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An Assessment of the College of Technology, Architecture and Applied Engineering's Master of Technology Management Degree Program, Quality Systems Specialization, at Bowling Green State University

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AN ASSESSMENT OF THE COLLEGE OF
TECHNOLOGY, ARCHITECTURE AND APPLIED
ENGINEERING'S MASTER OF TECHNOLOGY
MANAGEMENT DEGREE PROGRAM, QUALITY
SYSTEMS SPECIALIZATION, AT BOWLING GREEN
STATE UNIVERSITY

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A Major Project

Submitted to the Graduate College of Bowling Green State University
in partial fulfillment of the requirements for the degree

Master of Technology Management

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Committee:

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ABSTRACT

The purpose of this project is to give a background and assessment of the quality specialization of the Master's degree presently being awarded at Bowling Green State University's College of Technology, Architecture, and Applied Engineering compared to other degrees of a similar type. The program now awarding the degree is described. The literature review discusses topics and ideas pertinent to the project and is necessary to better understand the research and assessment of the degree. The methodology and procedure section identifies the course of investigation and defines what form the gathered data will take. The Results chapter presents the findings of the investigation as they apply to the project objectives. Finally, the Summary, Observations & Comments chapter condenses the results, allows for side and miscellaneous observations pertaining to the project and opens the door for the researcher to offer suggestions for future studies along the same line of inquiry as the project.

DEDICATION

I would like to dedicate this project to my parents, who always set a high value on formal education and supported and encouraged my decision to pursue an advanced degree. Thanks also to my brother for his patience while I worked on completing my degree.

ACKNOWLEDGEMENTS

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CHAPTER 1: INTRODUCTION

Overview

This first chapter introduces a brief history of what is now the College of Technology, Architecture, and Applied Engineering, its origins as well as when it began to offer a Master's degree in Technology. The statement of the problem, research objectives, significance of the project, assumptions, and limitations are first introduced here. A section of term definitions, helpful in understanding the project, is followed by a chapter summary.

Introduction

The College of Technology, Architecture and Applied Engineering started as the Department of Industrial Education and Technology in the College of Education. In the fall of 1972 the Department was moved into its own building. Prior to that time, the Department was occupying and using 5 different sites, one of which was a rented space in downtown Bowling Green (BG News, 1972). The new Technology Building contained 4 main lab areas, several classrooms and numerous faculty offices. In April 1978 the University Academic Council approved the proposal to re-designate the Department of Industrial Education and Technology into the School of Technology – still within the College of Education (Winslow, 1978). The Board of Trustees approved the change later that year. The School of Technology became an autonomous School in the summer of 1983. In July of 1985 the autonomous School of Technology became the College of Technology containing the Department of Technology Systems and the Department of Visual Communications and Technology Education (McIntyre, 1985). When the School of Technology became the College of Technology it was already offering a master's degree. But it was a Masters of Education degree.

Starting in the fall of 1988 the College of Technology began offering a Master of Industrial Technology (MIT). The 39 credit-hour program included "nine hours of core classes in research, statistics, and communication, 15 hours in advanced technology and nine hours of advanced business operations." (Whitehead, 1988) It was one of a few of its kind in the country and the first and only one in Ohio, cited Dr. Ernest Savage, then the College of Technology director of graduate studies (Technology Tempo, 1989). Initially, only a specialization in manufacturing was offered, but a specialization in construction management technology was added by the next fall. The Quality Systems specialization began to be offered in the fall term of 2009.

The College of Technology, Architecture, and Applied Engineering at Bowling Green State University currently offers two different master's degrees, a Masters of Education in Learning Design and a Masters of Technology Management. The Masters of Technology Management degree has three possible specializations: Construction Management, Engineering Technology, and Quality Systems. These degrees require 33 credit hours and, part time, can take up to six years to complete. Most full time graduate students take two years to complete the degree.

In the interest of continual improvement, a cornerstone of Quality Systems, this project will focus on assessing the Masters of Technology Management Quality Systems specialization at Bowling Green State University's College of Technology, Architecture and Applied Engineering with the intent of identifying areas which may be improved in relation to similar degrees at competing institutions.

Statement of Problem

The problem for this project is to assess the current Master of Technology Management degree, Quality Systems specialization, in relation to similar degrees.

Research Objectives

Several research objectives became apparent to assist in accomplishing the project. The objectives for the study are:

1. Assess how the MTM Quality System specialization compares with other institutions with regards to:

   - Similar named degrees.

   - Cost of the degree.

   - Required credit hours to complete the degree.

   - Curriculum.

   - Other factors such as accreditation and degree requirements.

2. Suggest how the MTM Quality Systems specialization at BGSU's College of Technology, Architecture and Applied Engineering might be enhanced for competitive attractiveness.

Significance of the Project

The College of Technology, Architecture and Applied Engineering has endured many changes in the past few years. It is hoped that this project may assist the College in determining how its MTM degree, Quality System specialization, compares with other, similar, degrees and perhaps provide insight as to what areas may be improved to compare more favorably, thereby elevating its reputation and helping to establish it more firmly as a foremost name in education and academic research in the region.

Assumptions

The assumptions associated with this project are as follows:

   - It is assumed that every institution used in the assessment uses the Carnegie Unit credit hour as a unit of measure for degree completion.

   - It is assumed that the information shown on a degree program's web-site is true and accurate for the current academic school year.

Limitations

The limitations associated with this project are as follows:

- The number of institutions which offer graduate degrees in Quality in may seem to make for a small sample size.

- The information gathered in conducting the assessment may be limited by the academic institution's readily available web-site information.

Definition of Terms

American Society for Quality (ASQ): The American Society for Quality is a global community of people dedicated to quality who share the ideas and tools that make our world work better. With individual and organizational members around the world, ASQ has the reputation and reach to bring together the diverse quality champions who are transforming the world's corporations, organizations and communities to meet tomorrow's critical challenges (ASQ, 2014).

Audit: The on-site verification activity, such as inspection or examination, of a process or quality system, to ensure compliance to requirements. An audit can apply to an entire organization or might be specific to a function, process or production step (ASQ, 2014).

Credit Hour: The University System of Ohio, Ohio Higher Ed, defines a semester credit hour as: One semester credit hour will be awarded for a minimum of 750 minutes of formalized instruction that typically requires students to work at out-of-class assignments an average of twice the amount of time as the amount of formalized instruction (1,500 minutes). It is acknowledged that formalized instruction may take place in a variety of modes (Ohio Higher Ed, 2014).

Curricula/Curriculum: In formal education, a curriculum (plural: curricula or curriculums) is the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. Some other definitions can combine various elements to describe curriculum as follows:

- All the learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school (John Kerr).

- The aggregate of courses of study given in a learning environment. The courses are arranged in a sequence to make learning a subject easier. In schools, a curriculum spans several grades (Wikipedia, 2014).

<u>Engineering Technology</u>: Engineering Technology is the field concerned with the application of basic engineering principles and technical skills in support of engineers engaged in a wide variety of projects. Engineering Technology programs typically include instruction in various engineering support functions for research, production, and operations, and applications to specific engineering specialties (NCES).

<u>Graduate Degree</u>: A graduate degree is an academic certificate that is awarded to persons who have demonstrated that they have the mastery over a field of study or a professional practice. This degree is earned after a minimum of three years of study, and one must have an undergraduate degree. It is also known as a Master's degree (Ask.com, 2014).

<u>Lean</u>: The core idea is to maximize customer value while minimizing waste. Simply, lean means creating more value for customers with fewer resources (Lean.org, 2014).

<u>Master's Degree</u>: A master's degree is a type of graduate degree, degree earned after completion of an undergraduate degree (BA or BS). Typically the master's degree requires about 30 credits of coursework and takes 2 years of full time study beyond the bachelor's degree. In addition to coursework, the master's degree sometimes entails completing comprehensive exams and/or a thesis. Master's degrees in awarded in all fields, usually as MA (master of arts) or MS (master of science), although some fields have discipline-specific degrees, such as social work (MSW) and art (MFA), for example (Kuther).

<u>Six Sigma</u>: Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving toward six standard deviations between the mean and the nearest specification limit) in any process – from manufacturing to transactional and from product to service. (isixsigma.com, 2014)

<u>Technologist</u>: Graduates of four-year engineering technology programs are called technologists, while graduates of two-year engineering technology programs are called technicians (ABET, 2011).

<u>Total Quality Management</u>: A core definition of total quality management (TQM) describes a management approach to long–term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services, and the culture in which they work (ASQ, 2014).

Summary

This chapter introduced the project. This included introducing the problem statement, research objectives, significance of the project, assumptions, limitations, and concluded with definitions for a number of key terms that will be helpful in better understanding the project.

CHAPTER 2: Review of Literature

Overview

The purpose of this project was to develop an assessment of where the College of Technology, Architecture, and Applied Engineering's Master Degree in Technology Management lies in comparison with similar degrees offered by other institutions within the continental United States and Canada. The chapter begins with an overview of the Graduate degree in Technology Management, currently offered. After that is a short historical perspective of the College and graduate degree offered, followed by a brief description of the Master of Technology Management as it currently stands. A discussion of what Technology degrees are defined as and how the name of a degree can make a difference to both the student and the institution comes next. After that there is a short discussion on the costs of a graduate education: both on-line and on-site. The number of credit hours required to obtain graduate degrees are also discussed. The main part of the review concludes with a discussion concerning the curriculum of a Master degree in Technology, what is required, and industry standards for a graduate degree focusing on quality. The chapter concludes with a brief summary.

Historical Perspective

Bowling Green State University was initially established in 1910 by an act of the state general assembly authorizing the Governor to appoint a commission for the purpose of establishing two new 'normal schools' (BGSU, 1915). A 'normal school' trained high school graduates to be teachers. Bowling Green held its first classes in 1914. There were over 300 students enrolled for the initial year, with 21 faculty. The first bachelor's degrees were awarded in 1917 (BGSU, 2014). In 1935 Bowling Green attained the status of full university and added the College of Business Administration and graduate programs. In 1947, the Graduate School was formed, and BGSU awarded its first doctoral degrees in English in 1963 (BGSU, 2014).

