers multiple disciplines employing many quantitative and qualitative tools. A study of the content of Quality curriculums of top ten Midwestern universities by Joseph Gabrowski of Caterpillar, Inc., Aurora, Illinois in 1989 revealed four important courses: (1) Statistics, (2) Design of Experiments, (3) Reliability, and (4) Quality Control (5). Where as a recent survey of twelve AACSB accredited Business Schools in the United States by the author has revealed no further progress in Quality

Management curriculum except the addition of a fifth component (5) leadership skills and Quality. Also found in this survey, was that most of the graduate level classes in TQM did not use a textbook but rather relied on case studies and articles from management journals.

This survey also reveals that at most U.S. business schools, (TQM) is taught from an operations or control perspective, and in order to enhance the theme of integration, some schools employ the participation of several instructors from different functional areas, and most frequently from statistics, marketing, design, operations, organizations and control. In courses taught by a single faculty member, integration is often accomplished by bringing guest lecturers or by the instructor himself or herself, actively presenting different perspectives. However, it is impossible to address all the dimensions of total quality management at one time. Therefore, most instructors discuss only some of its components in depth before moving on to others.

KEY ELEMENTS OF A QUALITY MANAGEMENT COURSE

From analysis of Quality Management course of twelve AACSB accredited universities, ten key areas have been distinctly identified. They are: (1) Introduction to Quality: its definition, and historical perspective, (2).Strategic Quality planning, (3) Organizing for Quality, (4) Quality in product design (5) Quality in process design for (6) Quality control of fabrication and assembly process, (7) Statistical quality control tools and methods, (8) Quality Assurance and Audit, and (9) Quality standards and (10) Suppliers registration process, and (11) Global issues in quality management.. More specifically, each key areas may be described as follows

- (1) Introduction to Quality: its definitions, dimensions, and historical perspective:** pertains to various definitions of Quality, various dimensions of product quality as well as service quality, and a historical perspective of quality management. Quality pioneers and their contributions to the field of quality management.
- (2) Strategic Quality Planning:** pertains to developing quality goals, mission statement, quality policies, quality procedures, and quality instructions. It also involve developing strategic plans for achieving quality objectives. and Advanced Quality Planning (AQP),
- (3) Organizing for Quality:** involves developing an independent and effective quality management function within the organization, assigning responsibilities and authorities and accountabilities within the framework of the organization structure, and developing proper documentation for effective operation of the quality function
- (4) Quality in product/service design** includes determining customers needs and expectations, house of quality, Taguchi's methods of designing for quality, design of experiments, Quality Function Deployment (QFD), reliability, Failure mode and Effects Analysis (FMEA) robust design, and Advanced Quality Product Planning (AQPP).
- (5) Quality in process design:** includes choices of process alternatives for assembly and fabrication of products conforming to design specifications and tolerances. It also includes process capability studies, and six sigma analysis of processes..

- (6) **Quality Control of fabrication and assembly processes:** includes measurements and measuring instruments, destructive and non-destructive testing methods, 100 percent and sampling inspections, outgoing, work-in-progress and receiving inspections and pokay okay (mistake proof) production systems. :
- (7). **Statistical Quality Control tools and methods** deals with work-in-progress quality control, concepts of variability of a process and process mean and (+3 to -3 =6)six sigma deviation of a process from the process mean Statistical quality control tools and charts for attributes and sample mean, and Statistical Process Control
- (8) **Quality Assurance and Audit:** includes principles and practices of first party, second party, and third party audits, code of ethics, qualifications and training of quality auditors.
- (9) **Quality standards:** includes evolution of quality standards, from design specifications to military (MIL) standards, international ISO9000 Series of standards, ISO/TS-16949, QS-9000, and ISO-14000 environmental quality management systems
- (10) **Supplier's registration process:** includes the concepts and practices of registration of suppliers by third party registrars in compliance with ISO-9000, ISO/TS 16949, and QS-9000 standards.
- (11). **Global issues in quality management:** examines how all of the above categories are affected when companies operate in a global environment.