Information received from the university's Office of Institutional Research indicates that what is now the College of Technology, Architecture & Applied Engineering at BGSU was started as the Department of Industrial education within the College of Education in 1940. In April of 1978 the Department of Industrial Education became the School of Technology (Winslow, 1978). Early in 1983 the School of Technology was awarded a four year accreditation by the National Association of Industrial Technology (NAIT) (Spyker, 1983). Later that same year, in the summer, it was given the status of an autonomous school (McIntyre, 1985). It changed from the (autonomous) School of Technology to the College of Technology in 1985 (McIntyre, 1985). In 1988 it first offered a master's degree in Industrial Technology, with the first graduate receiving the Masters of Industrial Technology in 1990.

In May, 2013, the requirements for a degree to be awarded were dropped from 39 credit hours to 33 credit hours. This time frame also coincided with the College receiving permission to change its name from the College of Technology (CoT) to College of Technology, Architecture, and Applied Engineering (CTAAE) (M. Drewes, Personal Communication, May 3, 2013).

Current Degree

The current Master's degree from BGSU's College of Technology, Architecture, and Applied Science is called the Masters of Technology Management (MTM) and requires 33 credit hours to complete. Those 33 hours are divided into four phases: Technology Core, Technology Concentration, Business Operations and the Synthesis Experience. There are presently three specializations offered under the MTM degree: Construction Management, Engineering Technology and Quality Systems. This project will focus on the Quality Systems specialization.

Degrees in Technology

The College of Technology, Architecture & Applied Engineering's basic graduate degree has been called a Master of Industrial Technology (initially) and a Master of Technology Management

(currently). What do those names really mean? The Association of Technology, Management, and Applied Engineering (ATMAE), an accrediting body, uses the U.S. Department of Education Institute of Education Sciences: Classification of Instructional Programs (CIP) definition of:

> "Industrial Technology is the field concerned with the application of basic engineering principles and technical skills in support of industrial engineers and managers. Industrial Technology degreed programs typically include instruction in optimization theory, human factors, organizational behavior, industrial processes, industrial planning procedures, computer applications, and report and presentation preparation."(NCES)

ATMAE has developed its own definition for Technology Management as:

> "Technology Management is the field concerned with the supervision of personnel across the technical spectrum and a wide variety of complex technological systems. Technology Management degreed programs typically include instruction in production and operations management, project management, computer applications, quality control, safety and health issues, statistics, and general management principles."(ATMAE, 2009)

Additionally ATMAE had a Venn diagram developed to help illustrate the relationship of those and similar terms and degrees. That diagram is shown in Figure 1.

Looking at the ATMAE Venn diagram in Figure 1 it can be seen that Engineering Management is defined as the intersection of Applied Engineering and Management, opposite both Technology Management and Engineering Technology.
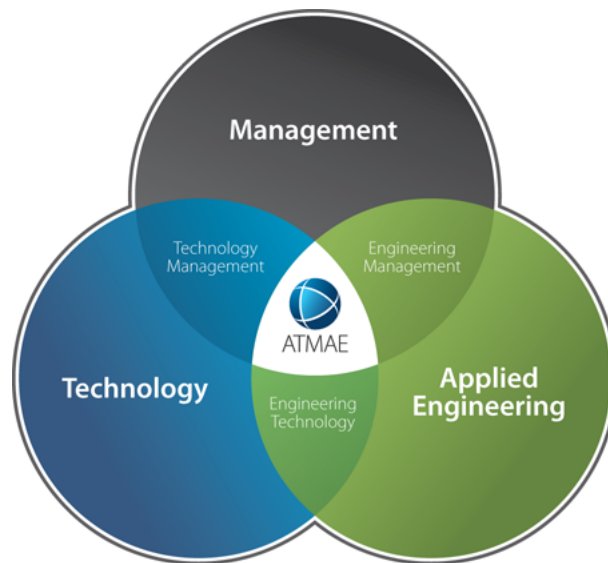
Figure 1: ATMAE Venn diagram.

ATMAE accredits a number of graduate programs in Technology, including Technology and Industrial Management (ATMAE, 2012).

Even though ATMAE's Venn diagram indicates that Engineering Technology, Technology Management and Engineering Management are all different, they still all contain aspects of the same things: Engineering, Technology and Management. How different are Technology Management and Engineering Management? Dayna Catropa, in her Inside Higher Ed web-site blog post entitled "How Much Does the Name of a Degree Matter?" , referenced a quote from Georgia Tech's paper *Technique* which talked about an 'X-degree' and in part said, "…because it [the degree name] is the public face of the program. The name of the degree will be at the top of graduates' resumes, and it will provide recruiters and graduate programs with their first impressions of candidates" (Catropa, 2012). Although the article is referring to an undergraduate degree program, the same is also true concerning graduate degrees and programs. Catropa later asserts that degree names make a difference for students, that a worthy degree name should:

- Attract the right students
- Reflect the current focus of the program

- Clearly communicate the program's focus to employers
- Use language that students, employers and the market understand (Catropa, 2012).

The Accreditation Board for Engineering and Technology (ABET), another accrediting body, has a commission specifically for Engineering Technology, the Engineering Technology Accreditation Commission (ETAC). Although ABET-ETAC does not accredit Master degrees in Technology, standards for such degrees can be inferred from ABET's Engineering Accreditation Commission (EAC) and Applied Science Accreditation Commission (ASAC), which do accredit Master degree programs.

The EAC criteria for master level engineering programs are:

- fulfillment of the baccalaureate level general criteria

- fulfillment of program criteria appropriate to the masters level specialization area

- one academic year of study beyond the baccalaureate level

- a demonstration "…that graduates have an ability to apply masters level knowledge in a specialized area of engineering related to the program area." (ABET 2013).

Criteria for master's level applied science programs are:

- inclusive of those for baccalaureate level applied science programs with the following additions

- one year of study beyond the baccalaureate level

- "…a project or research activity resulting in a report that demonstrates both the mastery of the subject matter and a high level of communication skills" (ABET, 2013).

Both degree accreditations include fulfillment of the baccalaureate level criteria and one academic year of study beyond the baccalaureate level. Past that the requirements are similar for both

disciplines. It is entirely reasonable to equate the demonstration of subject matter mastery with the ability to apply master level knowledge of an engineering specialization, as far as levels of knowledge are concerned.

The degree requirements put forth by ATMAE for master's degree program accreditation provides a suggested number of credit hours and curriculum type grouping which can, and should, result in the graduate student possessing knowledge and skills at a masters level. ATMAE accredited Master's programs have the following requirements:

"ATMAE Master's Degree: Programs/options shall be a minimum of 30 semester hours and shall meet the following minimum/maximum foundation semester hour requirements:

Communications and/or Problem Solving………………………....6-12

Research ……………...…………………………….………..….6-12

Management and/or Technical ….……………….……………....12-18

Electives ……………………………………………………..….0-6"

(ATMAE, 2013).

Using the ATMAE credit hour and foundation requirements along with the similar ABET criterion as a guide for the level of knowledge and technical expertise, a master degree in Technology can easily be realized.

Graduate Degree Costs

Paying for a graduate degree is often very difficult. Add in the current economic climate and institutions of higher learning are increasing their graduate tuition along with the undergraduate. There are a number of different ways to help finance the cost of a Master degree. Financial Aid – in the form of fellowships, grants, loans, and scholarships; Subsidized Tuition – employers and military

service may have programs to assist in covering or reimbursing tuition; College/Departmental Assistantship – tuition waivers and stipends are often included in return for assisting a program, department or college with teaching or research duties; Location – Out of state tuition fees can significantly increase the cost of tuition so try to stay in-state. There is also, often, a difference in the cost of on-line courses as opposed to on-site classes.

Graduate Credit Hours

The number of credit hours required for a Master's degree can vary depending on the program and the school. As Miller stated in her article, 'The Number of Credit Hours it Takes to Earn a Master's Degree in Psychology', '…students must complete about 30 credit hours of coursework for a master's degree' (Miller, 2013). The credit hour that we commonly refer to is actually called a Carnegie Unit, created by the Carnegie Foundation for the Advancement of Teaching in 1906. Generally defined as one hour of faculty-student contact per week along with two hours of outside work, the Carnegie Unit is used in high schools, as well as colleges and universities in both quarter and semester systems. Further, Barret states in his article 'Carnegie, the Founder of the Credit-Hour, Seeks Its Makeover', the Carnegie Unit was "initially invented chiefly to determine faculty members' eligibility to receive a pension, the credit hour has assumed an importance it was never meant to have." (Barret, 2012). The MTM degree at BGSU currently requires 33 credit hours. This requirement has been compared to other similar degrees along with any other project/thesis or exam requirements.

Graduate Technology Degree Curriculum

Finally, a discussion concerning the curriculum for a Master degree in Technology. The Lumina Foundation for Education assembled a number of experts to determine degree profiles for the three different degree levels: Associate, Bachelor's and Master's. For a Masters level degree this is what the group came up with:

The master's degree holder:

- Elucidates the major theories, research methods and approaches to inquiry, and/or schools of practice in the field; articulates relevant sources; and illustrates their relationship to allied fields.

- Assesses the contributions of major figures and organizations in the field; describes its major methodologies and practices; and implements at least two such methodologies and practices through projects, papers, exhibits or performances.

- Articulates major challenges involved in practicing the field, elucidates its leading edges, and delineates its current limits with respect to theory, knowledge and practice.

- Initiates, assembles, arranges and reformulates ideas, concepts, designs and techniques in carrying out a project directed at a challenge in the field beyond conventional boundaries. (Lederman, 2011).

In looking at a graduate degree with a specialization in quality, in relation to the above criteria, it should be determined what topics must be covered in order to satisfy the profile.

If the profile criteria, listed above, are condensed to the primary ideas it looks something like this:

- major theories, methods and inquiry approaches

- contributions of major organizations, describe major methodologies and practices and implement through papers, projects, etc.

- major practicing challenges

- details in completing a challenging project in the field

Taking each bullet point in turn and associating the Quality System concepts:

- major theories, methods and inquiry approaches: Lean, Six-Sigma, 5-S, TQM, SPC, Data Collection and Analysis, Audits

- contributions of major organizations, describe major methodologies and practices and implement through papers, projects, etc.: ASQ, major methodologies and practices are listed in the previous item's methods and inquiry approaches.