COURSE STRUCTURE AND PEDAGOGY

The survey also revealed that instructors are rapidly innovating in the class rooms. by using many different teaching tools and approaches. In most business school classes, the overall approach is still lecture oriented and case dominated, with more than half of the sessions dedicated to case discussions within the framework of the above 10 key areas. To supplement case discussions, some instructors also use recent business press stories to update issues in the case or to highlight emerging business trends. Another common supplement to lectures and cases is to use guest speakers from industries (4).

A MODEL CURRICULUM FOR QUALITY MANAGEMENT (QM) MAJOR

After thorough study of various certification programs of American Society for Quality (ASQ) and International Society for Quality and Productivity Management (ISQPM), and gathering expert opinions from a Delphi survey of experts from practitioners and academicians in QM field, a model Syllabus of a fifteen week Quality Management course using three hours per week format has been developed and presented in table 1. Also a Quality Management curriculum as a part of a B.S. in Business Administration program has been developed and presented in table 2.

The QM class as well as the QM curriculum can be successfully implemented in an American university for successfully leading students into QM career path. Student graduating from this curriculum has tremendous potential for being successfully placed in jobs in QM areas in manufacturing as well as service industries in the United States.

CONCLUSION

Currently, there is a growing body of materials available from various sources for teaching quality management. Similar to many areas in management education, current cases on hot topics in QM are always in short supply. Since quality management concepts are so closely integrated with other functional areas of business organization there is a vast set of topics to cover, and specific classes often concentrate on specific areas such as manufacturing, service operations or logistics are not sufficient to cover the spectrum of QM. Therefore authors strongly suggest that QM must be covered as a Curriculum, and not just as a course in an MBA or B.S. B.A. program This will only serve to fuel the demand for quality management education in this new millennium.

REFERENCES

1. Bandyopadhyay, J. K. and D. A. Sprague, (2002) “ Total quality management in an automotive supply chain”, *International Journal of Management, London, U.K.*
2. Bandyopadhyay, J. K., (2004) “Current practices of Quality Assurance in Global Supply Chain of American automotive industry”, *International Journal of Management, London, U.K.*
3. Clauson Jim,(1999), “On-line Quality courses offer many side benefits” *Quality Progress, Vol.32, No.1, January 1999.*
4. Finkelmeier, Robert L.(1994), ”A Quality-based Graduate degree program”, *The Journal of Quality Participation, Vol.17, issue1, January, 1994.*
5. Grabowski, Joseph M. (1989), “ A Study of Quality Curriculums”, *Quality, September, 1989.*
6. Langford,D.P(1993). “The State of Quality Education”, *The American Productivity and Quality Center, June/July 1993*
7. Potocki, Kenneth, Brocato Richard,and Popick Paul R. (1994), “How TQM Works in a university classroom”, *The Journal of Quality and Participation, Vol.17, Issue 1, January 1994.*
8. Placek, Chester,(1989), “Education, Training or both” *Quality, September, 1989.*
9. Sag, A.G., Jhamb,H.K., Murthy D.N.P.(1995),” Quality Management Education -The case study approach”, *Asia Pacific Journal of Quality Management, Hong Kong, Vol 4, Issue 2, 1995.*

10. Sinn, John. W.(2002), “ A Quality Major”,Quality Progress, Vol.30, No.10, October 2002.

11. U.S. Department of Labor(1991), “What Work Requires of Schools- A SCANS Report of America 2000, *The Secretary’s Commission on Achieving Necessary Skills, June, 1991*

ABOUT THE AUTHORS

Jayanta K. Bandyopadhyay, PhD. In I.E. and CFPIM, is a tenured Full Professor of Production Operations management at Central Michigan University, and the Founder of International Society for Quality & Productivity Management (ISQPM) and **Lata Amilininie** is graduate student at Central Michigan University and a student member of ISQPM.

TABLE –1

A MODEL SYLLABUS FOR A QUALITY MANAGEMENT COURSE

MODULE 1. INTRODUCTION

- A. Definition of Quality**
- B. Dimensions of product and service quality**
- C. Historical perspective of Quality and the pioneers of quality management**
- D. Total quality management**
- E. Quality Awards: Malcom Baldrige award, Deming prize, other awards**

MODULE 2. STRATEGIC QUALITY PLANNING

- A. Developing quality goals, mission statements, and quality policies**
- B. Developing quality documentation**
- C. Developing strategic quality plans, and Advanced Product Quality Plans (APQP) and Failure Mode and Effects Analysis (FMEA)**

MODULE 3. ORGANIZING FOR QUALITY

- A. Developing an independent and effective quality function within the organization**
- B. Quality Circles**
- C. Kaizan**
- D. Self directed quality teams**

MODULE 4. QUALITY IN PRODUCT/SERVICE DESIGN

- A. Customers’needs and expectation survey**
- B. Quality Function Deployment (QFD)**
- C. Taguchi’s methods of design for quality**
- D. Design of experiments**
- E. Robust design**
- F. House of quality**

MODULE 5. QUALITY IN PROCESS DESIGN

- A. Choices of process alternatives for assembly and fabrication**
- B. Process capability studies**
- C. Six sigma analysis in process selection**

MODULE 6. QUALITY CONTROL OF ASSEMBLY AND FABRICATION PROCESSES

- A. Measurement and measuring instruments**
- B. Destructive and non-destructive testing methods**
- C. 100 percent and sampling inspections**
- D. Outgoing, working-progress, and receiving inspection methods**
- E. On-line inspection, and Pokay Okay (mistake proof) systems**

MODULE 7. STATISTICAL QUALITY CONTROL TOOLS AND METHODS

- A. Concepts of variability of a process**
- B. Process means and six sigma deviation of a process from the process mean**
- C. Statistical quality control tools and charts**
- D. Statistical process control principles and practices**

MODULE 8. QUALITY ASSURANCE AUDIT

- A. Principles and practices of auditing**
- B. First party, second party and third party audit**
- C. Code of ethics, qualification and training of quality auditors**
- E. Certification process for quality auditors**

MODULE 9. QUALITY STANDARDS

- A. Evolution of quality standards from design specifications to MIL standards**
- B. Internationalization and harmonization of quality standards**
- C. ISO-9000, ISO/TS16949, and QS-9000 quality systems requirements of U.S. Auto makers**
- D. A Model framework for developing universal standards for any other industry**

MODULE 10. SUPPLIERS' REGISTRATION PROCESS

- A. Concepts and practices of suppliers' registration**
- B. Third Party Registrars and accreditation agencies**
- C. The registration process, its costs and benefits and other implications**

MODULE 11. GLOBAL ISSUES IN QUALITY MANAGEMENT

- A. Global environment of quality**
- B. Costs and benefits of globalization of quality**
- C. Impact of quality management initiatives for multi-national businesses**

**A MODEL FOR DEVELOPING A CURRICULUM FOR A QM PROGRAM
(Under a Bachelor of Business management program)**

GENERAL EDUCATION REQUIREMENTS :	72cr hrs
CORE BUSINESS COURSES:	
Fundamentals of Accounting and financial management	3cr hrs
Fundamentals of marketing management	3cr hrs
Fundamentals of supply chain management	3cr hrs
Fundamentals of information management	3cr hrs
Fundamentals of Statistical methods in business	3cr hrs
REQUIRED COURSES	
Quality management systems	3cr hrs
Quality management in product and process design	3cr hrs
Quality control tools and their applications	3cr hrs
Quality Assurance Audit and standards and Suppliers' registration process	3cr hrs
Global and other strategic issues in QM	3cr hrs
Electives/project/internship	18cr hrs
<hr/> Total Credit hours	<hr/> 120cr hrs