- major practicing challenges: variations in processes and adapting the techniques to any particular non-manufacturing or non-standard quality effort.

- details in completing a challenging project in the field: project management, Gantt charts

Other than collegiate institutions, there are a number of professional organizations which focus on quality, the application of quality techniques and methods, and educating those in the business and industrial world about quality. The organizations that will be briefly mentioned here are: the American Society for Quality (ASQ), Chartered Quality Institute (CQI), and the Lean Enterprise Institute (LEI).

The American Society for Quality (ASQ) provides the quality community with training, professional certifications, and knowledge to a vast network of members of the global quality community (ASQ, 2014).

The Chartered Quality Institute (CQI), a British equivalent of the ASQ, promotes a quality management approach utilizing planning, measurement and improvement. The Chartered Quality Institute was established in 1919 under the name of the Institute of Quality Assurance. The Institute of Quality Assurance gained a Royal Charter in 2006 and became the CQI in January 2007. The CQI web-site states that the CQI …"exists to benefit the public by advancing education in, knowledge of

and the practice of quality in industry, commerce, the public sector and the voluntary sectors. In short, the CQI exists to help make organizations better." (CQI, 2014).

The Lean Enterprise Institute (LEI) is a nonprofit education, publishing, research, and conference organization. Lean enterprises Institute carefully develops hypotheses about lean thinking and experiments to see which approaches work best in the real world. They write up and teach what has been discovered, providing new methods for organizational transformation. The LEI web-site reveals information on how they do this:

"We carry out our mission through value streams: Lean Education, Lean Learning Materials, the Lean Summit conferences, and our website lean.org. In addition, we exchange information across the world through the Lean Global Network, consisting of more than a dozen nonprofit organizations similar to LEI, sharing a common mission in different countries" (LEI, 2009).

Reviewing the ASQ, CQI, and LEI websites and cross-referencing the most popular topics from the Knowledge Center section and the Training section indicates that the main areas of interest and training are:

ASQ: Auditing, Lean, Six Sigma, and Total Quality Management

CQI: Lean Six Sigma, Quality Management, Process Management, Auditing

LEI: Lean Leadership, Lean Concepts & Tools, Value Stream Mapping

Topics, or related topics, appearing in two-out-of-three sections will qualify as a main quality topic: Auditing, Lean, Six Sigma, Total Quality Management.

Granted, there are many aspects to each overall quality topic that has just been listed, but quality organizational leaders such as ASQ, CQI, and LEI think enough of the topics to specifically mention them in their training and knowledge center items. Brief descriptions may be found in the Glossary of Terms in Chapter 1.

Some companies also promote and educate about quality. These companies provide consultants and services which assist business and industrial concerns in starting and continuing their quality efforts. Total Quality Engineering (TQE) and iSixSigma are two such companies. Some business quality companies find their quality niche and focus their services in that area of knowledge. Total Quality Engineering seems to be one of those companies. As TQE's web-site explains:

"Total Quality Engineering Inc. (TQE) helps organizations become more effective by providing software and training that support the principles of Total Quality Management. TQE specializes in the Hoshin Kanri planning process and provides both PC and web-based software to help organizations achieve 'excellence in execution' of their plans. Both in-house and self-paced training are provided to get everyone up to speed quickly. TQE also provides both in-house and self-paced training in Process Management and Process Improvement using basic quality tools and Design of Experiments (DOE)." (TQE, 2010)

Total Quality Engineering focuses on TQM techniques using a variation of plan-do-check-act methodology and also provides training on process management and improvement through standard quality tools and design of experiment.

ISixSigma, on the other hand, seems to be set up similar to the organizations for quality in that they offer a broad spectrum of services, information and knowledge. ISixSigma is a business-to-business company which provides essential information, research and how-to knowledge to help businesses and organizations in their quality efforts. The iSixSigma web-site gives the following information:

"To help you increase business efficiency by providing engaging, educational and entertaining content.

Our publishing focus areas include Lean, Lean Six Sigma, Lean Startup, project

management, change management…and a host of other process improvement

methodologies.

ISixSigma champions the idea that breakthrough process improvement can be accomplished

by anyone within an organization." (isixsigma.com)

Reviewing both TQE and iSixsigma's areas of interest and training yields the following:

iSixSigma: Lean, Lean Six Sigma, Leadership, Change Management, Theory of Constraints, Business

Process Management (BPM)

TQE: Hoshin Kanri Planning Process, process management and improvement, Design of

Experiments (DoE)

Although there are not many terms in common, other than process, there is a great deal of

overlap in the actual content. Theory of Constraints and Business Process Management are in the

same area as the Hoshin Kanri Planning Process as well as process management and improvement.

Design of Experiment falls within the scope of Lean Six Sigma techniques used to fully understand a

process. Improving a client company's processes is how the business quality company makes its

profit. They do it by directed education and consulted strategic and tactical planning.

Summary

This section has reviewed the literature pertaining to the research objectives of this project.

Starting from a brief description of the evolution of the college from department to school to a full

college and the Master of Technology Management as it now stands, the review proceeded to explore

the research objectives. The names of graduate degrees and why they matter; the financial costs and

ways to meet those requirements; a brief discussion of the credit hours needed to receive the degree

and finally discussing the topics studied in the course of obtaining the degree and specialization.

CHAPTER 3: PROCEDURES

Overview

This chapter begins by restating the problem and research objectives. It continues with a discussion of the Investigation Procedures – identification of sample population, data gathering and data examination. Conclusion and recommendation methodology is discussed next. The chapter ends with a timeline and chapter summary.

Restatement of the Problem

The problem for this project is to assess the current Master of Technology Management degree, Quality System specialization, in relation to similar degrees.

Restatement of the Objectives

The research objectives are as follows:

1.   Assess how the MTM Quality System specialization compares with other institutions with

regards to:

- Similar named degrees.

- Cost of the degree.

- Required credit hours to complete the degree.

- Curriculum.

- Other factors such as accreditation and degree requirements

2.   Suggest how the MTM Quality Systems specialization at BGSU's College of Technology, Architecture and Applied Engineering might be enhanced for competitive attractiveness.

Investigation Procedures

Assessment of the MTM Quality Systems specialization offered by the College of Technology, Architecture, and Applied Science was completed by comparing the degree with other, similar degrees offered by competing institutions. Five areas were compared:

1. The name and type of degree offered;

2. The cost of the degree offered.

   i. The cost of private universities differs greatly from public universities. The population was separated in to public and privately funded groups.

   ii. In-state tuition for state funded universities is often less than out-of-state tuition. Both were compared.

   iii. Cost of on-line degree was noted, if different from on-site classes.

3. The required credit-hours needed to be awarded the degree.

4. The curriculum of classes required to be taken to be awarded the degree.

5. Accreditation, degree requirements and other contributing factors

The size of the project's comparative population was limited to those institutions listed in the American Society for Quality's College and University Programs in Quality web-page covering the United States, its protectorates and territories, and Canada. On-line resources – the web-sites maintained by those institutions offering master degrees with a Quality focus - were used extensively in obtaining the information used in comparing the MTM degree with others of its kind. The collected information was placed in an Excel file to facilitate its statistical examination.

Identification of Sample Population

The American Society for Quality's Quality Progress web-site has compiled an extensive list of colleges and universities offering courses, programs and degrees in quality. The Quality Progress web-page was used to identify institutions offering master's degrees in quality, or masters degrees with specializations, concentration, or focuses in quality. The colleges and institutions are organized by

state and listed alphabetically within each state. Each listing indicates what type of institution it is, any certificates or degrees offered, online/distance programs and further methods of contact for information – names, phone numbers, e-mail addresses, websites, etc.

The Colorado Technical University (CTU), one of the institutions mentioned on the Quality Progress web-site and initially surveyed, defined concentration and specialization in relation to graduate degrees. The CTU catalog states that concentrations: "…provide students exposure to subject matter through a series of focused courses within a given area of study." Specializations "...provide students with in-depth knowledge in a given area of expertise." (CTU, 2014) Oregon State University defines concentrations in graduate school as: "A graduate area of concentration is a subdivision of a major or minor in which a strong graduate program is available. Areas of concentration may be referenced on the student's program of study, but they are not listed on the student's transcript." (Oregon State University, 2004)

Once the institutions offering master's degrees involving quality were identified, more information was gained. Initially, the institution's web-address information was noted. The state and college offering the degree was also recorded.

Gathering Data

Each identified degree awarding institution's program web-site was searched and the following information recorded:

- The degree name, e.g. Technology Management, Engineering, etc.

- The type of degree - Master of Arts (MA) or Master of Science (MS), Master of Business Administration (MBA), etc.

- The cost of the degree offered was calculated based on a two academic year requirement and has three (3) fields: in-state, out-of-state, and on-line class fees, if available and different from on-site class fees.

- The number of required credit-hours for the degree.

- Degree requirements: Most of these factors are binary (yes/no) in nature and include information such as:

  o Project/thesis: This component is a binary factor and is indicated by a simple Y/N.

  o If the degree may be completed by taking an exam or other metric instead of a project/thesis. This component is also a binary factor and is indicated by a simple Y/N.

  o If an internship is required to complete the degree

    ▪ If internships are required, how many internships.

- Accreditation by an accrediting body. This includes overall accreditation by a division of the Higher Learning Commission or other, similar regional accrediting bodies. ATMAE or ABET accreditation were weighted higher than a normal accreditation. This indicator is a letter string representing the accreditation – ATMAE, ABET, HLC, etc. with a '0' for no accreditation.

- The curriculum for the technical (specialization) aspect of the degree was compared to the suggested criteria as well as to the rest of the sample population. This listing is comprised of 6 different topics of study within the field of Quality or Quality Systems. 5-S, Lean, Six-Sigma, TQM, ISO-9001, Auditing/Assessment.

  o If the curriculum is not listed on-line, the university/college was contacted to obtain the needed information.

- o If the name of a course was too vague, the course description was used as a

    reference for content clarification.

- Other information gathered: Other information was gathered for incidental, supporting

    facts. Such information included, but was not limited to:

    - o Whether a separate certificate in the quality field is offered.

    - o If the degree is offered only On-site (OS), On-line (OL) or both (OS/OL)

    - o Average length of time for a full-time student to complete the degree.

    - o Average length of time for a part-time student to complete the degree.

    - o The number of students currently enrolled and studying the quality

        track/specialization/concentration of the offered degree.

Data Examination

After the data was accumulated, disqualifications reduced the size of the sample used for

analysis. The analyses took the following form:

- This data has the degree name, e.g. Technology Management, Engineering, etc. Any

    degree having Quality in its primary name will be awarded 2 weight points; if quality

    appears in the secondary name – indicating a concentration, specialization, or focus – then

    1 rating point was awarded.

- The two academic year degree cost with three values: in-state, out-of-state, and any

    difference in on-line class fees. This data factor was further divided into Private and

    Public groups. The mean and standard deviation for each group was determined and the

    BGSU's place in relation to the public group was noted.

- Required credit-hours: Little variation was expected in this component. This criterion was

    also divided along public and private grouping lines. The mean and standard deviation was

determined and the MTM quality specialization's place in relation to the public group was noted. Programs falling within 1 standard deviation less than the group mean in required credit hours received 1 weight point. Those programs requiring greater than the group mean received zero (0) rating points, or -1 if more than 1 standard deviation greater than the mean.

- The curriculum for the technical (specialization) aspect of the degree was the most difficult and lengthy aspect to factor into the assessment. The task was to determine which quality topics are covered/taught within any given degree program's curriculum. Programs received one rating point for each identified topic that was covered. It was possible to receive a total of six rating points. Programs which did not include the major identified quality topics did not score as well in the rating process.

- Degree requirements: a project/thesis: This component is a binary factor and was indicated by a simple Y/N. More 'weight' was given to those degrees requiring a project, thesis, exam, or other capstone experience over those programs which do not have similar requirements. A 'Y' equated to 1 rating point; an 'N' was 0 rating points. Those programs which have the versatility of both exams and project/thesis received rating points for both.

- Accreditation: More weight was given to accredited programs. Programs whose institutions did not have any accreditations pertaining to the Master degree listed on their web sites did not receive any rating points. Institutions with an overall accreditation by a division of the Higher Learning Commission or other, similar regional accrediting body received one rating point. Other, non-technical accreditations received two rating points. Programs with ATMAE or ABET accreditations received three assessment rating points.

Each degree program was 'weighed' and placed in a numerical rating based on the program's aggregate rating points. The mean and standard deviation of the overall ratings was determined. The rating placement of BGSU's CoTAAE Quality Systems specialization in relation to the mean and standard deviation of each factor, as well as the overall, influenced the suggestions made concerning its competitive enhancement. The proposed data collection form can be viewed in appendix A.

Timeline for Project

	May 1st	Week 1	Week 2	Week 3	Week 4	June	June 5th	August 1st	August 9th
Proposal Approval	■								
Objective 1: Research		■							
Write-up			■			■			
Objective 2: Research		■	■						
Write-up:			■	■		■			
Objective 3: Research			■	■					
Write-up:				■	■	■			
Objective 4: Research				■	■				
Write-up:					■	■			
Graduation Application Deadline							■		
Deposit Thesis								■	
Submittal to Graduate College								■	
Commencement									■

Table 1: Timeline for Project

Summary

This section restated the project problem statement and objectives and also discussed and explained the basic investigative procedures to be used to achieve the research objectives. A basic timeline is included containing the proposed schedule.

CHAPTER 4: RESULTS

Overview

Chapter 4 presents the results that were derived from the data gained during the study of the university graduate degree program web-sites. The data gathered in the course of the study has been organized and descriptive statistics used to simplify and summarize the information.

Assessment Population

Using the ASQ's Programs in Quality web-page to identify Master programs suitable to include in the assessment, a number of things quickly became apparent. Most notably, the web-page information is not up-to-date. This is not the fault of the ASQ, but rather the universities listed. Some master programs have been discontinued. Undoubtedly, there are some master degrees involving quality that have been initiated that are not listed. The inaccuracy of some of the web-sites is expected and is one of the recognized limitations of the project. It is hoped that the numbers balance each other out.

The initial survey of the Programs in Quality web-pages identified 45 Masters Programs having quality as part of the curriculum. Investigation of those programs in the second and third reviews eliminated roughly 1/3 of the initially identified programs. The eliminations were due to a number of factors. Most often the program was eliminated because the criterion for inclusion - an identifiable, recognized focus, concentration or specialization in quality - was not satisfied. Not that courses were not offered that could be used to create such a focus, but the institution did not recognize the focus in the degree program. A few eliminations were due to the discontinuation or suspension of the quality focus within the offered degree program, or of the program itself. The final population for the assessment was 28 programs, including the MTM-QS at BGSU.

Objective #1

Assess how the MTM Quality System specialization compares with other institutions with regards

to:

Similar named degrees. This is a difficult aspect to determine. After all, in order to qualify

to be used in the assessment, the degree in question must have a focus, concentration or specialization

in quality. Seldom does the base degree have 'quality' in the name. Those universities that do have

quality in the base degree name gain 2 rating points in the assessment. If the specialization or

concentration is mentioned after the main degree then the university gains one assessment point.

Programs without quality in the primary or second (specialization) name gain zero assessment points.

	# of programs	Percentage of sample population
"Quality" in main degree name	5	.179
"Quality" in specialization degree name	14	.50
"Quality" not appearing in degree name	9	.321

Table 2: Program Name Assessment Statistics

The degree awarded at BGSU's College of Technology, Architecture and Applied Engineering

has a specialization in Quality. A specialization appears as a hyphenated code after the letter

designation of the degree and therefore the BGSU program gains one (1) assessment rating point for

the specialization appearing after the main degree. Referring to Table 2: Program Name Assessment

Statistics, the MTM-QS degree is one of 14, 50% of the assessment population, that have Quality in

the specialization degree name. There are five programs, almost 18%, with 'Quality' in the main

degree name, and nine programs, about 32%, without 'Quality' in either main or secondary/specialization degree name. Appendix C: Degree Names and Abbreviations contain the information pertinent to this part of the project: university name, state of location, name of college or school, and degree name abbreviations.

      Cost of the degree. Most institutions list their tuitions and fees by cost per credit hour. Other fees are then added - often on a per term (semester, quarter, etc.) basis. First the cost of a term of full time graduate school was determined. Then the standard cost per semester was then multiplied by four to estimate the cost of a two-year, full time graduate degree. For on-line degrees the cost per credit hour was simply multiplied by the number of credit hours required for the degree. Three values are calculated in this manner: the cost of tuition in-state; out-of-state; and on-line class fees. The minimum, maximum, median, mean and standard deviation for each value was determined and the position of BGSU's CoTAAE MTM quality specialization degree's place in relation to the value for public institutions was noted.

      Due to the fact that some of the universities are private and have higher tuition rates, the tuitions and fee data has been segregated along those lines. Eight of the twenty-eight universities in the assessment population are privately funded.

      In order to obtain a value which may be of use in the overall numerical weighting, the project uses the institution's program cost place in relation to the standard deviation. Those degrees whose costs fall with in the first standard deviation below the mean received 1 assessment point. Those degrees whose costs fall with in the first standard deviation above the mean will be penalized an assessment point. This method does not have zero (0) in the rating scale. The rationale will continue for each additional standard deviation value above or below the mean. Table 3: Tuition Statistics shows the resultant statistics for both public and private institution degree programs. It is interesting

to note that the private universities assessed as part of the project had no difference between in-state and out-of-state tuition.

Private	Tuition In-state	Tuition Out-of-state	Tuition On-line	Public	Tuition In-state	Tuition Out-of-state	Tuition On-line
Min.	$17,640.00	$17,640.00	$24,199.92		$4672.00	$10,440.00	$9570.00
Max.	$84,864.00	$84,864.00	$30,000.00		$45,876.00	$85,384.00	$48,150.00
Median	$33,240.00	$33,240.00	$26,475.00		$18,202.00	$35,952.00	$17,313.00
Mean	$40,667.01	$40,667.01	$26,787.48		$19,436.44	$38,246.05	$20,188.17
Std. Deviation	$20,840.95	$20,840.95	$2214.108		$9103.39	$15,636.95	$11,732.88
BGSU's MTM-QS	n/a	n/a	n/a		$17,504.00	$28,485.00	$14,487.00

Table 3: Tuition Statistics

For private universities, the minimum tuition and fee cost is at Marion University in Wisconsin; the maximum is paid at University of Miami in Florida. Only half of the private universities in the project population offer the quality focus degrees on-line. Of those private universities that do offer their quality focus degrees online, the National Graduate School of Quality Management is the least expensive and Lehigh University of Pennsylvania is the most expensive.

Publicly funded universities defray a sizeable percentage of the cost of higher education for in-state resident students. This is reflected in the difference of in-state and out-of-state tuitions and fees. The least expensive in-state tuition among the public university programs assessed is the University of Mayaguez in Puerto Rico; the most expensive is the University of Michigan. Out-of –state tuitions of public universities offering master degrees in quality are obviously higher. The highest out-of-state tuition of those programs studied in the project is, again, at the University of Michigan in Ann Arbor.

The least expensive out-of-state tuition of the universities studied in the project is at the University of California, Dominguez Hills. Dominguez Hills also has the least expensive on-line tuition. The most expensive on-line tuition of those programs in the project is at the University of Wisconsin, Madison.

Where tuition is concerned BGSU's MTM-QS degree program is less expensive than the mean in all three categories, placing in the first standard deviation range below the mean. As such, the MTM-QS program gains 3 rating points, one for each type of tuition assessed. Appendix D: Program Tuition Costs contains the statistics and derived data.

Required credit hours to complete the degree. Similar to the cost of the degree, the required number of credit hours has been separated into public and private subgroups, though this is due to an out-lying data point in a private institution degree program. The minimum, maximum, median, mean and standard deviation has been determined for each group and the position of BGSU's CoTAAE MTM quality specialization degree's place in relation to the public group was noted.

In order to obtain a value which may be used in the overall numerical weighting and rating, where the program's required number of credit hours, in relation to the mean, will be used. Unlike the other factors weighed, the credit hour rating will be slightly different. Due to the small range in data, those degrees whose required credit hours fall with in the first standard deviation below the mean will receive 1 assessment point. Those degrees whose required credit hours fall with in the first standard deviation above the mean will not be penalized an assessment point, receiving a 0 for that rating category. Those programs whose required credit hours fall more than one standard deviation above the mean will receive -1 assessment points. Table 4: Credit Hour Statistics lists the credit hour minimum, maximum, median, mean, and standard deviation for both private and public institution degrees in the assessment. BGSU's MTM-QS credit hour requirement is also listed.

The MTM-QS degree requires 33 credit hours to graduate. If it were measured in relation to the private institutions then it would be below the mean, and gain an assessment point. In relation to the degrees offered at public universities, however, it is in the first standard deviation range above the mean. No assessment points are awarded. More complete data can be found in Appendix E: Credit Hours Data and Statistics.

Credit Hours	Min.	Max.	Median	Mean	Standard Deviation	BGSU MTM-QS
Private: 8	30.00	56.00	36	33.8571429	3.48173074	n/a
Public: 20	30.00	36.00	31.5	32.1	2.38194967	33

Table 4: Credit Hour Statistics

Curriculum. The most difficult and time-consuming part of this aspect of the project was not developing the assessment, but determining if the individual degrees included the identified critical quality topics in the taught curriculum. The large majority of the time only the catalog course descriptions were available. Familiarity with quality material was essential in determining if the critical topics were being taught in a class. The study of quality is an ever-expanding field. For example, the Taguchi Method involves statistical methods relating to quality. Six-sigma also uses statistical methods but with a focus on reducing costs. Thus, if a course description indicates that the Taguchi methods are studied, it is NOT safe to assume that six-sigma will also be studied. I can only attribute 60% accuracy to the data used in this part of the assessment.

Viewing Table 5: Curriculum Statistics, the indications are that Lean, Six-sigma and TQM are widely studied in among the programs assessed as part of the project. Less widely studied are ISO-9000 and Auditing with slightly less than two-thirds of the assessed programs covering the topics in their curricula. The indications are that 5-S is included the least among the investigated program's

studied curriculum. An assessment rating point is awarded for each critical topic that is studied in

an investigated program. A total of six curriculum rating points may be awarded to an assessed

program.

Table 4: Curriculum Statistics also shows that the MTM-QS degree curriculum covers 5 out of

6 of the critical quality topics identified during the literature review. That translates into 5 assessment

rating points. The curriculum data recorded can be found in Appendix F: Curriculum.

Quality Topic	**5-S**	**Lean**	**Six-Sigma**	**TQM**	**ISO9000**	**Audit**
# of degrees covering the topic	8	25	26	23	16	18
Percentage of degrees covering the topic	0.286	0.893	0.929	0.821	0.571	0.643
BGSU MTM-QS	Y	Y	Y	Y	Y	N

Table 5: Curriculum Statistics

Other factors – Certificates, Degree Requirements, and Accreditation.   A certificate is

a short course of study in a single subject. It is also usually the least expensive type of academic

credential that a person can acquire. Certificates consist of courses that help you develop career

competency in a single subject. A certificate typically consists of from three to twelve courses, all

commonly completed within a year or a year-and-a-half of study (GetEducated, 2009).

If a graduate certificate in some aspect of quality is available to be earned at the institution, an

assessment rating point is awarded for that. Table 6: Certificates, Degree Requirements and

Accreditations reflects that the College of Technology, Architecture and Applied Engineering at

Bowling Green State University does offer a graduate certificate in Quality Systems. An assessment

rating point was awarded for offering the certificate.

For program degree requirements it was a simpler matter. If a project or thesis was required to be completed in order to receive the degree, then 1 assessment point was given. If an exam or other 'capstone' requirement was possible then an assessment point was awarded for that. If both were possible a point for each was awarded. Only 8 degree programs offer both methods – project/thesis and exam/other - of completing the degree. The MTM program at BGSU normally only offers the project/thesis option and so is not one of the eight programs receiving two assessment points.

Most universities are accredited to some degree or another. A majority of the time the accreditation is a regional accreditation from the Higher Learning Commission (HLC) or a similar accrediting body. Sometimes it is a more specific accreditation from a special accrediting body like ABET or ATMAE. If no accreditations can be found on the university or program web-site, then 0 assessment points are given. If a general accreditation, such as HLC, IHE, or CHE are indicated then 1 assessment point is attributed to the program. If it is a more specialized accreditation, but not ABET or ATMAE, then 2 assessment points are attributed to the program. If ABET or ATMAE is indicated, then 3 assessment points are awarded to the program.

	Certificates	Proj/Thesis	Exam/Other	Accreditation	Special/Advanced Accreditation
Total	17	17	12	20	5
Percentage of degrees positive in this criteria	0.607	0.607	0.429	0.714	0.179
BGSU MTM-QS	Y	Y	N	HLC	N

Table 6: Certificates, Degree Requirements and Accreditations

Table 6: Certificates, Degree Requirements and Accreditations shows the total number of programs assessed in this project which offer certificates, have a project or thesis requirement, allow

exams to fulfill their requirements, and are accredited. The percentage of the project program

assessment population which they represent is also given. Appendix G contains the information

dealing with certificates, degree requirements and accreditation. Appendix I: Assessment Project Data

Tabulation shows the ratings for all of these factors grouped together and shown as one number.

Miscellaneous data. Internships were another possible requirement that were investigated.

Although a number of institutions accept credit from internships to fulfill part of the requirements for

their degrees, none of them required that internships, specifically, be completed in order to receive the

degree. Whether or not a program accepted internship credit hours was not recorded, only the fact

that internships were not required. The MTM degree at BGSU does not require internships but does

allow credit hours based on internships to be included as part of the requirement to fulfill the MTM

degree. In some cases where internship credit hours were accepted, there were limitations on the

number, or percentage, of the degree requirements that could be fulfilled with internship credit hours.

	Average time to finish, months – Full time	Average time to finish, months – Part-time	# of Students Enrolled
Minimum	12	12	1
Maximum	30	66	410
Median	20.5	30	12
Mean	19.78	30.42	37.57
Standard Deviation	3.85	15.95	n/a
BGSU MTM-QS	21	39	11

Table 7: Average Completion Times and Number of Students

Another few items of interest are the average amount of time it takes for students, both full and part time, to complete the degrees. Although the response from the institutions was not 100%, it was approximately 79%, more than enough to calculate some basic statistics. Along with that comes the question of how many students are currently enrolled and studying at each institution.

Table 7: Average Completion Times and Number of Students shows the wide range of data associated with this type of data. Size of institution and its' location in relation to major population centers has a major impact on the values involved in these particular statistics. This data can be found in Appendix H: Average Completion Time and Students.

Overall Assessment Rating. When all the assessment rating points for each program are added together the resultant number is that quality program's assessment rating. Because it is possible to be awarded negative rating points, the low end of the scale, if a program were to somehow rate at the bottom of every assessment category, is -7. If a program were to rate at the top of every assessment category, receiving the maximum possible number of assessment points, that program would have 22 assessment rating points. Table 8: Overall Assessment Rating shows each program's rating with associated statistics at the bottom and the category scale at the top. The program with the highest rating score is ranked as number 1. The program with the lowest rating score is ranked at 28.

Those programs with the same rating score are each indicated by the range of rankings that the programs hold in the overall assessment. For example, there are four programs with an assessment rating score of 8. Those four programs hold the places of 16 through 19 in the overall rating and are each indicated by 16-19 in the ranking column of Table 8: Overall Assessment Rating.

Table 8: Overall Assessment Rating indicates that the program with the minimum assessment rating is the program at the University of Michigan, with -1. The program with the highest rating is, not surprisingly, the National Graduate School of Quality Management with an overall assessment rating of 14. The mean of the ratings is 8.5 with a standard deviation of 4.03.

University	Degree Name	Costs-IS	Costs-OS	Costs-OL	Credit Hours	Certs, Req's., Accred.	Curric.	Total	Ranking
Category Scale	0 - 2	-2 to 2	-2 to 2	-2 to 2	-1 to 2	0 - 6	0 - 6	-7 to 22	
U.of Alabama-Tuscaloosa	1	1	-1	1	1	4	1	8	16-19
Arizona, University of	1	-1	-1	n/a	1	4	4	8	16-19
Bowling Green State U.	1	1	1	1	0	3	5	12	6-9
Bradley University	0	1	1	n/a	2	5	3	12	6-9
Cal.State U., Dominguez Hills	2	1	2	1	0	2	5	13	2-5
Calumet College of St. Joseph	1	1	1	1	0	1	5	10	12-13
Eastern Illinois University	1	1	1	n/a	0	3	4	10	12-13
Eastern Michigan U.	2	-1	1	1	-1	2	4	8	16-19
Indiana State University	1	1	1	1	-1	4	6	13	2-5
Lehigh University	0	-1	-1	-2	2	2	5	5	22-23
Marian University	1	2	2	n/a	0	3	4	12	6-9
University of Mayaguez	1	2	2	n/a	1	3	4	13	2-5
University of Memphis	0	1	-1	n/a	-1	3	6	8	16-19
Miami, University of	0	-2	-2	n/a	-1	1	5	1	26-27
Michigan, University of	0	-2	-2	-2	1	1	3	-1	28
Michigan, U. of (Dearborn)	1	-1	1	-1	1	3	5	9	14-15
Nat.Grad.Sch.of Qual.Mgmt.	2	1	1	2	0	3	5	14	1
Ohio University	0	-1	1	1	1	1	3	6	21
Oklahoma State U.	0	1	1	1	1	4	3	11	10-11
Pennsylvania State U.	1	-2	-1	n/a	1	2	3	4	24-25
Rochester Institute of Tech.	0	-2	-2	-1	2	2	2	1	26-27
Rutgers University	2	-2	-2	n/a	1	3	3	5	22-23
San José State University	1	1	-1	n/a	1	3	4	9	14-15
Southern Polytechnic State U.	2	2	1	1	-1	2	6	13	2-5
St. Thomas, University of	0	1	1	n/a	-1	1	5	7	20
Texas Tech University	1	1	1	n/a	1	3	4	11	10-11
U. of W.-Madison (CQPI)	1	-1	-1	-2	1	2	4	4	24-25
U. of Wisconsin-Stout	1	1	1	1	0	3	5	12	6-9
							Minimum	-1	
							Maximum	14	
							Median	9	
							Mean	8.5	
							Standard Deviation	4.03	

Table 8: Overall Assessment Rating

The MTM-QS degree at BGSU has an assessment rating of 12 and shares the 6-9 rankings with the programs at Bradley University, Marian University, and the University of Wisconsin – Stout. An assessment rating of 12 is at the upper end of the first standard deviation above the mean. Using simple mathematics to determine the percentile rating:

$6/28 = 0.2143$ $\qquad$ $9/28 = 0.3214$

Both 6 and 9 are program ranking positions. Twenty-eight (28) is the number of programs in the population.

The calculations indicate that BGSU's MTM-QS degree, and those it shares the 6-9 ranking with, are between the 21st and 32nd percentile among the programs assessed by the project. That is within the top 1/3 of the assessed programs. Appendix I: Assessment Project Data Tabulation shows the ratings for all of these factors grouped together and shown as one number.

Objective #2

Suggest how the MTM Quality Systems specialization at BGSU's College of Technology, Architecture and Applied Engineering might be enhanced for competitive attractiveness.

From its overall assessment rating of 12, with the highest awarded assessment rating a 14, it's obvious that BGSU's MTM-QS degree is well situated to become more of a leader in the field of quality education. Already ranking in the top one-third of the programs assessed in the project the obvious opportunities for improvement are limited, and in some cases outside of the purview of the College to change. Recognizing those factors that cannot be easily or quickly changed, first, will assist in determining where helpful suggestions may be directed.

Degree Name. Degree name changes are determined and approved by the university's Board of Trustees. It is highly unlikely that the type and name of the degree will be changed. The MTM program currently offers a specialization in Quality Systems. That specialization has garnered the

program an assessment rating point with regards to its standing in the project. Short of changing the main degree name to somehow include 'Quality', this is not a factor that can be optimized at this time.

Tuition Costs. Tuition and most fees are determined at the University/state level. Although technology based courses often have an associated laboratory fee, it is on a course-by-course basis. Without some overall grant, endowment, or funding specifically associated with enrollment in the MTM-QS program, there is no way to reduce the costs of attaining the MTM-QS degree that does not affect the rest of the college and university. The current tuition and fees at BGSU are already favorable in relation to other public universities assessed as part of the project.

Credit Hours. The number of credit hours required for the MTM-QS degree has been reduced from 39 to 33 within the past two years. If full–time graduate student status is set at nine credit hours per semester, and the average graduate student takes that course-load every semester, then by the end of four semesters the average graduate student should have accrued 36 credit hours. With that, and all other requirements being fulfilled, the student should be eligible for graduation. Further reducing the number of credit hours, while possible, will not significantly increase the specialization's competitive attractiveness.

Certificates. The MTM program offers on-line certificates in the Quality Systems specialization. This was recognized as part of the assessment and, therefore, offers no immediate opportunities for competitive enhancement.

The remaining three factors assessed as part of the project can be adjusted to assist in increasing the competitive attractiveness of the MTM-QS degree. Those factors are: Degree Requirements, Accreditation, and Curriculum.

Degree Requirements. Presently the MTM degree at BGSU requires a Thesis or Project as a capstone experience to be awarded the degree. This requirement could be expanded to include the

option of taking a master's exam, instead of the thesis or project, to receive the degree. In terms of the assessment done by this project, it would increase the rating score by one (1) rating point. The increase in competitive attractiveness where prospective graduate students are concerned is difficult to gauge, but having the exam option would likely be attractive to non-traditional graduate students along with some distance learning students. Exam administering for on-line students does present some possible issues, but those would be ironed out in application. An exam used as a master degree requirement option should not be less than 4 hours in time-length.

Accreditation. Bowling Green State University is accredited by the Higher Learning Commission (HLC) and the undergraduate programs at the College of Technology, Architecture and Applied Engineering are accredited by ATMAE. Increasing the competitive attractiveness of the MTM-QS degree is possible in 2 manners.

1. Obtain ATMAE accreditation for the MTM degree. This is not unrealistic. The degree is already organized in a manner consistent with ATMAE methodology, and the college has undergraduate programs accredited by ATMAE making the accreditation process familiar.

2. Obtain some form of ABET accreditation. This competitive attractiveness increase would be a bit more difficult to achieve. ETAC-ABET does not accredit Master degrees. The degree, itself, would have to be either changed to an engineering degree so that it falls under the domain of ABET's engineering commission, the EAC, or somehow altered to fall within the realm of ABET's applied science commission, the ASAC.

A third possibility could be to get ABET to start accrediting Master degrees in Technology, but such a course of action is external as opposed to internal change. The college would still have to obtain the accreditation for the program. In either case, the attractiveness to prospective students

would be increased by accreditation from a more specialized accrediting body. The program's assessment rating for accreditation would also increase from one to three in such a case.

Curriculum. The range of ratings for program curricula assessed in the project was 1 to 6. Only one program was rated with a 1 and only three programs received all 6 rating points in the curriculum category. The MTM-QS program's curriculum assessment was favorable in five-out-of-six of the critical topic areas. Adjusting the coursework to include a section on auditing and/or assessment would maximize the curriculum category's assessment rating as well as better prepare students in an important part of increasing quality: measurement of the effectiveness of the quality effort.

Summary

This chapter has presented the data and analyses of the results from the project that was conducted to assess how the MTM Quality Systems specialization compares with similar degrees at other institutions, and to make suggestions to increase the competitive attractiveness of the degree in comparison to those other degrees.

CHAPTER 5: SUMMARY, OBSERVATIONS & COMMENTS

Overview

Due to the fact that the conclusions and recommendations were part of the project's second objective, and therefore discussed in the previous chapter, this chapter will be used to summarize, make observations, and make comments concerning the project.

Summary

The purpose of this project was to assess the Master of Technology Management degree, Quality Systems specialization, offered through the College of Technology, Architecture & Applied Engineering at Bowling Green State University in comparison to other, similar degrees offered throughout the United States and Canada. Two research objectives were formulated to address the project's purpose:

1. Assess how the MTM Quality System specialization compares with other institutions with regards to: degree names, degree cost, required credit hours, curriculum, and other factors such as degree requirements and accreditation.

2. Suggest how the MTM Quality Systems specialization at BGSU's College of Technology, Architecture and Applied Engineering might be enhanced for competitive attractiveness.

The outcomes of the research objectives will be briefly reviewed as part of this summary. Universities with programs having a quality focus were identified using the ASQ Quality Progress, Colleges and University Programs in Quality web-site. Information was gathered from the identified university program web sites. For some required information it was necessary to contact the university offering the program. The gathered data was converted into a numerical rating for each category of comparison. The numerical conversion also allowed for the compilation of an overall assessment

rating for each program in the assessment population.   There were 28 programs in the assessment population. The following information helps to summarize the results of the project.

- The overall assessment score scale was -7 to 22.

- The program assessment scores ranged from -1 to 14

- 28.5% of the 28 programs in the assessment population were offered by private institutions.

- BGSU's MTM-QS degree scored either positively or better than average (within the first standard deviation of the mean – above or below, whichever was deemed to be more beneficial) in all but one assessment category.

- BGSU's MTM-QS degree's overall assessment rating score of 12 was shared with 3 other programs, putting them in the $21^{st} – 32^{nd}$ percentile. Within the top third of the programs assessed.

- The College of Technology, Architecture and Applied Engineering can feasibly only make a direct difference in about half of the categories assessed.

- In the interests of competitive attractiveness, alterations were suggested it the following areas: Accreditation, Degree requirements, and Curriculum.

Observations

In the course of contacting the institutions for information concerning data on time-to-degree and number of students, it was observed that some institutions are rather wary of releasing any information concerning their programs. Such data is not protected by any privacy or confidentiality laws as it contains absolutely no personal information or data. It can only be presumed that those institutions were concerned that such information could be used to reflect negatively on them in comparison to other institutions.

Changing scales of some of the category ratings was considered. For example, allotting more rating points for the Curriculum category was considered. However, doing so would have altered the rating scale and the assessment score, but <u>would not</u> have significantly changed the program rankings. Only in changing the methodology in which the categories are scored or assessed would the rankings be affected. A maximum of six rating points in curriculum represents approximately 20% of the possible rating points in the assessment. Few graduate students review a program's actual curriculum before selecting a graduate program. There are many other factors that contribute to a student's graduate program choice. This project has sought to identify some of those factors.

Of the 28 programs in the project assessment population:

- 5 of the programs are Business/Applied Statistics degrees

- 6 of the programs are master of engineering or master of science in engineering degrees.

- The programs at Southern Polytechnic State University and California State University, Dominguez Hills, are completely on-line.

- Although the locations of the various institutions offering graduate degrees with a quality focus are relatively spread out, there are three states that each has three institutions with programs having a quality focus: California, Michigan and Wisconsin.

Comments

As this is the initial study comparing the numerous degrees which have a focus on Quality, it does have a number of short-comings and limitations. It also opens the door for more in-depth studies and projects to be conducted. The greatest room for further investigation is in the category of comparing the curriculum of study in the quality programs. Such an investigation would surely include a survey of some type, to be completed by faculty at the institution whose program was being

investigated as part of the study. In such a case there would likely be more than six quality topics compared.

Certainly, for a future project a different, or concurrent, method for identifying the programs to be used in the assessment population might yield a more complete representation of the institutions and programs that offer a graduate degree with a focus on quality. The Quality Progress tool was used as a convenience and to get a base-line sense of the depth of the field. During the data collection it was realized that the resource tool was in need of updating. Doing a quick on-line search for 'graduate degrees in quality' yields four immediate university program hits – one of which is not in the project's assessment population. GradSchools.com may be useful in the future to cross-check graduate programs for population inclusion.

Another item which might be of interest for further investigation, as an addition to the data on the number of students currently enrolled in each program, would be data on the number of students that have graduated from the quality course of study, to date. Inclusion of such data might also lead to ranking the programs by size and age.

Within the area of degree requirements it was noted that numerous institutions accepted credit hours from internships, and that those programs that did accept internship credit hours toward degree completion often had limitations on the number of credit hours that internships may count toward the degree requirements. A further project which included more precise data listing which institutions and programs accepted internship credit hours and how many are allowed to count toward the degree requirements would be interesting.

Summary

This chapter has served to wrap up the project report: summarizing and allowing a place for observations and comments. The project found that the Master of Technology Management, Quality Systems specialization degree offered at Bowling Green State University rates well against competing

degrees in quality but does have room for improvement. Areas of possible improvement were identified in accreditation, degree requirements and curriculum. The observation section made note of some miscellaneous facts associated with the project. The comment section served to suggest avenues of possible further investigation or improvement.

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Appendix A: Proposed Data Collection Form

University	State	College	Degree Name	MA/MS	Cost-IS	Cost-OS	Cost-OL	Credit Hours
BGSU	Ohio	CoTAAE	MTM	MS	?	?	?	33

Proj/Thesis	Accred.	Curric.-5S	Curric.-Lean	Curric.-6-Sig	Curric.-TQM	Curric.-ISO9K	Curric.-Audit	
Y	N	Y	Y	Y	Y	Y	N	

Appendix B: Information Request E-mail Body

Dear XXXX,

I am a graduate student at Bowling Green State University, Bowling Green, Ohio. My Graduate Project is an assessment of the Master of Technology Management - Quality Systems Specialization, offered here at BGSU's College of Technology, Architecture and Applied Engineering, compared to other degrees with a focus, concentration or specialization in Quality. According to your institution's web-site, the XXXX degree has a focus in an aspect of quality.

As part of completing my research I need only three small bits of information from you (or someone in your College)

1. Average length of time for a full-time student to complete the degree. (months)

2. Average length of time for a part-time student to complete the degree. (months)

3. Number of students currently (Spring 2014) enrolled and studying the quality focus aspect of your offered Graduate degree.

I greatly appreciate your prompt assistance in this matter. I look forward to receiving the information concerning your institution's degree.

Thank you.

Sincerely,

Alan Powers

Appendix C: Degree Names and Abbreviations

	University	State	College	Degree Name Abbr.
1	U.of Alabama-Tuscaloosa	AL	Manderson SoB	App.Stat.-Q&SS
2	Arizona, University of	AZ	Coll. Of Engineering	ME-Q&R
3	Bowling Green State U.	OH	CoTAAE	MTM-QS
4	Bradley University	IL	Caterpillar CoE&T	Ind.Eng-MM
5	Cal.State U., Dominguez Hills	CA	Coll.Ext&Internal'tEd	M.S.Qual. Assurance
6	Calumet College of St. Joseph	IN	Calumet College	MSM-QM
7	Eastern Illinois University	IL	Lumpkin Coll. Bus & AS	MST-QS
8	Eastern Michigan University	MI	CoT	MSQM/EM
9	Indiana State University	IN	CoT	MSTM
10	Lehigh University	PA	P.C. Rossin Coll. of E.& A.S.	MS/ME-MS&E/IS&E
11	Marian University	WI	Sch. of Bus.&Pub.Safety	MS-OL&Q
12	University of Mayaguez	PR	College of Engineering	ME-QCS
13	University of Memphis	TN	Herff Coll. of Eng.	MSET
14	Miami, U.of	FL	Sch. Of Bus-Admin	MBA-Mgmt Sci
15	Michigan, University of	MI	Michigan Engineering	MS-IOE
16	Michigan, U. of (Dearborn)	MI	Coll. of Eng & C.S.	MSE-ISE-QSD
17	Nat.Grad.Sch.of Qual.Mgmt.	CA	Grad. Sch. Qual. Mgmt.	Q.S. Mgmt
18	Ohio University	OH	Russ Coll. of Eng & Tech.	MS-I&SE
19	Oklahoma State University	OK	CoEA&T	MS-ETM/MIEM
20	Pennsylvania State University	PA	Coll. of Eng.	MS-QE
21	Rochester Institute of Tech.	NY	CQAS	MS-AS
22	Rutgers University	NJ	Sch. of Eng.	Qual & Rel. Eng.
23	San José State University	CA	CWD, Coll. of Eng.	ISE-P&QA
24	Southern Polytechnic State U.	GA	Dept.Ind.Eng.Tech.	MSQA
25	St. Thomas, University of	MN	School of Eng.	MSMS
26	Texas Tech University	TX	Whitacre Coll. of Eng.	MSIE-M&QA
27	U. of W.-Madison (CQPI)	WI	College of Engineering	MS-ISE-QE
28	U. of Wisconsin-Stout	WI	Coll.of Sci-Tech-Eng&Math	MS-O&SM-QM

Appendix D: Program Tuition Costs

University	Degree Name	MA/MS	Cost-IS	Cost-OS	Cost-OL
Bradley University	Ind.Eng-MM	MS	29160.00	29160.00	0.00
Calumet College of St. Joseph	MSM-QM	MS	25380.00	25380.00	25380.00
Lehigh University	MS/ME-MS&E/IS&E	MS	48240.00	48240.00	30000.00
Marian University	MS-OL&Q	MS	17640.00	17640.00	0.00
Miami, U.of	MBA-Mgmt Sci	MBA	84864.00	84864.00	0.00
Nat.Grad.Sch.of Qual.Mgmt.	Q.S. Mgmt	MS	24700.04	24700.04	24199.92
Rochester Institute of Tech.	MS-AS	MS	58032.00	58032.00	27570.00
St. Thomas, University of	MSMS	MS	37320.00	37320.00	0.00
U.of Alabama-Tuscaloosa	App.Stat.-Q&SS	MS	18900.00	47900.00	10200.00
Arizona, University of	ME-Q&R	ME	23047.40	48943.40	0.00
Bowling Green State U.	MTM-QS	MTM	17504.00	28485.00	14487.00
Cal.State U., Dominguez Hills	Qual. Assurance	MS	10440.00	10440.00	9570.00
Eastern Illinois University	MST-QS	MS	13332.84	26868.84	0.00
Eastern Michigan University	MSQM/EM	MS	21177.20	37465.40	18300.60
Indiana State University	MSTM	MS	13428.00	26388.00	16776.00
University of Mayaguez	ME-QCS	ME	4672.00	17954.24	0.00
University of Memphis	MSET	MS	19120.00	41476.00	0.00
Michigan, University of	MS-IOE	MS	45876.00	85384.00	41160.00
Michigan, U. of (Dearborn)	MSE-ISE-QSD	MS	19792.00	36432.00	23852.00
Ohio University	MS-I&SE	MS	19488.00	35472.00	18750.00
Oklahoma State University	MS-ETM/MIEM	MS	14041.80	33841.80	12254.40
Pennsylvania State University	MS-QE	MS	30748.00	50440.00	0.00
Rutgers University	Qual & Rel. Eng.	MS	34416.00	54720.00	0.00
San José State University	ISE-P&QA	MS	17498.00	41306.00	0.00
Southern Polytechnic State U.	Qual. Assurance	MS	9744.00	31416.00	10908.00
Texas Tech University	MSIE-M&QA	MS	14429.12	27461.12	0.00
U. of W.-Madison (CQPI)	MS-ISE-QE	MS	25975.36	52629.12	48150.00
U. of Wisconsin-Stout	MS-O&SM-QM	MS	15099.12	29898.00	17850.00
	Private	Mean	40667.01	40667.01	26787.48
		Std.Dev	20840.95	20840.95	2214.11
		Median	33240.00	33240.00	26475.00
		Rnge-Min	17640.00	17640.00	24199.92
		Rnge-Max	84864.00	84864.00	30000.00
	Public	Mean	19436.44	38246.05	20188.17
		Std.Dev	9103.39	15636.95	11732.88
		Median	18202.00	35952.00	17313.00
		Rnge-Min	4672.00	10440.00	9570.00
		Rnge-Max	45876.00	85384.00	48150.00

Appendix E: Credit Hours Data and Statistics

	University	State	Degree Name	Credit Hours
Private	Bradley University	IL	Ind.Eng.-MM	30
	Calumet College of St. Joseph	IN	MSM-QM	36
	Lehigh University	PA	MS/ME-MS&E/IS&E	30
	Marian University	WI	MS-OL&Q	36
	Miami, U.of	FL	MBA-Mgmt Sci	56
	Nat.Grad.Sch.of Qual.Mgmt.	CA	Q.S. Mgmt	36
	Rochester Institute of Tech.	NY	MS-AS	30
	St. Thomas, University of	MN	MSMS	39
Public	U.of Alabama-Tuscaloosa	AL	App.Stat.-Q&SS	30
	Arizona, University of	AZ	ME-Q&R	31
	Bowling Green State U.	OH	MTM-QS	33
	Cal.State U., Dominguez Hills	CA	Qual. Assurance	33
	Eastern Illinois University	IL	MST-QS	33
	Eastern Michigan University	MI	MSQM/EM	36
	Indiana State University	IN	MSTM	36
	University of Mayaguez	PR	ME-QCS	30
	University of Memphis	TN	MSET	36
	Michigan, University of	MI	MS-IOE	30
	Michigan, U. of (Dearborn)	MI	MSE-ISE-QSD	30
	Ohio University	OH	MS-I&SE	30
	Oklahoma State University	OK	MS-ETM/MIEM	32
	Pennsylvania State University	PA	MS-QE	32
	Rutgers University	NJ	Qual. & Rel. Eng.	30
	San José State University	CA	ISE-P&QA	30
	Southern Polytechnic State U.	GA	Qual. Assurance	36
	Texas Tech University	TX	MSIE-M&QA	30
	U. of W.-Madison (CQPI)	WI	MS-ISE-QE	30
	U. of Wisconsin-Stout	WI	MS-O&SM-QM	34
			Private - Mean	33.8571429
			Std. Deviation	3.48173074
			Range Minimum	30.00
			Range Maximum	56.00
			Public - Mean	32.1
			Std. Deviation	2.38194967
			Range Minimum	30.00
			Range Maximum	36.00

Appendix F: Curriculum

University	Degree Name	5-S	Lean	6-Sig	TQM	ISO9K	Audit
U.of Alabama-Tuscaloosa	App.Stat.-Q&SS	N	N	Y	N	N	N
Arizona, University of	ME-Q&R	N	Y	Y	Y	Y	N
Bowling Green State U.	MTM-QS	Y	Y	Y	Y	Y	N
Bradley University	Ind.Eng-MM	N	Y	Y	N	N	Y
Cal.State, Dominguez Hills	Qual. Assurance	N	Y	Y	Y	Y	Y
Calumet College of St. Joseph	MSM-QM	N	Y	Y	Y	Y	Y
Eastern Illinois University	MST-QS	N	Y	Y	Y	Y	N
Eastern Michigan University	MSQM/EM	N	Y	Y	Y	N	Y
Indiana State University	MSTM	Y	Y	Y	Y	Y	Y
Lehigh University	MS/ME-MS&E/IS&E	N	Y	Y	Y	Y	Y
Marian University	MS-OL&Q	Y	Y	N	Y	N	Y
University of Mayaguez	ME-QCS	N	Y	Y	Y	N	Y
University of Memphis	MSET	Y	Y	Y	Y	Y	Y
Miami, U.of	MBA-Mgmt Sci	Y	Y	Y	Y	Y	N
Michigan, University of	MS-IOE	N	N	N	Y	Y	Y
Michigan, U. of (Dearborn)	MSE-ISE-QSD	N	Y	Y	Y	Y	Y
Nat.Grad.Sch.of Qual.Mgmt.	Q.S. Mgmt	Y	Y	Y	Y	N	Y
Ohio University	MS-I&SE	N	Y	Y	Y	N	N
Oklahoma State University	MS-ETM/MIEM	N	Y	Y	Y	N	N
Pennsylvania State U.	MS-QE	N	Y	Y	N	N	Y
Rochester Institute of Tech.	MS-AS	N	Y	Y	N	N	N
Rutgers University	Qual & Rel. Eng.	N	Y	Y	Y	N	N
San José State University	ISE-P&QA	Y	Y	Y	N	Y	N
Southern Polytech State U.	Qual. Assurance	Y	Y	Y	Y	Y	Y
St. Thomas, University of	MSMS	N	Y	Y	Y	Y	Y
Texas Tech University	MSIE-M&QA	N	Y	Y	Y	N	Y
U. of W.-Madison (CQPI)	MS-ISE-QE	N	N	Y	Y	Y	Y
U. of Wisconsin-Stout	MS-O&SM-QM	N	Y	Y	Y	Y	Y
		8	25	26	23	16	18

Appendix G: Certificates, Degree Requirements, and Accreditation

University	College	Degree Name	Certs	Proj/Thesis	Exam	Accred.
U.of Alabama-Tuscaloosa	Manderson SoB	App.Stat.-Q&SS	Y	N	Y	AACSB
Arizona, University of	Coll. Of Engineering	ME-Q&R	N	N	Y	ABET
Bowling Green State U.	CoTAAE	MTM-QS	Y	Y/N	N	HLC
Bradley University	Caterpillar CoE&T	Ind.Eng-MM	N	Y/N	Y	ABET
Cal.State U., Dominguez Hills	Coll.Ext&Internal'tEd	Qual. Assurance	Y	Y	N	0
Calumet College of St. Joseph	Calumet College	MSM-QM	N	N	N	HLC
Eastern Illinois University	Lumpkin Coll. Bus & AS	MST-QS	Y	Y	Y	0
Eastern Michigan University	CoT	MSQM/EM	Y	Y	N	0
Indiana State University	CoT	MSTM	Y	Y	Y	HLC
Lehigh University	P.C. Rossin Coll. of E.& A.S.	MS/ME-MS&E/IS&E	Y	Y/N	N	0
Marian University	Sch. of Bus.&Pub.Safety	MS-OL&Q	N	Y	N	IACBE
University of Mayaguez	College of Engineering	ME-QCS	N	Y	Y	CHE
University of Memphis	Herff Coll. of Eng.	MSET	Y	Y	N	SACS
Miami, U.of	Sch. Of Bus-Admin	MBA-Mgmt Sci	N	N	N	SACS
Michigan, University of	Michigan Engineering	MS-IOE	Y	N	N	0
Michigan, U. of (Dearborn)	Coll. of Eng & C.S.	MSE-ISE-QSD	Y	N	Y	HLC
Nat.Grad.Sch.of Qual.Mgmt.	Grad. Sch. Qual. Mgmt.	Q.S. Mgmt	Y	N	Y	IHE
Ohio University	Russ Coll. of Eng & Tech.	MS-I&SE	N	Y	N	0
Oklahoma State U.	CoEA&T	MS-ETM/MIEM	Y	Y	Y	HLC
Pennsylvania State University	Coll. of Eng.	MS-QE	N	Y	N	CHE
Rochester Institute of Tech.	CQAS	MS-AS	Y	Y	N	0
Rutgers University	Sch. of Eng.	Qual & Rel. Eng.	N	Y	Y	CHE
San José State University	CWD, Coll. of Eng.	ISE-P&QA	Y	Y	Y	0
Southern Polytechnic State U.	Dept.Ind.Eng.Tech.	Qual. Assurance	Y	N	N	SACS
St. Thomas, University of	School of Eng.	MSMS	N	N	N	HLC
Texas Tech University	Whitacre Coll. of Eng.	MSIE-M&QA	N	Y	Y	SACS
U. of W.-Madison (CQPI)	College of Engineering	MS-ISE-QE	Y	N	N	HLC
U. of Wisconsin-Stout	Coll.of Sci-Tech-Eng&Math	MS-O&SM-QM	Y	N	N	ACBSP

Appendix H: Average Completion Time and Students

University	College	Degree Name	FT-Avg Finish	PT-Avg Finish	# Stud-Enrld
Bradley University	Caterpillar CoE&T	Ind.Eng-MM	-	-	-
Calumet College of St. Joseph	Calumet College	MSM-QM	21	21	1
Lehigh University	P.C. Rossin Coll. of E.& A.S.	MS/ME-MS&E/IS&E	21	0	4
Marian University	Sch. of Bus.&Pub.Safety	MS-OL&Q	20	20	53
Miami, U.of	Sch. Of Bus-Admin	MBA-Mgmt Sci	-	-	-
Nat.Grad.Sch.of Qual.Mgmt.	Grad. Sch. Qual. Mgmt.	Q.S. Mgmt	n/a	12	35
Rochester Institute of Tech.	CQAS	MS-AS	18	n/a	20
St. Thomas, University of	School of Eng.	MSMS	-	-	-
U.of Alabama-Tuscaloosa	Manderson SoB	App.Stat.-Q&SS	15	24	1
Arizona, University of	Coll. Of Engineering	ME-Q&R	21	42	5
Bowling Green State U.	CoTAAE	MTM-QS	21	39	11
Cal.State U., Dominguez Hills	Coll.Ext&Internal'tEd	Qual. Assurance	n/a	43	410
Eastern Illinois University	Lumpkin Coll. Bus & AS	MST-QS	18	28	2
Eastern Michigan University	CoT	MSQM/EM	n/a	36	80
Indiana State University	CoT	MSTM	-	-	-
University of Mayaguez	College of Engineering	ME-QCS	30	56	5
University of Memphis	Herff Coll. of Eng.	MSET	18	28	15
Michigan, University of	Michigan Engineering	MS-IOE	12	36	30
Michigan, U. of (Dearborn)	Coll. of Eng & C.S.	MSE-ISE-QSD	16	28	12
Ohio University	Russ Coll. of Eng & Tech.	MS-I&SE	24	42	35
Oklahoma State University	CoEA&T	MS-ETM/MIEM	21	33	5
Pennsylvania State University	Coll. of Eng.	MS-QE	-	-	-
Rutgers University	Sch. of Eng.	Qual & Rel. Eng.	21	0	12
San José State University	CWD, Coll. of Eng.	ISE-P&QA	18	36	50
Southern Polytechnic State U.	Dept.Ind.Eng.Tech.	Qual. Assurance	17	30	70
Texas Tech University	Whitacre Coll. of Eng.	MSIE-M&QA	-	-	-
U. of W.-Madison (CQPI)	College of Engineering	MS-ISE-QE	24	n/a	2
U. of Wisconsin-Stout	Coll.of Sci-Tech-Eng&Math	MS-O&SM-QM	21	66	6
		Mean:	19.78	32.11	39.05

Appendix I: Assessment Project Data Tabulation

University	Degree Name	Costs-IS	Costs-OS	Costs-OL	Credit Hours	Certs, Proj/Exam Accred.	Curriculum	Total
U.of Alabama-Tuscaloosa	1	1	-1	1	1	4	1	8
Arizona, University of	1	-1	-1	n/a	1	4	4	8
Bowling Green State U.	1	1	1	1	0	3	5	12
Bradley University	0	1	1	n/a	2	5	3	12
Cal.State, Dominguez Hills	2	1	2	1	0	2	5	13
Calumet Coll. of St. Joseph	1	1	1	1	0	1	5	10
Eastern Illinois University	1	1	1	n/a	0	3	4	10
Eastern Michigan U.	2	-1	1	1	-1	2	4	8
Indiana State University	1	1	1	1	-1	4	6	13
Lehigh University	0	-1	-1	-2	2	2	5	5
Marian University	1	2	2	n/a	0	3	4	12
University of Mayaguez	1	2	2	n/a	1	3	4	13
University of Memphis	0	1	-1	n/a	-1	3	6	8
Miami, U.of	0	-2	-2	n/a	-1	1	5	1
Michigan, University of	0	-2	-2	-2	1	1	3	-1
Michigan, U. of (Dearborn)	1	-1	1	-1	1	3	5	9
Nat.Grad.Sch.of Qual.Mgmt.	2	1	1	2	0	3	5	14
Ohio University	0	-1	1	1	1	1	3	6
Oklahoma State University	0	1	1	1	1	4	3	11
Pennsylvania State U.	1	-2	-1	n/a	1	2	3	4
Rochester Institute of Tech.	0	-2	-2	-1	2	2	2	1
Rutgers University	2	-2	-2	n/a	1	3	3	5
San José State University	1	1	-1	n/a	1	3	4	9
Southern Polytechnic State	2	2	1	1	-1	2	6	13
St. Thomas, University of	0	1	1	n/a	-1	1	5	7
Texas Tech University	1	1	1	n/a	1	3	4	11
U. of W.-Madison (CQPI)	1	-1	-1	-2	1	2	4	4
U. of Wisconsin-Stout	1	1	1	1	0	3	5	12
						Mean	4.143	8.5
						Std. Deviaton	1.187	4.03
						Median	4	9